Operational Report

Wisconsin State Highway
2004
Maintenance, Traffic, and Operations Conditions

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Compass Advisory Team

Mike Burns, WisDOT District 2
John Corbin, WisDOT Highway Operations
Bruce Fredrickson, WisDOT District 4
Brian Gaber, WisDOT District 7
Bob Hanifl, WisDOT District 5
Todd Hogan, WisDOT District 1
John Kinar, WisDOT Highway Operations
Gary Kennedy, Manitowoc County
Alison S. Lebwohl, WisDOT Highway Operations
Joe Nestler, WisDOT State Highway Programs
Mike Ostrenga, WisDOT District 8
Scott Schnacky, WisDOT Highway Operations
Brett Wallace, WisDOT District 3
Tom Walther, Eau Claire County
Jack Yates, Marquette County

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Introduction and Overview

About this report

This report is intended for operations managers in WisDOT and partner organizations. It is issued annually to provide information on the condition of Wisconsin's state highways. The first section of this report provides an executive overview and has been issued separately to high-level decision-makers in WisDOT. Both documents are 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 already being used to help understand trends and conditions, prioritize resources, and set target future condition levels for our highway system. As we gather more information, 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 remember what data is *not* yet in this report when using it to make decisions. This report *includes* measures of traveled way, shoulders, drainage, roadsides, selected traffic devices, and selected aspects of winter. It *does not yet include* measures of preventive maintenance, bridges, operational services (like traveler information and incident management), electrified traffic assets (like signals and lighting), or relative information on winter performance.

Feedback on format, content, and other aspects of the report is welcome and should be sent to Alison S. Lebwohl at Alison.lebwohl@dot.state.wi.us or 608-266-8666.

Key observations

Field staff performance

- District and county highway operations staff cooperated to deliver on their promises to live within constrained funding.
- Targets are set annually by supervisors and managers – after the budget and winter expenditures are known – and provide a common set of priorities for the summer maintenance season. With a few notable exceptions (see Targets, p13), these targets were met.

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 (range of storms over the winter season).

Safety:

- 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.
- Hazardous debris on the shoulders received a feature grade of D. Keeping hazardous debris off the shoulders prevents it from being moved back into live traffic, and protects drivers of cars that may swerve or pull over onto the shoulder.
- Rutting on asphalt pavement received a feature grade of D. This critical safety deficiency can contribute to hydroplaning in summer, and icy pavement in the winter.
- Mowing for vision got a grade of D. This is one of only two features (the other is flumes) in which the feature ended up in a condition worse than targeted.

Traffic:

- Routine maintenance of both regulatory/warning signs and of other signs received D's. A higher rate of backlog for other signs (46%) than for regulatory/warning signs (36%) is a result of WisDOT policies that allocate all routine sign maintenance resources to regulatory/warning signs.

- Delineators and raised pavement markers both received a C, and their condition has declined since last year. Both are valued by drivers, and may offer opportunities to improve satisfaction.

Traveled way:

- Asphalt pavement received feature grades of C in longitudinal and transverse cracking. WisDOT engineers note that lack of funding for cost-effective routine maintenance like crack-filling and chip-sealing is keeping WisDOT from getting the full life from that pavement.
- Concrete pavements, with all features scoring a C or worse, are in worse shape than asphalt.
- All pavement features improved slightly or remained the same from last year to this year. This likely reflects expenditures made through the improvement program.
- Asphalt pavement scored high (A or B) on features that provide a smooth ride. Concrete pavement scored low (C or below) on features that provide a smooth ride.

Roadsides and drainage:

- Noxious weeds are becoming more prevalent statewide. Field staff reports that complaints about these three invasive plants are slowly increasing. Despite a state statute requiring that WisDOT control noxious weeds, lack of funding resulted in a policy shift last summer to stop spraying.
- Litter got a grade of D.
- Flumes received a C, the lowest grade among all the drainage features, and showed a notable decline in condition from last year to this year. Furthermore, this is one of only two features for which the feature ended up in a condition worse than targeted.

The environment: 2004 priorities and the public

A survey of the traveling public done in February 2004 told us the following:

- Overall, satisfaction with traveling the state highways is relatively high.
- The public believes WisDOT and its partners are doing well on keeping stop-lights and stop-signs visible; pavement clear of debris; and signs readable.
- Keeping roads clear of snow and ice is a priority for the traveling public. Though the public is not dissatisfied, improving service here could increase overall satisfaction.
- Drivers would like to feel safer while traveling the highways. They point to traffic speed, other drivers, and snow and ice removal as the three factors that would improve their safety.

The high satisfaction with readability of signs may indicate that national standards for signs could be refined. However, it may also indicate that public satisfaction reflects the readability of signs under daytime conditions, while national standards reflect readability under adverse conditions (wet, dark). The high satisfaction with keeping pavement clear of debris likely indicates that highway operations staff is doing a good job with the traveled way, despite a substantial amount of hazardous debris on the shoulder.

Complete survey results are available on the WisDOT website at http://www.dot.wisconsin.gov/library/research/docs/finalreports/04-01customersatisfaction.pdf.

In keeping with these survey results, winter operations remained a priority for the $165 million highway operations budget. The 2003-2004 winter was more expensive than average, and left less money to address critical highway maintenance needs during the 2004 summer season. In addition, buying power declined in the face of rising labor and equipment costs and an increased number of lane miles.

Additional observations

Shoulders:

- Hazardous debris levels in District 1 are relatively high.
- Miles backlogged on unpaved drop-off is variable from district to district, showing a low of 24% in D6 and a high of 45% in D3. Paved cracking and unpaved cross-slope also show higher variability.

Roadsides:

- Roadside features may be the hardest to manage to their targets. There are a relatively high number of features above or below their targets.
- Fences, mowing, and noxious weed control are in better condition than targeted in most districts.

- Noxious weeds are widespread in District 1 and also beginning to appear in significant amounts in northern districts.
- Mowing for vision is significantly more backlogged in District 7 (78%) than elsewhere in the state (average backlog of 26%).
- Woody vegetation is somewhat more backlogged in D1 (14%) than the state average (4%).

Signs:

- We would need to replace over 40% of regulatory/warning signs on the state system this year to bring all our signs up to standard; and over 50% of other signs.
- Regulatory/warning signs are in better shape than other signs, with 63% of regulatory/warning signs within their service life, as compared to 54% of other signs. However, at least 18% of regulatory/warning signs out there are over five years beyond their recommended service life.
- All districts are performing above the target for emergency replacement of other signs.
- Some districts are in better shape than others. In District 7, over 40% of the regulatory/warning signs are over five years beyond their recommended service life. (Statewide, the average is 18%.) In District 5, over 30% are over five years beyond their recommended service life.

Traveled way:

- Cracking, faulting, and slab breakup received F's and D's.
- Most of the pavement that is backlogged is considered "fair" by WisDOT's pavement maintenance management system, rather than "moderate" or "bad." Asphalt is in better shape than concrete.
- Pavement improved across the board over last year. On average, pavement improved incrementally, but this conceals dramatic improvement in selected districts, particularly in longitudinal joint distress, longitudinal cracking and transverse cracking. Again, this can likely be attributed to investments made through the improvement program.

Data recommendations

Do research and develop standards

1. Develop routine and preventive maintenance standards for pavement, drainage and other features, so we can measure our stewardship of these assets and of the system generally.
2. Consider creating or refining deterioration curves, to help us refine predictions. This would be immediately helpful for signs, where national standards may not be appropriate for all signs.

Gather information

3. Look into getting inventory information on unpaved drop-off. It can be added to MetaManager and become a safety flag, part of budgeting and work-planning.
4. Complete SignView (the sign database). Field review of signs is progressing, most notably in District 8 and District 2. District 3 has 13% of its signs field reviewed, compared to 73% statewide.
5. Populate Marking View.
6. Complete development of Signal View.
7. Consider gathering output and inventory information, to help us estimate efficiency and extent.

Develop measures

8. Get basic measures and standards for missing pieces of the budget and services in the next year, however rudimentary. For example, traveler information, bridge maintenance, and signals.
9. Consider creating response time measures for some of these features. For example, guardrail repair or incident management.
10. Look into stratifying data by highway type for decision-making.
11. Keep an eye on what information might be lost when we combine districts to create regions.

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. When a feature is at an A, it does not mean that it has no deficiencies. It 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, litter. See the Compass website for details.
- *2004 targets.* Targets are set annually, after winter spending has been completed, and are intended to reflect priorities and goals for that 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 pavement and routine maintenance of signs. It uses sample data for all other assets, taken from August 15 to October 15, 2004. Analysis has been done to determine statistical significance for state- and district-level data. District 3's sign data is likely an unrepresentative sample and should not be used yet.

In order to include only unsealed cracking in traveled way, asphalt (alligator, block, transverse, and longitudinal), we have made a few simplifying assumptions about the ratio of sealed to unsealed cracking on the roadways. We will not need to do this in future reports. Pavement numbers may change slightly as a result of this.

Reporting and analysis on pavement, signs, and winter, as well as statistical analysis for all elements in this report, was done by Professor Teresa Adams at the University of Wisconsin, along with Emil Juni, Suphawut Malaikrisanachalee, and Lei Xu, under the direction of WisDOT staff.

Executive Overview Reports

Wisconsin 2004: Compass Report on Highway Maintenance and Traffic Conditions

Element	What are we spending?			Feature	How much of the system still needs work at the end of the maintenance season?										How well-maintained is the system?					This feature contributes primarily to:				
	Dollars spent[1] (in millions)				Condition change: last year to this year[2]	% of system backlogged									Feature grades									
						last year	2004																	
	↑↓	FY 03	FY 04				0	10	20	30	40	50	60	70	A	B	C	D	F	Critical safety	Safety/mobility	Ride/comfort	Stewardship	Aesthetics
Traveled way, asphalt	↑	20.3	21.1	Alligator cracking	--	2	**1**								×								✓	
				Block cracking	--	3	**3**								×								✓	
				Edge raveling	↑	15		**14**								×							✓	
				Flushing	--	1	**1**								×								✓	
				Longitudinal cracking	--	24			**23**								×						✓	
				Longitudinal distortion	--	1	**0**								×							✓		
				Patch deterioration	↑	12		**10**								×						✓		
				Rutting	--	10		**11**										×		✓				
				Surface raveling	--	3	**2**								×							✓		
				Transverse cracking	↑	25			**22**								×						✓	
				Transverse distortion	--	1	**1**								×							✓		
Traveled way, concrete	↓	3.7	3.2	Distressed joints/cracks	--	33				**33**								×				✓		
				Longitudinal joint distress	↑	26			**22**								×					✓		
				Patch deterioration	↑	29			**28**								×					✓		
				Slab breakup	↑	47					**46**							×				✓		
				Surface distress	↑	23			**21**								×						✓	
				Transverse faulting	↑	77								**75**					×			✓		
Traffic & safety (selected)	↓	17.8	16.9	Centerline markings	--	6	**5**									×				✓				
				Edgeline markings	↑	11	**7**									×					✓			
				Delineators	↓	19			**21**								×				✓			
				Other signs (emergency repair)	↑	2	**0**								×						✓			
				Other signs (routine)		n/a[3]					**46**							×				✓		

[1] Dollars not adjusted for inflation.
[2] Arrows indicate a statistically valid change of more than 1 percentage point 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.
[3] This is the first year with inventory data on routine maintenance of other signs and regulatory/warning signs. Therefore, we do not have a score for last year. Pavement data is compared to 2002.

Element	What are we spending?			Feature	How much of the system still needs work at the end of the maintenance season?											How well-maintained is the system?					This feature contributes primarily to:				
	Dollars spent[1] (in millions)				Condition change: last year to this year[2]	% of system backlogged										Feature grades									
						last year	2004																		
	↑↓	FY 03	FY 04				0	10	20	30	40	50	60	70		A	B	C	D	F	Critical safety	Safety/mobility	Ride/comfort	Stewardship	Aesthetics
				Protective barriers	↑↑	18	**3**									×						✓			
				Raised pavement markers	↓	11		**15**										×				✓			
				Reg./warning signs (emergency)	↑	6	**1**									×					✓				
				Reg./warning signs (routine)		n/a				**36**									×			✓			
				Special pavement markings	--	15		**13**										×				✓			
Shoulders				Hazardous debris	↓	9		**13**											×		✓				
				Cracking (paved)	↓	46						**51**							×					✓	
				Cross slope (paved)	--	0	**0**									×								✓	
	↓	9.3	8.2	Drop-off/build-up (paved)	--	11	**9**										×						✓		
				Potholes/raveling (paved)	--	7	**5**									×							✓		
				Cross-slope (unpaved)	--	14		**15**									×						✓		
				Drop-off/build-up (unpaved)	--	45				**37**										×		✓			
				Erosion (unpaved)	--	3	**3**									×								✓	
Drainage				Culverts	--	14		**17**									×							✓	
				Curb & gutter	↑	8	**6**									×								✓	
				Ditches	--	2	**2**									×								✓	
	--	6.5	6.5	Flumes	↓	20				**32**								×						✓	
				Storm sewer system	--	8	**9**										×							✓	
				Under-drains/edge-drains	--	15		**14**									×							✓	
Roadsides				Barriers	n/a[4]	2																		✓	
				Fences	↑↑	14	**4**									×						✓			
				Litter	↓	67									**70**				×						✓
				Mowing		n/a[5]					**40**							×				✓			
	↓	23.4	19.4	Mowing for vision		n/a			**26**										×			✓			
				Noxious weeds	↓↓	19				**30**								×						✓	
				Woody vegetation	--	4	**4**									×						✓			
				Woody veg. control for vision	--	0	**1**									×						✓			

[4] There were not enough field observations of noise barriers and retaining walls to draw a statistically valid conclusion about their condition this year.
[5] Since the definition of mowing and mowing for vision have changed since last year, we cannot compare last year's score with this year's for either one.

Wisconsin 2003-2004: Compass Report on Winter Operations

These are summary measures from a report done by Professor Teresa Adams and Emil Juni of the University of Wisconsin, and by Alison S. Lebwohl of WisDOT, under the direction of the Compass Winter Standards Team.

The full text of the report is available later in this document, on page 40. A link to the 2003-2004 Annual Winter Maintenance Report – which offers much more operational detail – can be found on the reports page of the Compass website, referenced earlier in this document. Winter maintenance reports from this and past years can also be accessed directly at the winter reports home page (http://dotnet/dtid_bho/extranet/winter/reports/index.htm from inside WisDOT or https://trust.dot.state.wi.us/extntgtwy/dtid_bho/extranet/winter/reports/index.htm from outside WisDOT).

Highway Operations has reported winter performance measures for many years through the Annual Winter Maintenance Report and is now in the process of developing standards for those performance measures. As those are developed, this report will include measures of how we are meeting expectations.

Statewide measures for winter 2003-2004

Public satisfaction with winter operations	**7.5** on a scale of 1 (low) to 10 (high)
Time to bare/wet pavement	**2 hrs 38 mins** after the storm ended
Cost per lane mile	**$1,279**
Winter severity index	**31.2**

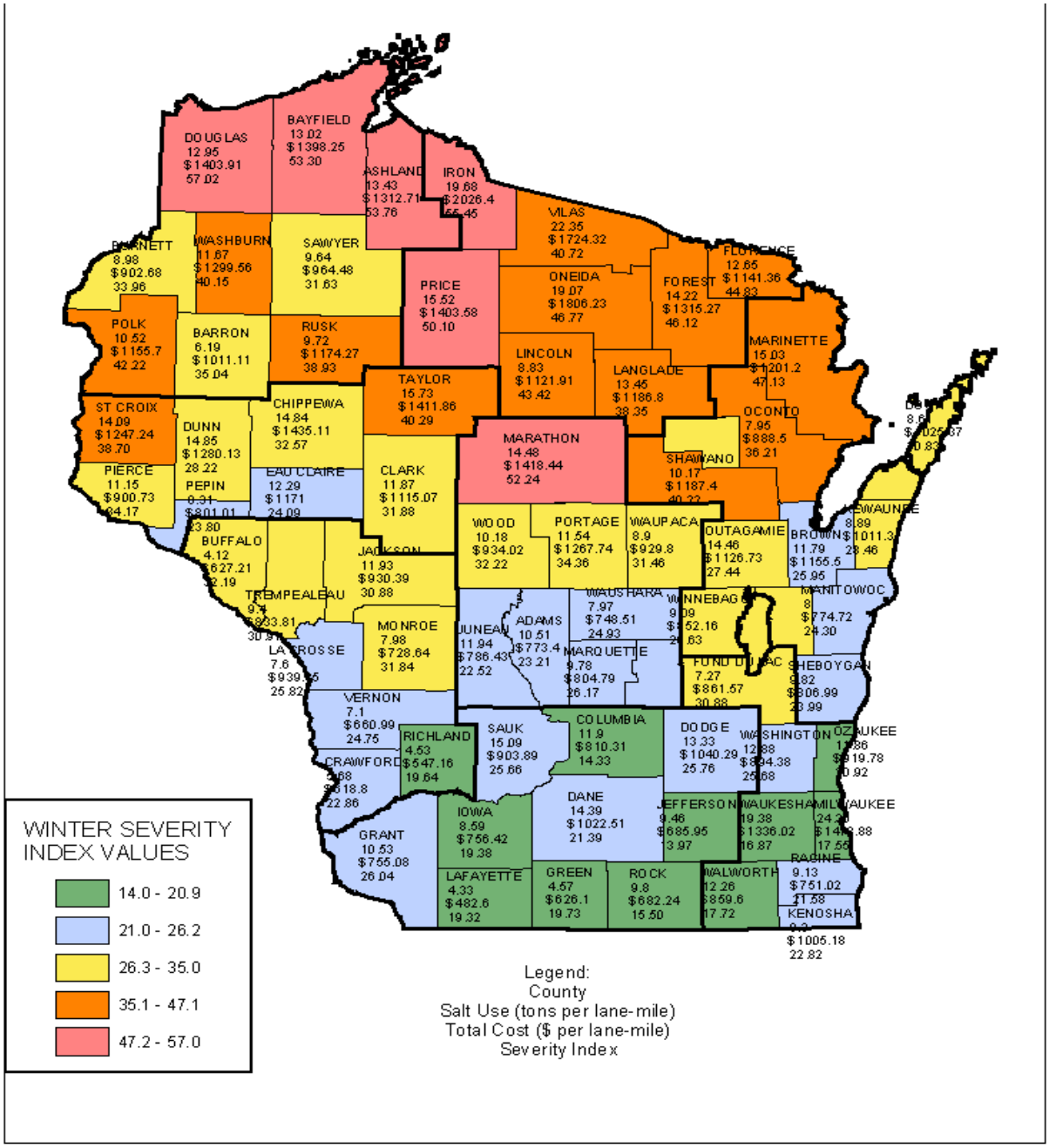
Key findings

- Public satisfaction with WisDOT's winter operations has remained relatively high and steady over time.
- 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 (range of storms over the winter season).
- As expected, cost per lane mile increases with the severity of the winter.

Winter by county

Note: The below map is in color. If you are not viewing a color copy, please email alison.lebwohl@dot.state.wi.us for a color version to be mailed or emailed to you.

Wisconsin's Winter Severity Index (WSI) is highly correlated with snowfall. Looking at the statewide winter severity numbers, the statewide average for '03/'04 was 31.2 and the previous five-year ('98/'99-'02/'03) average was 30.8. If you look at severity numbers by DOT districts for this year, the northern two-thirds of the state was "more severe" than normal while the southern one-third of the state was "less severe" than normal.



2003-2004 winter salt use, cost, and severity

Winter by the numbers

Infrastructure	Lane miles	31,429 miles
	Salt sheds	345
	Salt capacity goal	569,072 tons
	Salt capacity	500,704 tons 88% of goal
	Salt available at start of winter[1]	648,278 tons
	Road Weather Information System (RWIS) stations	58
Material usage[4]	Salt	390,664 tons 12.43 tons per lane mile
	Average cost of salt	$30.17 per ton
	Pre-wetting liquid used	556,949 gal.
	Anti-icing agent	286,212 gal.
	Sand	17,959 cubic yd.
Services	Regular county hours on winter[2]	129,089 hrs.
	Overtime county hours on winter	95,191 hrs.
	Public service announcements aired	6,664 total 6,006 radio; 658 TV
	Cost of public service announcements	$31,500
Management and technology	Snowplow sections	729
	Average patrol section length	43.11 miles
	Salt spreaders equipped with on-board pre-wetting unit[3]	572 of 2518 (23%)
	Counties with salt spreaders equipped with on-board pre-wetting unit	57 of 72 (79%)
	Salt spreaders equipped with ground-speed controller unit	1226 of 2518 (49%)
	Counties with salt spreaders equipped with ground-speed controller unit	69 of 72 (96%)
	Underbody plows	454
	Counties with underbody plows	47 of 72 (65%)
	Counties equipped to use anti-icing agents	63 of 72 (88%)
	Counties that used anti-icing agents during 2003-04 winter season	56 of 72 (78%)

[1] Total salt available includes early fill of salt sheds, seasonal fill of sheds, vendor reserve, and salt inventory remaining from the previous season.
[2] Costs and hours come from the storm report, and reflect sanding, salting, plowing and anti-icing efforts.
[3] County equipment may be used on either state or county roads.
[4] All material usage quantities are from the storm report except for salt. The salt quantities are from the Salt Inventory Reporting System.

How long after the storm stops will the pavement be bare/wet?

WisDOT provides different levels of effort during and after a storm depending on how busy and how critical a given category of highway is. The trend for average time to bare/wet pavement is as expected: The more critical the highway, the shorter the average time to bare/wet pavement. Further analysis suggests that variability, within a category, is due more to weather effects (range of storms throughout the winter season) than to differences in the level of effort or relative resources. See full report online for more information.

Time to bare/wet pavement is calculated from the reported end time of the storm. Bare/wet never achieved means that it took more than 24 hours to achieve bare/wet, or the next storm began before bare/wet was achieved.

Highway category		**Average time to bare/wet pavement** (hours after end of storm)*	Storms		
			Total	Bare/wet never achieved	**% Bare/wet never achieved**
More critical highways ↓ Less critical highways	1	1.07	174	1	1%
	2	1.31	332	29	9%
	3	1.52	491	25	5%
	4	2.45	507	76	15%
	5	3.63	678	151	22%

*Only includes storms where bare/wet pavement was achieved.

How satisfied is the public with highway snow and ice removal?

	Average Score			
Survey Question	2004	1999	1997	1996
"On a scale of 1-10 where 10 means extremely satisfied and 1 means not at all satisfied, how satisfied are you that the pavement is clear of snow and ice?"	7.5			
"On a scale of 1-10 where 10 is a very good job and 1 is a very poor job, and 5 is average, how well is WisDOT performing in clearing roads of snow and ice?"		7.6	7.4	7.5

What is the cost per lane mile relative to winter severity?

As severity of the winter increases, so does the cost per lane mile. Districts that incurred higher cost per lane mile had more severe weather than the statewide average, with the exception of District 2. The statewide average cost per lane mile was $1,279 with average severity index of 31.20. Total costs include material, labor, equipment, and administrative costs.

District	Average WSI	Actual cost/LM	Relative cost per WSI point
1	20.10	$1,020	$50.75
2	21.75	$1,369	$62.94
3	31.29	$1,343	$42.92
4	30.10	$1,286	$42.72
5	27.36	$868	$31.73
6	31.72	$1,452	$45.78
7	45.72	$1,737	$37.99
8	42.89	$1,411	$32.90
Statewide	31.20	$1,279	$40.99

Districts 2004: Compass Report on Highway Maintenance Conditions

		How much of the system needs work at the end of the season? *What did it cost to achieve this condition?*								
Element	Feature	District Percent of System Backlogged[1]								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**statewide**
Traveled way, asphalt	Alligator cracking	2	2	1	1	1	1	1	0	1%
	Block cracking	4	3	3	1	2	3	2	2	3%
	Edge raveling	18	21	12	13	18	10	10	6	14%
	Flushing	0	0	0	0	1	2	1	0	1%
	Longitudinal cracking	27	20	16	14	25	26	17	39	23%
	Longitudinal distortion	1	1	0	0	0	0	0	1	0%
	Patch deterioration	11	16	6	13	13	6	6	5	10%
	Rutting	15	4	7	10	11	12	10	18	11%
	Surface raveling	3	2	1	4	1	2	3	2	2%
	Transverse cracking	21	20	19	15	17	28	18	43	22%
	Transverse distortion	2	0	0	0	0	0	0	1	1%
	Dollars spent on traveled way, asphalt (in millions)	$3.1	$5.9	$1.7	$3.1	$2.6	$2.1	$1.3	$1.3	$21.1
Traveled way, concrete	Distressed joints/cracks	27	48	21	23	45	41	50	31	33%
	Longitudinal joint distress	12	39	12	12	36	29	30	25	22%
	Patch deterioration	26	38	23	28	31	29	21	16	28%
	Slab breakup	45	61	36	37	50	50	59	31	46%
	Surface distress	16	24	20	13	37	23	12	25	21%
	Transverse faulting	75	78	76	74	69	80	64	66	75%
	Dollars spent on traveled way, concrete (in millions)	$1.0	$0.7	$0.5	$0.1	$0.2	$0.5	$0.2	$0.02	$3.2
Traffic and safety (selected devices)	Centerline markings	3	2	4	4	7	3	1	18	5%
	Edgeline markings	4	5	8	3	6	3	16	18	6%
	Delineators	32	21	10	14	20	30	--	10	21%
	Other signs (emergency repair)	1	0	0	0	1	1	0	1	0%
	Other signs (routine)	53	34	--	45	49	41	68	49	46%
	Protective barriers	--	3	--	--	7	3	--	--	3%
	Raised pavement markers	12	29	3	--	--	--	--	--	15%
	Regulatory/warning signs (emergency)	2	1	0	1	0	1	1	0	1%

[1] -- Where there were fewer than 25 observations of a feature in a district, the score for that district is not shown.

Element	Feature	How much of the system needs work at the end of the season? *What did it cost to achieve this condition?* District Percent of System Backlogged[1]								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**statewide**
	Regulatory/warning signs (routine)	41	27	--	29	50	29	66	36	37%
	Special pavement markings	--	18	6	26	--	--	--	--	13%
	Dollars spent on traffic and safety (selected) (in millions)	$3.1	$5.3	$1.5	$1.6	$1.7	$1.6	$0.9	$1.2	$16.9
Shoulders	Hazardous debris	30	10	10	5	10	4	9	12	13%
	Cracking (paved)	53	63	59	44	31	56	36	56	51%
	Cross slope (paved)	1	1	0	0	1	0	0	0	0%
	Drop-off/build-up (paved)	10	8	15	7	2	8	2	19	9%
	Potholes/raveling (paved)	4	10	5	6	5	6	2	2	5%
	Cross-slope (unpaved)	28	10	13	8	11	7	18	15	15%
	Drop-off/build-up (unpaved)	44	39	45	33	25	24	32	43	37%
	Erosion (unpaved)	7	4	1	1	0	2	3	4	3%
	Dollars spent on shoulders (in millions)	$1.9	$1.5	$0.8	$0.8	$1.0	$1.0	$0.7	$0.6	$8.2
Drainage	Culverts	25	15	11	14	16	15	15	19	17%
	Curb & gutter	7	4	3	11	--	12	--	--	6%
	Ditches	6	1	1	2	1	0	2	2	2%
	Flumes	--	--	--	--	--	--	--	--	32%
	Storm sewer system	--	8	12	--	--	--	--	--	9%
	Under-drains/edge-drains	--	15	11	12	--	--	--	--	14%
	Dollars spent on drainage (in millions)	$1.0	$2.0	$0.6	$0.5	$0.6	$0.7	$0.5	$0.6	$6.5
Roadsides	Barriers	--	--	--	--	--	--	--	--	--
	Fences	11	0	--	--	--	--	--	--	4%
	Litter	77	68	73	77	73	69	53	62	70%
	Mowing	56	54	46	15	44	39	22	23	40%
	Mowing for vision	17	8	20	9	36	23	78	36	26%
	Noxious weeds	65	29	37	27	9	11	15	20	30%
	Woody vegetation control	14	1	2	2	5	0	1	5	4%
	Woody vegetation control for vision	1	1	1	0	1	0	3	0	1%
	Dollars spent on roadsides (in millions)	$4.3	$6.5	$2.1	$1.5	$1.9	$1.6	$0.7	$0.8	$19.4

2004 Targets:
Compass Report on Highway Maintenance Conditions

Targets are set annually, after winter spending has been completed, and are intended to reflect priorities and goals for that year. Targets are not long-term goals, but reflect fiscal constraints. They are set annually by operations supervisors and managers.

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:

- District and county highway operations staff cooperated to deliver on their promises to live within constrained funding.
- With a few notable exceptions, targets were met.
- Roadside features may be the hardest to manage to their targets. There are a relatively high number of these features above or below their targets.
- Fences, mowing, and noxious weed control are in better condition than targeted in most districts.
- Mowing for vision and flumes are the only two features in which the feature ended up in a condition worse than targeted.
- All districts are providing service above the target for emergency replacement of other signs.

Wisconsin 2004 Targets: 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.

		Statewide											Districts		
Element	Feature	Actual % backlog 2004	Target % backlog 2004	On target[1]	Gap if target missed[2]								Worse condition	On Target	Better condition
					Worse condition				Better condition						
					30	20	10			10	20	30			
Traveled way, asphalt	Alligator cracking	1	3	◎										All	
	Block cracking	3	5	◎										All	
	Edge raveling	14	15	◎									2	1 3 4 5 6 7	8
	Flushing	1	1	◎										All	
	Longitudinal cracking	23	21	◎									1 8	2 3 5 6 7	4
	Longitudinal distortion	0	0	◎										All	
	Patch deterioration	10	10	◎									2	1 3 4 5 6 7 8	
	Rutting	11	17						**6**					1 6 8	2 3 4 5 7
	Surface raveling	2	2	◎										All	
	Transverse cracking	22	24	◎									8	1 2 3 6	4 5 7
	Transverse distortion	1	5	◎										All	
Traveled way, concrete	Distressed joints/cracks	33	43							**10**			7	2 5 6	1 3 4 8
	Longitudinal joint distress	22	27	◎									2 5	6 7 8	1 3 4
	Patch deterioration	28	30	◎									2 7 8	1 4 5 6	3
	Slab breakup	46	44	◎									2 5 6 7	1	3 4 8
	Surface distress	21	25	◎									5	2 3 6 8	1 4 7
	Transverse faulting	75	80	◎										1 2 3 6	4 5 7 8
Traffic and safety devices (selected)	Centerline markings	5	6	◎									8	1 2 3 4 5 6 7	
	Edgeline markings	7	6	◎									7 8	1 2 3 4 5 6	
	Delineators	21	15	◎									1 6	2 3 4 5 7 8	
	Other signs (emergency repair)	0	15							**15**					All
	Other signs (routine)	46	n/a[3]												
	Protective barriers	3	9						**6**					7	1 2 3 4 5 6 8
	Raised pavement markers	15	14	◎									2	1 5 7 8	3 4 6

[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] Routine maintenance of other signs and regulatory/warning signs did not have targets for 2004, since this is the first year we have had data for these features.

		Statewide											Districts		
Element	Feature	Actual % backlog 2004	Target % backlog 2004	On target[1]	Gap if target missed[2]								Worse condition	On Target	Better condition
					Worse condition				Better condition						
					30	20	10			10	20	30			
	Regulatory/warning signs (emergency)	1	6	◎										All	
	Regulatory/warning signs (routine)	36	n/a												
	Special pavement markings	13	21	◎										2 4 5 8	1 3 6 7
Shoulders	Hazardous debris	13	6	◎									1	2 3 4 5 6 7 8	
	Cracking (paved)	51	50	◎									2	1 3 4 6 8	5 7
	Cross slope (paved)	0	0	◎										All	
	Drop-off/build-up (paved)	9	16	◎										1 2 3 4 6 8	5 7
	Potholes/raveling (paved)	5	12	◎										1 2 3 4 5 6	7 8
	Cross-slope (unpaved)	15	9	◎									1	2 3 4 5 6 7 8	
	Drop-off/build-up (unpaved)	37	34	◎										All	
	Erosion (unpaved)	3	8	◎										All	
Drainage	Culverts	17	13	◎										All	
	Curb & gutter	6	8	◎										1 2 3 4 6 7 8	5
	Ditches	2	2	◎										All	
	Flumes	32	14				**11**						3 7	1 2 4 5 6 8	
	Storm sewer system	9	8	◎										All	
	Under-drains/edge-drains	14	11	◎										All	
Roadsides	Barriers	n/a[4]	5												
	Fences	4	16							**12**					All
	Litter	70	71	◎										1 2 3 4 5 6 8	7
	Mowing	40	58							**16**				1 2	3 4 5 6 7 8
	Mowing for vision	26	5				**19**						1 3 5 6 7 8	2 4	
	Noxious weeds	30	48							**16**			1	2 3	4 5 6 7 8
	Woody vegetation control	4	7	◎										1 2 3 4 5 7 8	6
	Woody vegetation control for vision	1	5	◎										All	

[4] There were not enough field observations of noise barriers and retaining walls to draw a statistically valid conclusion about their condition this year.

2004 Signs:
Compass Report on Condition and Age Distribution

Data in this section comes from the Sign Inventory Management System (SIMS). Reporting and analysis were done by Professor Teresa Adams of the University of Wisconsin, with Project Assistant Suphawut Malaikrisanachalee, under the direction of WisDOT staff. This section covers only routine maintenance, not emergency replacement of knock-downs and related work. Information on emergency management of signs is available on pages 6,7, and 11 of this report.

Key Observations:

Routine maintenance

- Routine maintenance of both regulatory/warning signs and of other signs have high numbers of signs backlogged, or beyond their recommended service life. A higher rate of backlog for other signs (46%) than for regulatory/warning signs (36%) is a result of WisDOT policies that allocate all routine sign maintenance resources to regulatory/warning signs.
- WisDOT would need to replace over 40% of regulatory/warning signs on the state system this year to bring all signs up to standard; and over 50% of other signs.
- Regulatory/warning signs are in better shape than other signs, with 63% of regulatory/warning signs within their service life, as compared to 54% of other signs. However, at least 18% of regulatory/warning signs out there are over five years beyond their recommended service life.
- Some districts are in better shape than others. In District 7, over 40% of the regulatory/warning signs are over five years beyond their recommended service life. (Statewide, the average is 18%.) In District 5, over 30% are over five years beyond their recommended service life.

Customer satisfaction

- A survey of the traveling public done in February 2004 told WisDOT that the public believes WisDOT and its partners are doing well on keeping signs readable. Complete survey results are available on the WisDOT website at http://www.dot.wisconsin.gov/library/research/docs/finalreports/04-01customersatisfaction.pdf.
- Given the low grade for routine maintenance of signs, the high satisfaction with readability of signs may indicate that national standards for signs could be refined. However, it may also indicate that public satisfaction reflects the readability of signs under daytime conditions, while national standards reflect readability under adverse conditions (wet, dark).

Wisconsin 2004: Compass Report on Sign Condition

Regulatory/warning/school signs				Other signs			
Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life
125,419	37%	46,893	5.4	99,651	46%	45,530	5.7

Districts 2004: Sign Condition

	Regulatory/warning/school signs				Other signs			
District	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life
1	25,003	41%	10,306	5.2	13,225	53%	7,036	5.8
2	24,920	27%	6,605	4.4	17,685	34%	6,028	5.4
3	3,113	17%	522	4.0	3,457	19%	664	4.6
4	16,187	29%	4,764	4.9	13,486	45%	6,126	4.8
5	17,006	50%	8,535	7.2	15,607	49%	7,580	7.2
6	14,420	29%	4,242	4.4	15,984	41%	6,589	3.7
7	9,843	66%	6,533	5.9	8,413	68%	5,699	7.5
8	14,927	36%	5,386	4.7	11,794	49%	5,808	5.5

Counties 2004: Sign Condition

		Regulatory/warning/school signs				Other signs			
District	County	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life
1	Columbia	2,830	44%	1,245	5.5	1,378	53%	729	5.4
	Dane	5,544	39%	2,166	4.8	2,650	52%	1,368	5.3
	Dodge	2,409	40%	969	4.5	1,357	49%	661	5.5
	Grant	2,920	46%	1,329	4.9	1,769	58%	1,029	6.1
	Green	1,526	33%	504	5.1	724	43%	313	6.3
	Iowa	1,844	41%	760	5.8	1,187	49%	585	6.2
	Jefferson	1,422	38%	543	4.0	722	54%	393	5.0
	Layfayette	1,181	54%	637	6.5	824	70%	573	7.0
	Rock	2,114	41%	858	4.8	1,325	47%	628	6.1
	Sauk	3,213	40%	1,295	6.3	1,289	59%	757	5.7
2	Fond du Lac	1,873	45%	842	4.8	1,346	46%	615	6.2
	Kenosha	3,454	35%	1,214	3.9	2,845	43%	1,229	4.9
	Milwaukee	4,683	16%	748	4.8	3,372	29%	986	6.2
	Ozaukee	1,415	25%	356	4.8	861	44%	381	5.5
	Racine	3,991	37%	1,471	4.3	2,876	39%	1,115	5.0
	Walworth	3,012	25%	755	4.4	2,176	35%	752	4.9
	Washington	2,759	29%	813	4.2	2,059	29%	590	4.8
	Waukesha	3,733	11%	406	4.2	2,150	17%	360	6.1
3	Brown	95	4%	4	2.5	116	3%	4	2.0

		Regulatory/warning/school signs				Other signs			
District	County	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life
3	Calumet	88	0%	0	0.0	75	1%	1	8.0
	Door	335	33%	110	3.1	216	44%	95	4.0
	Kewaunee	4	0%	0	0.0	NA	NA	NA	NA
	Manitowoc	35	9%	3	1.0	87	9%	8	5.0
	Marinette	326	24%	77	5.8	390	11%	43	5.7
	Menominee	196	25%	49	3.2	95	38%	36	3.3
	Oconto	517	22%	114	3.5	526	28%	147	3.9
	Outagamie	636	8%	53	5.8	642	13%	83	5.3
	Shawano	173	10%	18	3.9	283	19%	53	4.3
	Sheboygan	300	18%	54	3.7	392	38%	147	5.2
	Winnebago	408	10%	40	4.4	635	7%	47	5.0
4	Adams	894	24%	219	5.6	707	36%	258	5.1
	Green Lake	787	46%	359	6.7	706	58%	412	6.9
	Juneau	1,782	40%	706	5.4	1,927	53%	1,019	5.7
	Marathon	4,003	24%	972	4.8	2,933	40%	1,174	4.9
	Marquette	942	47%	447	5.4	1,031	61%	628	4.4
	Portage	2,113	36%	752	3.2	2,120	45%	952	3.1
	Waupaca	1,692	25%	418	3.6	1,215	38%	461	3.5
	Waushara	1,804	26%	477	5.8	1,313	52%	678	5.1
	Wood	2,170	19%	414	5.9	1,534	35%	544	5.4
5	Buffalo	1,628	55%	888	7.4	1,399	52%	729	7.6
	Crawford	2,143	46%	991	6.5	1,558	40%	616	7.7

		Regulatory/warning/school signs				Other signs			
District	County	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life
5	Jackson	1,652	44%	733	7.4	1,717	57%	976	7.0
	La Crosse	2,718	61%	1,654	7.8	2,637	58%	1,523	7.3
	Monroe	2,426	52%	1,254	7.5	2,548	55%	1,407	7.1
	Richland	1,897	53%	1,011	6.7	1,568	37%	574	7.9
	Trempealeau	1,890	42%	798	6.7	1,859	48%	895	6.4
	Vernon	2,652	45%	1,206	7.1	2,321	37%	860	7.6
6	Chippewa	2,343	31%	717	4.1	2,443	47%	1,138	3.8
	Clark	1,861	23%	421	4.1	1,558	39%	601	3.5
	Dunn	2,046	22%	440	4.7	2,466	30%	738	3.7
	Eau Claire	2,579	41%	1,059	4.2	2,552	44%	1,135	3.8
	Pepin	543	26%	141	4.6	638	50%	321	4.1
	Pierce	1,695	27%	452	4.6	2,237	49%	1,092	3.6
	St. Croix	2,360	32%	750	4.7	3,008	40%	1,205	3.6
	Taylor	993	26%	262	4.5	1,082	33%	359	4.4
7	Florence	489	72%	353	6.1	505	74%	376	8.2
	Forest	1,320	55%	721	6.2	1,043	62%	646	8.1
	Iron	1,028	81%	836	5.7	810	77%	627	6.5
	Langlade	1,236	66%	821	6.5	1,243	78%	975	8.9
	Lincoln	1,430	55%	783	6.3	1,348	66%	883	8.0
	Oneida	1,794	67%	1,195	5.7	1,436	68%	976	6.5
	Price	1,024	80%	823	5.2	1,058	50%	531	6.9
	Vilas	1,522	66%	1,001	5.4	970	71%	685	7.0

		Regulatory/warning/school signs				Other signs			
District	County	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life	Total signs	% backlogged	Deficient signs	For deficient signs, average years beyond service life
8	Ashland	1,179	26%	306	3.7	879	38%	336	5.6
	Barron	1,827	50%	907	4.8	1,849	65%	1,207	5.5
	Bayfield	1,480	18%	265	3.7	1,197	28%	334	5.7
	Burnett	1,272	34%	428	5.9	885	48%	424	5.6
	Douglas	2,021	26%	527	4.7	1,596	44%	704	5.3
	Polk	2,249	43%	967	5.1	1,741	57%	998	5.5
	Rusk	1,306	47%	614	4.5	994	56%	559	5.3
	Sawyer	1,480	39%	572	4.9	1,190	44%	525	5.5
	Washburn	2,113	38%	800	4.4	1,463	49%	721	5.7

Wisconsin and Districts 2004: Sign Age Distribution

Regulatory/warning/school signs

	Years until end of service life *signs still good*							**Years past end of service life** *signs backlogged*						
	6-10	5	4	3	2	1	0	1	2	3	4	5-10	>10	Total
State	35,822	6,434	6,431	8,698	7,008	6,977	7,156	5,740	5,004	6,302	6,578	19,155	4,114	125,419
	29%	5%	5%	7%	6%	6%	6%	5%	4%	5%	5%	15%	3%	100%
D1	6,974	1,272	1,162	1,273	1,358	1,258	1,400	1,097	912	1,781	1,721	3,903	892	25,003
	28%	5%	5%	5%	5%	5%	6%	4%	4%	7%	7%	16%	4%	100%
D2	8,130	1,503	2,167	2,264	1,572	1,332	1,347	996	806	1,292	883	2,400	228	24,920
	33%	6%	9%	9%	6%	5%	5%	4%	3%	5%	4%	10%	1%	100%
D3	1,924	133	115	135	77	54	153	87	64	134	60	158	19	3,113
	62%	4%	4%	4%	2%	2%	5%	3%	2%	4%	2%	5%	1%	100%
D4	5,794	929	714	1,066	888	1,050	982	709	658	597	643	1,834	323	16,187
	36%	6%	4%	7%	5%	6%	6%	4%	4%	4%	4%	11%	2%	100%
D5	3,967	522	462	823	687	933	1,077	624	470	689	1,338	3,854	1,560	17,006
	23%	3%	3%	5%	4%	5%	6%	4%	3%	4%	8%	23%	9%	100%
D6	4,495	792	648	1,163	1,063	1,205	812	836	895	591	416	1,184	320	14,420
	31%	5%	4%	8%	7%	8%	6%	6%	6%	4%	3%	8%	2%	100%
D7	963	298	352	531	390	388	388	593	397	571	873	3,532	567	9,843
	10%	3%	4%	5%	4%	4%	4%	6%	4%	6%	9%	36%	6%	100%
D8	3,575	985	811	1,443	973	757	997	798	802	647	644	2,290	205	14,927
	24%	7%	5%	10%	7%	5%	7%	5%	5%	4%	4%	15%	1%	100%

Guide and other signs

	Years until end of service life *signs still good*							**Years past end of service life** *signs backlogged*						
	6-10	5	4	3	2	1	0	1	2	3	4	5-10	>10	Total
State	15,385	4,159	6,445	7,579	5,444	7,526	7,583	5,119	6,552	4,463	4,576	19,213	5,607	99,651
	15%	4%	6%	8%	5%	8%	8%	5%	7%	4%	5%	19%	6%	100%
D1	2,206	680	596	831	534	752	590	629	860	591	593	3,617	746	13,225
	17%	5%	5%	6%	4%	6%	4%	5%	7%	4%	4%	27%	6%	100%
D2	3,407	1,017	2,074	1,403	1,008	1,485	1,263	752	506	797	696	2,917	360	17,685
	19%	6%	12%	8%	6%	8%	7%	4%	3%	5%	4%	16%	2%	100%
D3	2,162	57	148	118	40	155	113	68	116	126	100	208	46	3,457
	63%	2%	4%	3%	1%	4%	3%	2%	3%	4%	3%	6%	1%	100%
D4	1,832	823	785	719	946	1,114	1,141	1,169	954	534	730	2,358	381	13,486
	14%	6%	6%	5%	7%	8%	8%	9%	7%	4%	5%	17%	3%	100%
D5	2,321	461	857	1,349	610	1,147	1,282	539	926	742	638	3,144	1,591	15,607
	15%	3%	5%	9%	4%	7%	8%	3%	6%	5%	4%	20%	10%	100%
D6	1,639	461	1,155	1,811	1,213	1,362	1,754	1,039	2,263	971	853	1,053	410	15,984
	10%	3%	7%	11%	8%	9%	11%	7%	14%	6%	5%	7%	3%	100%
D7	686	166	335	399	240	699	189	294	352	261	450	2,577	1,765	8,413
	8%	2%	4%	5%	3%	8%	2%	3%	4%	3%	5%	31%	21%	100%
D8	1,132	494	495	949	853	812	1,251	629	575	441	516	3,339	308	11,794
	10%	4%	4%	8%	7%	7%	11%	5%	5%	4%	4%	28%	3%	100%

Wisconsin and Districts 2004: Sign Inventory Management System Field Review Progress

	All signs		Not field reviewed			Field reviewed		Progress	
District	Total Signs[1]	%Total	No Mfg Date	No Face[2]	Total[3]	Field Reviewed	%Field Reviewed	%Field Reviewed from Previous Year	Field Reviewed Progress
1	47,143	15%	8,871	292	8,915	38,228	81%	77%	+ 5%
2	67,547	22%	24,911	1,350	24,942	42,605	63%	48%	+ 15%
3	50,207	16%	43,635	1,818	43,637	6,570	13%	6%	+ 7%
4	32,867	11%	3,186	31	3,194	29,673	90%	87%	+ 3%
5	33,477	11%	863	1	864	32,613	97%	97%	+ 0%
6	31,003	10%	595	5	599	30,404	98%	98%	+ 0%
7	19,774	6%	1,517	22	1,518	18,256	92%	92%	+ 0%
8	26,940	9%	158	61	219	26,721	99%	82%	+ 17%
State	308,958	100%	83,736	3,580	83,888	225,070	73%	66%	+ 7%

[1] Erroneous records were not included in this report.
[2] A sign with no face data is considered "not field reviewed."
[3] Total may be larger than the sum of "no mfg date" and "no face" since a given sign may have neither mfg date nor face data.

2004 Traveled Way:
Compass Report on Maintenance Condition

Data in this section comes from the Pavement Inventory File (PIF). Reporting and analysis were done by Professor Teresa Adams of the University of Wisconsin, with Project Assistant Suphawut Malaikrisanachalee, under the direction of WisDOT staff. Pavement condition reflects primarily dollars spent through WisDOT's improvement program.

Key Observations:

- Rutting on asphalt pavement received a feature grade of D in the Wisconsin Compass Report on page 6. This critical safety deficiency can contribute to hydroplaning in summer, and icy pavement in the winter.
- Asphalt pavement received feature grades of C in longitudinal and transverse cracking. WisDOT engineers note that lack of funding for cost-effective routine maintenance like crack-filling and chip-sealing is keeping WisDOT from getting the full life from that pavement.
- Concrete pavements, with all features scoring a C or worse, are in worse shape than asphalt.
- Asphalt pavement scored high (A or B) on features that provide a smooth ride. Concrete pavement scored low (C or below) on features that provide a smooth ride.
- Cracking, faulting, and slab breakup received F's and D's.
- Most of the pavement that is backlogged is considered "fair" by WisDOT's pavement maintenance management system, rather than "moderate" or "bad."
- All pavement features improved slightly or remained the same from last year to this year. This likely reflects expenditures made through the improvement program.
- On average, pavement improved incrementally, but this conceals dramatic improvement in selected districts, particularly in longitudinal joint distress, longitudinal cracking and transverse cracking. Again, this can likely be attributed to investments made through the improvement program.

Wisconsin 2004: Traveled Way Maintenance Condition

Asphalt Traveled Way

	% of miles backlogged		
	Year		
Distress	2002	2003	2004
Alligator Cracking	2%	1%	1%
Block Cracking	3%	3%	3%
Edge Raveling	15%	15%	14%
Flushing	1%	1%	1%
Longitudinal Cracking	24%	24%	23%
Longitudinal Distortion	1%	0%	0%
Patch Deterioration	12%	11%	10%
Rutting	10%	12%	11%
Surface Raveling	3%	2%	2%
Transverse Cracking	25%	24%	22%
Transverse Distortion	1%	1%	1%

Concrete Traveled Way

	% of miles backlogged		
	Year		
Distress	2002	2003	2004
Distressed Joint/Cracks	33%	34%	33%
Longitudinal Joint Distress	26%	23%	22%
Patch Deterioration	29%	29%	28%
Slab Breakup	47%	47%	46%
Surface Distress	23%	22%	21%

Districts 2004: Traveled Way

Asphalt traveled way

		% of miles backlogged							
		District							
Distress	Year	1	2	3	4	5	6	7	8
	2002	4%	2%	1%	1%	2%	1%	1%	1%
	2003	2%	2%	1%	1%	1%	1%	1%	0%
Alligator Cracking	2004	2%	2%	1%	1%	1%	1%	1%	0%
	2002	4%	3%	3%	2%	3%	2%	2%	1%
	2003	4%	3%	3%	1%	2%	3%	2%	2%
Block Cracking	2004	4%	3%	3%	1%	2%	3%	2%	2%
	2002	20%	21%	13%	14%	19%	11%	13%	8%
	2003	18%	21%	12%	13%	19%	11%	12%	7%
Edge Raveling	2004	18%	21%	12%	13%	18%	10%	10%	6%
	2002	1%	0%	0%	1%	4%	1%	1%	2%
	2003	0%	0%	0%	1%	2%	2%	1%	0%
Flushing	2004	0%	0%	0%	0%	1%	2%	1%	0%
	2002	26%	21%	18%	15%	24%	27%	19%	36%
	2003	29%	21%	17%	14%	26%	27%	19%	43%
Longitudinal Cracking	2004	27%	20%	16%	14%	25%	26%	17%	39%
	2002	2%	1%	0%	0%	0%	0%	0%	1%
	2003	1%	1%	0%	0%	0%	0%	0%	1%
Longitudinal Distortion	2004	1%	1%	0%	0%	0%	0%	0%	1%
	2002	10%	16%	6%	16%	16%	10%	7%	9%
	2003	11%	16%	6%	15%	15%	7%	7%	7%
Patch Deterioration	2004	11%	16%	6%	13%	13%	6%	6%	5%
	2002	14%	4%	8%	11%	9%	11%	13%	14%
	2003	17%	4%	8%	10%	12%	13%	12%	21%
Rutting	2004	15%	4%	7%	10%	11%	12%	10%	18%
	2002	5%	2%	2%	5%	4%	3%	3%	2%
	2003	3%	2%	2%	4%	1%	2%	3%	2%
Surface Raveling	2004	3%	2%	1%	4%	1%	2%	3%	2%
	2002	25%	20%	20%	16%	20%	31%	21%	44%
	2003	22%	20%	20%	16%	17%	29%	20%	46%
Transverse Cracking	2004	21%	20%	19%	15%	17%	28%	18%	43%
	2002	3%	0%	0%	0%	2%	1%	0%	2%
	2003	2%	0%	0%	0%	1%	0%	0%	1%
Transverse Distortion	2004	2%	0%	0%	0%	0%	0%	0%	1%

Concrete traveled way

		% of miles backlogged							
		District							
Distress	Year	1	2	3	4	5	6	7	8
	2002	24%	49%	23%	24%	43%	40%	51%	27%
	2003	29%	49%	23%	24%	46%	41%	50%	32%
Alligator Cracking	2004	27%	48%	21%	23%	45%	41%	50%	31%
	2002	21%	39%	14%	12%	40%	38%	31%	31%
	2003	13%	39%	13%	12%	36%	29%	30%	25%
Block Cracking	2004	12%	39%	12%	12%	36%	29%	30%	25%
	2002	28%	38%	25%	29%	32%	30%	21%	14%
	2003	27%	38%	25%	29%	31%	29%	21%	16%
Edge Raveling	2004	26%	38%	23%	28%	31%	29%	21%	16%
	2002	46%	62%	39%	39%	51%	51%	60%	30%
	2003	47%	62%	39%	38%	50%	50%	59%	32%
Flushing	2004	45%	61%	36%	37%	50%	50%	59%	31%
	2002	21%	24%	21%	14%	44%	25%	12%	26%
	2003	17%	24%	21%	14%	37%	23%	12%	25%
Longitudinal Cracking	2004	16%	24%	20%	13%	37%	23%	12%	25%

Wisconsin 2004: Traveled Way Condition Distribution

Asphalt traveled way

	Condition[4] % of miles[5]			
Distress	Excellent	Fair	Moderate	Bad
Alligator Cracking[6]	98%	1%	1%	0%
Block Cracking	94%	2%	2%	1%
Edge Raveling	86%	12%	1%	1%
Flushing	99%	0%	NA[7]	0%
Longitudinal Cracking	31%	41%	25%	4%
Longitudinal Distortion	100%	0%	0%	0%
Patch Deterioration	90%	3%	3%	4%
Rutting	89%	10%	NA	1%
Surface Raveling	98%	2%	0%	0%
Transverse Cracking	32%	43%	23%	3%
Transverse Distortion	99%	0%	0%	0%

Concrete traveled way

	Condition % of miles			
Distress	Excellent	Fair	Moderate	Bad
Distressed Joint/Cracks	67%	12%	17%	5%
Longitudinal Joint Distress	78%	12%	7%	3%
Patch Deterioration	72%	19%	7%	2%
Slab Breakup	54%	26%	19%	0%
Surface Distress	79%	14%	7%	NA

[4] Condition comes from WisDOT's pavement maintenance management system and reflects extent and severity of distress.
[5] Rows may not sum to 100% because of rounding.
[6] For all four asphalt "cracking" features, miles in "fair" condition may have sealed or unsealed cracks. Miles with unsealed cracks are included in the % backlogged.
[7] NA indicates that this is not a condition category for this distress.

Districts 2004: Traveled Way Condition Distribution

Asphalt traveled way

		Condition % of miles							
		District							
Distress	Condition	1	2	3	4	5	6	7	8
Alligator Cracking	Excellent	96%	96%	98%	98%	98%	98%	98%	100%
	Fair	2%	2%	1%	2%	1%	1%	2%	0%
	Moderate	1%	1%	1%	0%	1%	0%	0%	0%
	Poor	1%	1%	0%	0%	0%	0%	0%	0%
Block Cracking	Excellent	93%	92%	94%	94%	97%	93%	95%	97%
	Fair	3%	3%	3%	4%	1%	3%	2%	1%
	Moderate	2%	2%	2%	2%	2%	2%	2%	1%
	Poor	1%	3%	1%	0%	0%	2%	1%	1%
Edge Raveling	Excellent	82%	79%	88%	87%	82%	90%	90%	94%
	Fair	14%	18%	10%	11%	17%	9%	9%	6%
	Moderate	2%	1%	1%	2%	1%	1%	1%	0%
	Poor	1%	1%	1%	1%	0%	0%	0%	0%
Flushing	Excellent	100%	100%	100%	100%	99%	98%	99%	100%
	Fair	0%	0%	0%	0%	1%	1%	1%	0%
	Moderate	NA	NA	NA	NA	NA	NA	NA	NA
	Poor	0%	0%	0%	0%	0%	0%	0%	0%
Longitudinal Cracking	Excellent	30%	18%	36%	29%	31%	39%	37%	29%
	Fair	39%	39%	33%	48%	46%	33%	42%	51%
	Moderate	26%	38%	26%	21%	22%	23%	18%	16%
	Poor	4%	5%	5%	3%	2%	5%	2%	4%
Longitudinal Distortion	Excellent	99%	99%	100%	100%	100%	100%	100%	99%
	Fair	1%	0%	0%	0%	0%	0%	0%	1%
	Moderate	0%	0%	0%	0%	0%	0%	0%	0%
	Poor	0%	0%	0%	0%	0%	0%	0%	0%
Patch Deterioration	Excellent	89%	84%	94%	87%	87%	94%	94%	95%
	Fair	2%	4%	2%	4%	2%	2%	3%	1%
	Moderate	3%	4%	2%	7%	5%	2%	1%	2%
	Poor	6%	7%	2%	3%	6%	2%	1%	2%
Rutting	Excellent	85%	96%	93%	90%	89%	88%	90%	82%
	Fair	14%	4%	7%	9%	11%	11%	10%	15%
	Moderate	NA	NA	NA	NA	NA	NA	NA	NA
	Poor	1%	0%	0%	1%	0%	1%	1%	3%
Surface Raveling	Excellent	97%	98%	99%	96%	99%	98%	97%	98%
	Fair	3%	1%	1%	3%	0%	1%	2%	2%
	Moderate	0%	0%	0%	1%	0%	1%	1%	0%
	Poor	0%	0%	0%	0%	0%	0%	0%	0%
Transverse Cracking	Excellent	41%	18%	32%	27%	47%	35%	32%	24%
	Fair	36%	44%	42%	53%	35%	33%	48%	55%
	Moderate	21%	35%	24%	17%	17%	27%	18%	19%
	Poor	3%	3%	3%	3%	2%	5%	2%	3%
Transverse Distortion	Excellent	98%	100%	100%	100%	100%	100%	100%	99%
	Fair	2%	0%	0%	0%	0%	0%	0%	1%
	Moderate	0%	0%	0%	0%	0%	0%	0%	0%
	Poor	0%	0%	0%	0%	0%	0%	0%	0%

Concrete traveled way

		Condition % of miles							
		District							
Distress	Condition	1	2	3	4	5	6	7	8
Alligator Cracking	Excellent	73%	52%	79%	77%	55%	59%	50%	69%
	Fair	13%	10%	7%	12%	18%	14%	18%	16%
	Moderate	11%	27%	11%	9%	23%	25%	27%	10%
	Poor	3%	11%	3%	2%	5%	2%	5%	5%
Block Cracking	Excellent	88%	61%	88%	88%	64%	71%	70%	75%
	Fair	7%	16%	8%	8%	20%	13%	16%	14%
	Moderate	4%	14%	3%	3%	10%	13%	7%	10%
	Poor	1%	9%	1%	1%	5%	4%	7%	1%
Edge Raveling	Excellent	74%	62%	77%	72%	69%	71%	79%	84%
	Fair	19%	20%	16%	20%	21%	21%	12%	14%
	Moderate	6%	12%	6%	7%	8%	8%	9%	1%
	Poor	1%	6%	1%	1%	1%	1%	0%	0%
Flushing	Excellent	55%	39%	64%	63%	50%	50%	41%	69%
	Fair	32%	26%	19%	25%	27%	28%	34%	22%
	Moderate	13%	35%	17%	12%	22%	21%	25%	9%
	Poor	0%	0%	0%	0%	0%	0%	0%	0%
Longitudinal Cracking	Excellent	84%	76%	80%	87%	63%	77%	88%	75%
	Fair	11%	12%	14%	6%	28%	20%	12%	16%
	Moderate	5%	12%	6%	7%	9%	4%	0%	9%
	Poor	NA	NA	NA	NA	NA	NA	NA	NA

Counties 2004: Traveled Way

Asphalt traveled way

		% of miles backlogged										
District	County	Alligator Cracking[8]	Block Cracking	Edge Raveling	Flushing	Longitudinal Cracking	Longitudinal Distortion	Patch Deterioration	Rutting	Surface Raveling	Transverse Cracking	Transverse Distortion
1	Columbia	3%	3%	21%	0%	29%	0%	6%	16%	3%	22%	0%
	Dane	2%	4%	23%	2%	29%	1%	21%	22%	1%	26%	3%
	Dodge	1%	4%	21%	0%	28%	0%	11%	13%	8%	21%	3%
	Grant	1%	4%	13%	0%	26%	0%	10%	19%	0%	21%	0%
	Green	0%	4%	13%	0%	32%	1%	2%	3%	2%	14%	2%
	Iowa	1%	5%	10%	0%	27%	0%	5%	15%	0%	18%	0%
	Jefferson	4%	3%	11%	1%	31%	3%	9%	17%	1%	27%	4%
	Layfayette	1%	2%	16%	0%	28%	0%	5%	25%	0%	24%	0%
	Rock	4%	1%	22%	0%	26%	3%	11%	11%	7%	19%	3%
	Sauk	2%	5%	15%	1%	22%	1%	13%	7%	4%	16%	2%
2	Fond du Lac	3%	6%	33%	0%	23%	0%	21%	0%	4%	22%	1%
	Kenosha	2%	4%	28%	0%	18%	0%	13%	4%	0%	20%	0%
	Milwaukee	1%	2%	20%	1%	20%	2%	25%	4%	1%	20%	0%
	Ozaukee	0%	6%	17%	0%	22%	0%	14%	0%	2%	23%	0%
	Racine	2%	5%	14%	0%	17%	0%	12%	2%	2%	17%	0%
	Walworth	3%	5%	12%	0%	21%	1%	7%	10%	3%	19%	1%

[8] For this year only, unsealed cracking for the four asphalt cracking features is calculated based on the districtwide proportion of sealed to unsealed cracking

		% of miles backlogged										
District	County	Alligator Cracking[8]	Block Cracking	Edge Raveling	Flushing	Longitudinal Cracking	Longitudinal Distortion	Patch Deterioration	Rutting	Surface Raveling	Transverse Cracking	Transverse Distortion
	Washington	1%	2%	21%	0%	21%	1%	12%	5%	0%	21%	1%
	Waukesha	2%	1%	21%	0%	19%	0%	13%	4%	1%	19%	0%
3	Brown	0%	3%	7%	0%	13%	0%	3%	5%	0%	16%	0%
	Calumet	0%	8%	16%	0%	17%	0%	6%	17%	2%	22%	0%
	Door	0%	0%	1%	0%	11%	0%	1%	1%	0%	14%	0%
	Kewaunee	0%	2%	9%	0%	12%	0%	4%	0%	0%	15%	0%
	Manitowoc	0%	2%	7%	0%	15%	0%	1%	2%	1%	18%	1%
	Marinette	3%	3%	8%	0%	17%	0%	7%	9%	3%	20%	0%
	Menominee	2%	3%	28%	0%	18%	0%	6%	0%	0%	28%	0%
	Oconto	1%	5%	9%	0%	19%	0%	5%	4%	3%	21%	0%
	Outagamie	3%	1%	21%	0%	16%	0%	8%	9%	1%	16%	0%
	Shawano	1%	2%	5%	0%	15%	0%	3%	5%	0%	17%	0%
	Sheboygan	1%	2%	20%	0%	20%	0%	6%	15%	1%	21%	0%
	Winnebago	1%	7%	13%	2%	19%	0%	14%	10%	3%	22%	1%
4	Adams	0%	3%	13%	1%	17%	0%	4%	2%	4%	20%	0%
	Green Lake	0%	1%	15%	0%	13%	0%	7%	2%	5%	14%	0%
	Juneau	0%	2%	9%	0%	15%	0%	23%	13%	2%	14%	0%
	Marathon	1%	0%	14%	1%	13%	0%	17%	15%	5%	15%	1%
	Marquette	0%	0%	9%	0%	10%	0%	3%	3%	3%	14%	0%
	Portage	2%	2%	18%	0%	13%	0%	10%	4%	7%	14%	0%
	Waupaca	0%	1%	9%	1%	14%	0%	8%	15%	5%	16%	0%

		% of miles backlogged										
District	County	Alligator Cracking[8]	Block Cracking	Edge Raveling	Flushing	Longitudinal Cracking	Longitudinal Distortion	Patch Deterioration	Rutting	Surface Raveling	Transverse Cracking	Transverse Distortion
	Waushara	0%	2%	19%	1%	16%	0%	11%	17%	6%	16%	2%
	Wood	0%	1%	11%	1%	13%	0%	21%	6%	3%	16%	0%
5	Buffalo	1%	1%	18%	0%	24%	0%	12%	23%	0%	13%	0%
	Crawford	2%	1%	23%	1%	30%	0%	19%	8%	0%	20%	0%
	Jackson	0%	1%	16%	2%	24%	0%	10%	13%	1%	18%	0%
	La Crosse	0%	4%	25%	4%	33%	1%	13%	13%	2%	22%	1%
	Monroe	0%	1%	10%	0%	18%	0%	6%	7%	1%	13%	0%
	Richland	1%	4%	19%	1%	24%	0%	19%	12%	1%	14%	0%
	Trempealeau	1%	1%	10%	1%	25%	0%	16%	18%	1%	20%	0%
	Vernon	1%	1%	23%	0%	28%	0%	14%	2%	1%	13%	0%
6	Chippewa	0%	0%	13%	0%	21%	0%	13%	7%	2%	21%	0%
	Clark	0%	1%	1%	2%	20%	0%	7%	10%	1%	21%	0%
	Dunn	1%	7%	14%	2%	26%	1%	6%	20%	4%	29%	2%
	Eau Claire	0%	3%	13%	1%	31%	0%	7%	16%	3%	34%	0%
	Pepin	1%	0%	9%	0%	27%	0%	0%	14%	0%	26%	0%
	Pierce	2%	3%	14%	0%	30%	0%	4%	8%	1%	29%	0%
	St. Croix	1%	2%	6%	0%	24%	0%	2%	13%	1%	30%	0%
	Taylor	2%	4%	10%	10%	29%	0%	7%	4%	1%	32%	1%
7	Florence	2%	6%	14%	0%	23%	0%	9%	7%	9%	23%	0%
	Forest	1%	3%	3%	0%	14%	0%	1%	15%	1%	15%	0%
	Iron	2%	0%	20%	1%	22%	0%	3%	12%	1%	22%	0%

		% of miles backlogged										
District	County	Alligator Cracking[8]	Block Cracking	Edge Raveling	Flushing	Longitudinal Cracking	Longitudinal Distortion	Patch Deterioration	Rutting	Surface Raveling	Transverse Cracking	Transverse Distortion
	Langlade	1%	0%	10%	0%	17%	0%	5%	13%	2%	22%	0%
	Lincoln	1%	3%	16%	3%	17%	2%	15%	15%	13%	17%	1%
	Oneida	1%	0%	3%	0%	15%	0%	4%	3%	0%	17%	0%
	Price	0%	2%	6%	0%	15%	0%	3%	5%	1%	15%	0%
	Vilas	1%	1%	10%	0%	15%	0%	8%	12%	0%	19%	0%
8	Ashland	2%	2%	13%	0%	42%	0%	4%	15%	0%	46%	0%
	Barron	0%	1%	9%	0%	38%	0%	3%	10%	0%	44%	0%
	Bayfield	0%	4%	3%	0%	33%	1%	10%	17%	1%	39%	0%
	Burnett	0%	1%	7%	0%	42%	0%	1%	27%	0%	49%	0%
	Douglas	0%	5%	3%	0%	42%	2%	2%	2%	2%	42%	2%
	Polk	0%	0%	6%	0%	32%	1%	4%	17%	6%	38%	2%
	Rusk	1%	1%	7%	0%	42%	0%	8%	30%	0%	50%	0%
	Sawyer	0%	0%	6%	1%	33%	0%	8%	20%	0%	40%	0%
	Washburn	0%	5%	4%	1%	46%	4%	6%	32%	8%	47%	2%

Concrete traveled way

		% of miles backlogged				
District	County	Distressed Joint/Cracks	Longitudinal Joint Distress	Patch Deterioration	Slab Breakup	Surface Distress
1	Columbia	31%	19%	20%	39%	22%
	Dane	27%	7%	31%	54%	17%
	Dodge	29%	12%	13%	44%	6%
	Grant	19%	10%	21%	40%	2%
	Green	40%	20%	30%	45%	10%
	Iowa	5%	0%	16%	31%	2%
	Jefferson	45%	43%	45%	63%	43%
	Layfayette	10%	0%	5%	15%	5%
	Rock	25%	10%	15%	31%	19%
	Sauk	30%	2%	52%	50%	7%
2	Fond du Lac	50%	30%	48%	67%	19%
	Kenosha	29%	22%	29%	61%	11%
	Milwaukee	65%	50%	50%	87%	15%
	Ozaukee	4%	1%	4%	18%	0%
	Racine	69%	45%	70%	77%	32%
	Walworth	49%	54%	25%	33%	46%
	Washington	18%	0%	12%	20%	6%
	Waukesha	52%	48%	36%	64%	39%
3	Brown	18%	14%	29%	44%	28%
	Calumet	16%	16%	26%	37%	11%
	Door	17%	0%	8%	63%	0%
	Kewaunee	22%	27%	14%	28%	62%
	Manitowoc	44%	6%	56%	63%	0%
	Marinette	20%	0%	10%	24%	7%
	Menominee	41%	23%	44%	53%	12%
	Oconto	6%	0%	8%	14%	2%
	Outagamie	33%	13%	33%	44%	17%
	Shawano	12%	3%	12%	23%	3%
	Sheboygan	0%	0%	28%	22%	17%
	Winnebago	100%	40%	20%	80%	0%
4	Adams	14%	0%	27%	11%	9%
	Green Lake	33%	12%	33%	53%	12%
	Juneau	0%	0%	4%	19%	4%

		% of miles backlogged				
District	County	Distressed Joint/Cracks	Longitudinal Joint Distress	Patch Deterioration	Slab Breakup	Surface Distress
	Marathon	28%	28%	43%	44%	30%
	Marquette	2%	2%	2%	9%	2%
	Portage	14%	12%	28%	32%	14%
	Waupaca	33%	10%	21%	33%	8%
	Waushara	58%	33%	42%	83%	25%
	Wood	70%	40%	70%	100%	10%
5	Buffalo	50%	47%	20%	51%	65%
	Crawford	34%	17%	33%	38%	24%
	Jackson	30%	32%	25%	37%	51%
	La Crosse	55%	45%	45%	73%	9%
	Monroe	77%	56%	23%	67%	6%
	Richland	94%	81%	81%	94%	44%
	Trempealeau	25%	41%	19%	42%	36%
	Vernon	17%	3%	7%	25%	4%
6	Chippewa	55%	38%	27%	55%	11%
	Clark	53%	32%	57%	69%	15%
	Dunn	64%	0%	20%	60%	4%
	Eau Claire	59%	36%	46%	59%	47%
	Pepin	33%	33%	33%	33%	0%
	Pierce	75%	75%	75%	75%	50%
	St. Croix	38%	17%	21%	55%	8%
	Taylor	53%	18%	12%	53%	12%
7	Florence	100%	100%	17%	92%	25%
	Forest	100%	100%	0%	0%	0%
	Iron	75%	8%	42%	67%	25%
	Langlade	15%	40%	5%	20%	60%
	Lincoln	33%	0%	0%	0%	0%
	Oneida	36%	22%	21%	33%	20%
	Price	10%	0%	20%	50%	0%
	Vilas	100%	94%	12%	53%	0%
8	Ashland	13%	0%	88%	25%	0%
	Barron	21%	0%	8%	28%	0%
	Bayfield	31%	19%	20%	39%	22%
	Burnett	27%	7%	31%	54%	17%

		% of miles backlogged				
District	County	Distressed Joint/Cracks	Longitudinal Joint Distress	Patch Deterioration	Slab Breakup	Surface Distress
	Douglas	29%	12%	13%	44%	6%
	Polk	19%	10%	21%	40%	2%
	Rusk	40%	20%	30%	45%	10%
	Sawyer	5%	0%	16%	31%	2%
	Washburn	45%	43%	45%	63%	43%

Wisconsin 2003-2004: Compass Report on Winter Operations

Executive summary

Statewide measures for winter 2003-2004

Public satisfaction with winter operations	**7.5** on a scale of 1 (low) to 10 (high)
Time to bare/wet pavement	**2:38 hours** after the storm ended
Winter-related crash rate	**26 per 100 million** vehicle miles traveled
Cost per lane mile	**$1,279**

Key findings

- Public satisfaction with WisDOT's winter operations has remained relatively high and steady over time.
- 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 (range of storms over the winter season).
- As winter severity increases, so does the winter-related crash rate. However, counties with greater winter operations coverage tend to have a relatively lower crash rate.
- As expected, cost per lane mile increases with the severity of the winter.

About this report

The measures in this section of the report focus on a few key winter operations outcomes critical to drivers and taxpayers. The primary audience for these measures is expected to be WisDOT and county highway managers with a general interest in winter operations, e.g., district directors and county commissioners.

This section of the report was prepared under the guidance of the Compass Winter Standards Team, and looks at winter operations on state highways from November 1, 2003 to April 30, 2004. These operations involve county work forces under contract with WisDOT.

This section is one of three 2004 Compass reports on winter operations. All three are pilot efforts. The other two reports examine, respectively, vehicle calibration rate and the use of the winter severity index as a budgeting tool, and are available from Alison S. Lebwohl at 608-266-8666. In addition, the 2003-2004 Annual Winter Maintenance Report – which offers much more operational detail – is available at the winter reports home page (http://dotnet/dtid_bho/extranet/winter/reports/index.htm from inside WisDOT or https://trust.dot.state.wi.us/extntgtwy/dtid_bho/extranet/winter/reports/index.htm from outside WisDOT).

In future years, the Bureau of Highway Operations will issue two reports on winter. A Compass report, included as a section in a larger report, will focus on measures critical to drivers and citizens, and will be directed toward a general audience. The Annual Winter Maintenance Report will focus on operational measures and analysis, and will be directed toward front-line operations managers. Analysis and reporting will be done by Compass in support of the Annual Winter Maintenance Report.

About this winter

2003-2004 winter season snowfall for Wisconsin

Note: The below map is in color. If you are not viewing a color copy, please email alison.lebwohl@dot.state.wi.us for a color version to be mailed or emailed to you.

The National Weather Service (NWS) map below shows the snowfall for Wisconsin during the period July 1, 2003 to June 30, 2004. Comparison of the 2003-2004 snowfall map to the average snowfall map (also from NWS) indicates that the northern regions had more snowfall than average and the southern regions had less.

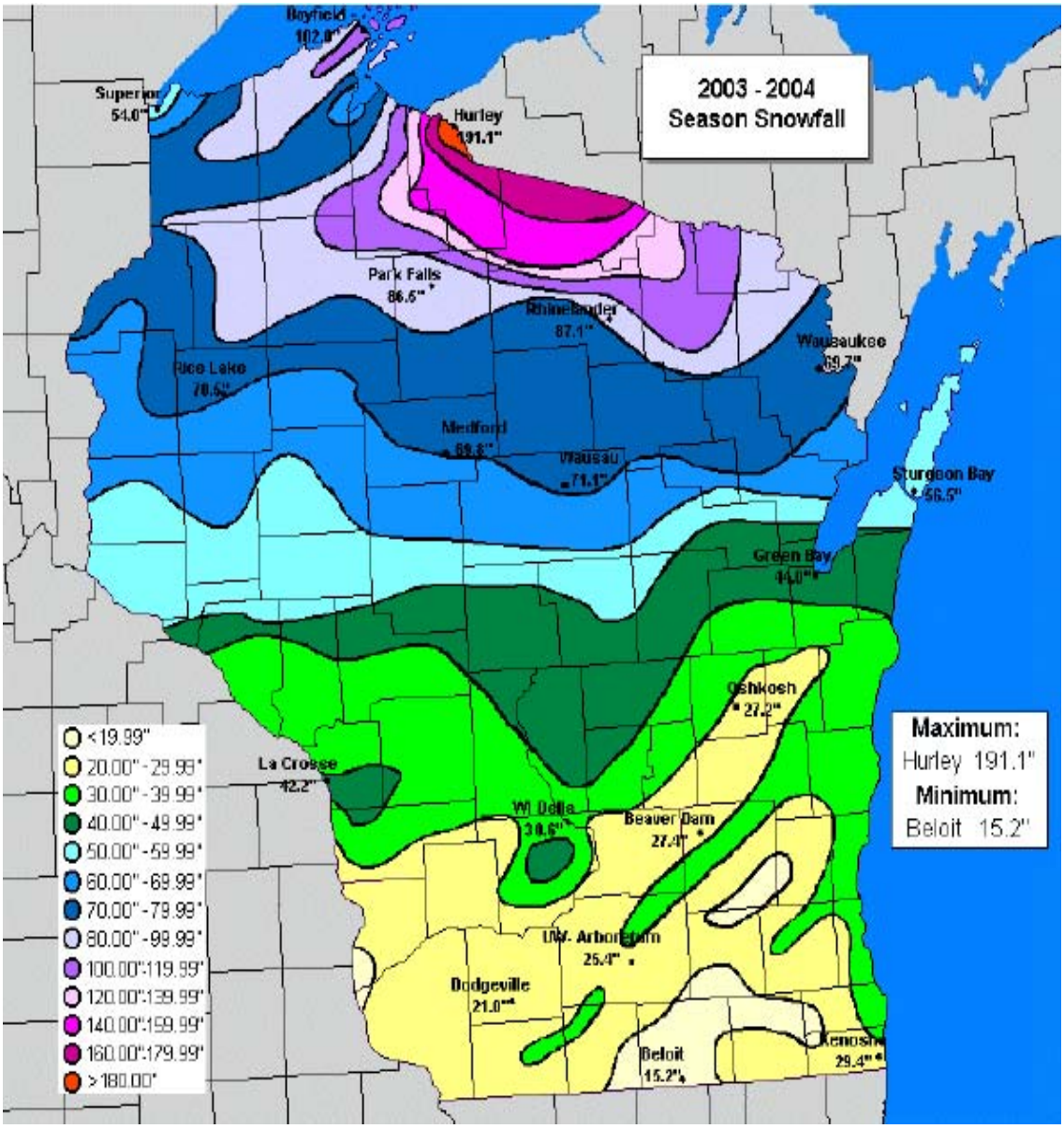


Figure 1. How much snow did Wisconsin get over the 2003-2004 winter?

2003-2004 severity index, salt/lane mile, and dollars/lane mile by county

Note: The below map is in color. If you are not viewing a color copy, please email alison.lebwohl@dot.state.wi.us for a color version to be mailed or emailed to you.

Wisconsin's Winter Severity Index (WSI) is highly correlated with snowfall. Looking at the statewide winter severity numbers, the statewide average for '03/'04 was 31.2 and the previous five-year ('98/'99-'02/'03) average was 30.8. If you look at severity numbers by DOT districts for this year, the northern two-thirds of the state was "more severe" than normal while the southern one-third of the state was "less severe" than normal.

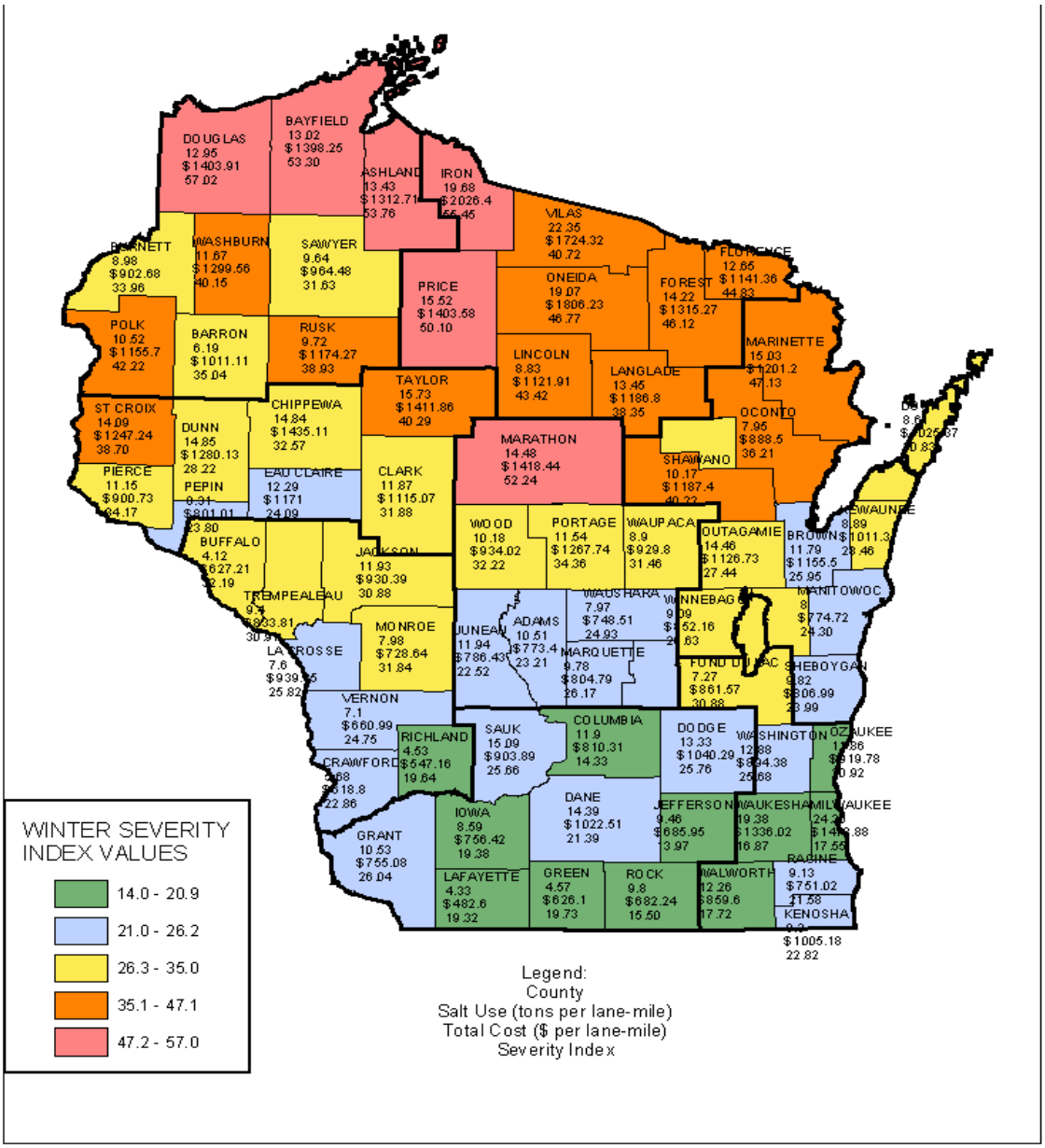


Figure 2: How bad was winter? What did it cost? How much salt was used?

Compass winter operations measures

1. Public satisfaction level

The 2004 information comes from a random telephone survey of 380 Wisconsin residents conducted in February 2004 by Chamberlain Research Consultants. The public satisfaction score of 7.5 (on a scale of 1 to 10, with 10 being high) is relatively high, and does not meaningfully differ from ratings in earlier years. For more information on this survey, contact John Nordbo at john.nordbo@dot.state.wi.us or 608-266-0172.

Table 1 compares public satisfaction in 2004 with previous years. Earlier surveys were also random telephone surveys, and included some 800 participants. Questions are not exactly comparable between 2004 and earlier years. The difference between any two years is within the margin of error, which is 5% for 2004. For more information on these surveys, contact Rick Moss at richard.moss@dot.state.wi.us or 608-267-7830.

Table 1. How satisfied is the public with highway snow and ice removal?

	Average Score			
Survey Question	2004	1999	1997	1996
"On a scale of 1-10 where 10 means extremely satisfied and 1 means not at all satisfied, how satisfied are you that the pavement is clear of snow and ice?"	7.5			
"On a scale of 1-10 where 10 is a very good job and 1 is a very poor job, and 5 is average, how well is WisDOT performing in clearing roads of snow and ice?"		7.6	7.4	7.5

2. Time to bare/wet pavement

WisDOT provides different levels of effort during and after a storm depending on how busy and how critical a given category of highway is. State highways fall into five such categories, with category 1 being the highest priority. It would be expected that an urban freeway (category 1) would receive more materials, labor and equipment – and would show a quicker time to bare/wet pavement – than would a rural two-lane highway (category 5). For more information on these categories, see Appendix A.

The table below shows that the trend for average time to bare/wet pavement is as expected: The more critical the highway, the shorter the average time to bare/wet pavement (Table 2). Less critical highways are also more likely to still have snow on them 24 hours after the storm has ended. This suggests that major urban freeways and highways are receiving a higher level of effort for winter operations than secondary roads.

Time to bare/wet pavement is calculated from the reported end time of the storm. Bare/wet never achieved means that it took more than 24 hours to achieve bare/wet, or the next storm began before bare/wet was achieved.

Further analysis suggests that variability, within a category, is due more to weather effects (range of storms throughout the winter season) than to differences in the level of effort or relative resources. See Winter Appendix B at the end of this section for more information.

Table 2. How long after the storm stops will the pavement be bare/wet?

Highway category		**Average time to bare/wet pavement** (hours after end of storm)*	Storms		
			Total	Bare/wet never achieved	**% Bare/wet never achieved**
More critical highway ↓ Less critical highways	1	1.07	174	1	1%
	2	1.31	332	29	9%
	3	1.52	491	25	5%
	4	2.45	507	76	15%
	5	3.63	678	151	22%

*Only includes storms where bare/wet pavement was achieved.

3. Winter weather crashes per vehicle miles traveled (VMT)

Table 3 shows that counties with higher winter coverage tend to have fewer crashes per 100 million VMT. (Group A has higher coverage than Group B, etc.). For more information on county groupings A-D, see Winter Appendix B at the end of this section. Winter weather crashes are those crashes that occurred on snow-, slush-, or ice-covered pavements.

As expected, the number of winter crashes increases as VMT increases, although districts with more rural roads tend to have higher winter crash rates (crashes per VMT). This is consistent with non-winter crash rates. The state average is 26 winter crashes per 100 million VMT. It is also interesting to look at the crash rate relative to winter severity, as we do in Figure 3, below.

Table 3. What is the crash rate?

	Scope	VMT* (100 million)	Crashes	Crashes per 100 million VMT	Average Winter Severity Index
	Statewide	274.18	7208	26	31.20
	D1	52.84	1239	23	20.10
	D2	94.00	1623	17	21.75
	D3	47.29	1295	27	31.29
	D4	25.33	851	34	30.10
	D5	16.78	595	35	27.36
	D6	20.02	742	37	31.72
	D7	9.31	392	42	45.72
	D8	12.35	471	38	42.89
Counties with more coverage ↓ Counties with less coverage	Group A	137.11	2900	21	26.02
	Group B	67.33	1935	29	25.32
	Group C	46.65	1597	35	31.20
	Group D	24.08	827	34	37.98

*100 million vehicle miles traveled (VMT) for November 1, 2003 though April 30, 2004 determined from annual average daily traffic (AADT) counts, gallons of gas sold, fuel tax collected, and average vehicle miles per gallon.

Figure 3 shows us that, as severity of the winter increases, so does the winter crash rate.

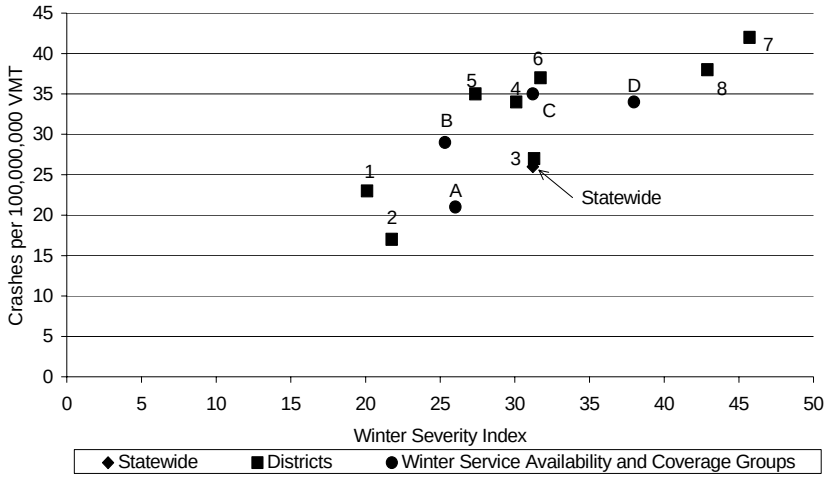


Figure 3. What is the crash rate?

4. Costs per lane mile versus winter severity index

Table 4 lists the total actual cost per lane mile for winter operations in each district, along with district winter severity index. As severity of the winter increases, so does the cost per lane mile. Districts that incurred higher cost per lane mile had more severe weather than the statewide average, with the exception of District 2.

The statewide average cost per lane mile was $1,279 with average severity index of 31.20. Total costs include material, labor, equipment, and administrative costs.

Table 4. How much are districts spending per lane mile?
Measured relative to winter severity

District	Average WSI	Actual cost/LM
Statewide	31.20	$1,279
1	20.10	$1,020
2	21.75	$1,369
3	31.29	$1,343
4	30.10	$1,286
5	27.36	$868
6	31.72	$1,452
7	45.72	$1,737
8	42.89	$1,411

Winter Appendix A: Data, Definitions, and Categories

Data

Unless otherwise noted, all material and labor figures come from the winter storm reports, which are submitted by each county, for every event or anti-icing procedure, throughout the winter season. Weather, road conditions, and materials use reported rely on the observations of county patrol superintendents and sometimes on their expert judgment and, as such, contain more variability than direct measurements. For the time-to-bare/wet-pavement measure, this was the first year for counties to report using the passable roadway categories. Consistency with the reporting procedure for this is unknown.

Definitions

Dollars: Cost data are from the fiscal year, July 1, 2003 to June 30, 2004.
Winter: November 1 through April 30, unless otherwise noted.
Winter Activities: Actual cost data incorporates all winter activities, including putting up snow fence, transporting salt, filling salt sheds, thawing out frozen culverts, calibrating salt spreaders, producing and storing salt brine, and anti-icing applications, as well as plowing and salting. Costs from storm reports, however, cover only plowing, sanding, salting, and anti-icing.
Roads: The roads referred to in this report are state maintained highways, including Interstate and US highways. See below for groupings.

Categories & groupings

Table 5. Passable roadway expectation categories

Category	Definition	Lane miles	% of total
1	Major urban freeways and most highways with six lanes and greater	1,913	6%
2	High volume four-lane highways (ADT $\geq$ 25,000) and some four-lane highways (ADT < 25,000), and some 6-lane highways.	2,662	9%
3	All other four-lane highways (ADT < 25,000)	6,575	21%
4	Most high volume two-lane highways (ADT $\geq$ 5,000) and some 2-lanes (ADT <5000)	4,669	15%
5	All other two-lane highways	15,090	49%

Table 6. Winter service availability and coverage groups

Group	Definition	Number of Counties	% of Counties
A	Counties where all or most of the highways receive 24-hour coverage	12	17%
B	Counties with 18-hour and 24-hour coverage. More than 50% of highways receive 24-hour coverage.	16	22%
C	Counties with 18-hour and 24-hour coverage. Less than 50% of highways receive 24-hour coverage.	20	28%
D	Counties where no highways receive 24-hour coverage.	24	33%

Winter Appendix B: Analysis of variation within time to bare/wet pavement

Table 7 shows that the standard deviation for time to bare/wet pavement is nearly constant (4 to 5 hours) with only slight increase with roadway category. Standard deviation is a measure of spread or variability in the data. A high standard deviation means there was more variation in the time to bare/wet pavement from storm to storm and county to county. The high standard deviation for all categories suggests that variability, within a category, is due more to weather effects (range of storms throughout the winter season) than to variability in the level of effort.

Table 7: Variation among storms in time to bare/wet pavement

Category	Time to bare/wet pavement (hours after each storm)*		Storms		
	Average	Standard deviation	Total	Bare/wet never achieved	% Bare/wet never achieved
1	1.07	3.94	174	1	0.57
2	1.31	4.06	332	29	8.73
3	1.52	4.25	491	25	5.09
4	2.45	4.96	507	76	14.99
5	3.63	5.04	678	151	22.27

Counties 2004:
Compass Report on Traffic, Shoulders, Drainage, Roadsides

Data in this section comes from the field review performed by WisDOT district area assistants and county patrol superintendents. Reporting was done by WisDOT staff. No statistical analysis has been done on this data. Please take the number of observations into account when reviewing the information.

Counties 2004: Traffic and Shoulders

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
1	Columbia	8%	4%	35%	0%	0%	21%	0%	--	71%	63%	5%	17%	16%	88%	26%	76%
		25	25	9	2	2	9	7	--[1]	24	19	19	18	19	25	23	25
	Dane	0%	3%	17%	2%	0%	2%	6%	14%	3%	50%	0%	8%	3%	39%	0%	0%
		41	41	11	16	4	7	21	4	39	30	30	13	30	38	38	38
	Dodge	0%	0%	45%	3%	0%	23%	0%	0%	83%	78%	0%	19%	0%	87%	26%	39%
		24	24	7	14	1	5	7	3	24	23	23	16	23	23	23	23
	Grant	0%	0%	0%	0%	0%	--	0%	--	5%	40%	0%	0%	0%	20%	0%	0%
		21	21	1	9	3	--	7	--	20	15	16	8	16	20	20	20
	Green	0%	0%	--	0%	--	--	0%	--	0%	40%	0%	--	0%	0%	0%	0%
		7	7	--	2	--	--	5	--	7	5	5	--	5	7	7	7
	Iowa	0%	0%	0%	0%	0%	0%	0%	0%	9%	56%	0%	0%	0%	17%	0%	9%
		25	25	4	8	1	4	12	1	22	9	9	3	9	23	23	23
	Jefferson	0%	0%	0%	0%	0%	30%	0%	0%	16%	63%	0%	100%	0%	16%	0%	32%
		20	20	3	9	1	1	9	1	19	19	19	1	19	19	19	19

[1] Where no numbers are given, there were no observations of this feature in this county for 2004.

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		0%	6%	0%	0%	1%	--	0%	--	13%	54%	0%	--	0%	25%	0%	13%
	Layfayette	16	16	1	4	4	--	6	--	15	13	13	--	13	16	16	16
		0%	0%	11%	0%	0%	7%	5%	0%	11%	54%	0%	6%	13%	19%	0%	4%
	Rock	28	28	7	12	2	6	8	5	28	24	24	18	24	27	26	27
		16%	22%	64%	0%	2%	23%	0%	0%	66%	28%	0%	4%	4%	77%	13%	81%
	Sauk	32	32	9	12	5	3	17	3	32	25	25	23	25	31	31	31
		0%	0%	20%	0%	0%	0%	0%	0%	10%	56%	0%	100%	9%	48%	0%	24%
2	Fond du Lac	29	29	3	5	2	2	10	2	29	25	25	1	22	29	28	29
		0%	0%	15%	0%	0%	75%	2%	0%	0%	65%	0%	17%	30%	37%	0%	5%
	Kenosha	22	22	4	10	5	4	18	11	22	20	20	6	20	19	19	19
		0%	9%	43%	0%	0%	24%	4%	9%	4%	83%	0%	0%	0%	75%	13%	13%
	Milwaukee	28	28	3	20	14	10	17	21	28	18	19	17	18	8	8	8
		8%	8%	8%	0%	0%	57%	0%	0%	0%	82%	0%	33%	30%	50%	0%	0%
	Ozaukee	13	13	7	6	3	7	6	5	13	11	11	9	10	10	10	10
		0%	0%	0%	0%	2%	--	3%	0%	10%	59%	0%	17%	7%	27%	15%	12%
	Racine	29	29	2	8	3	--	18	2	29	29	29	6	29	26	26	26
		0%	0%	19%	0%	15%	8%	0%	10%	3%	55%	0%	0%	0%	42%	0%	3%
	Walworth	37	37	15	8	6	9	17	2	37	11	11	9	11	33	34	34

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		0%	0%	25%	0%	16%	8%	0%	63%	0%	73%	0%	0%	0%	28%	0%	0%
	Washington	30	30	11	10	7	10	16	3	30	26	27	4	27	29	29	29
		6%	17%	25%	1%	1%	35%	0%	39%	32%	44%	4%	0%	16%	36%	5%	15%
	Waukesha	51	51	12	35	10	13	25	21	50	27	27	21	25	39	39	40
		0%	3%	12%	0%	0%	2%	0%	3%	9%	71%	0%	100%	6%	74%	0%	29%
3	Brown	32	33	12	17	4	9	18	8	33	31	31	1	31	31	31	31
		0%	0%	0%	0%	0%	--	0%	0%	0%	44%	0%	0%	0%	6%	6%	6%
	Calumet	17	17	1	11	2	--	7	1	17	16	16	6	16	17	17	17
		12%	6%	--	0%	--	--	0%	0%	0%	59%	0%	--	0%	69%	0%	0%
	Door	17	17	--	8	--	--	12	2	17	17	17	--	17	16	16	16
		0%	0%	--	0%	--	--	0%	0%	22%	33%	0%	--	0%	89%	0%	67%
	Kewaunee	9	9	--	3	--	--	4	1	9	9	9	--	9	9	9	9
		0%	0%	--	0%	0%	--	0%	27%	6%	71%	0%	0%	12%	50%	0%	6%
	Manitowoc	17	17	--	9	2	--	6	4	16	17	17	1	17	16	16	16
		16%	16%	0%	0%	0%	--	0%	--	26%	67%	6%	17%	17%	32%	0%	16%
	Marinette	19	19	1	10	1	--	9	--	19	18	18	6	18	19	19	19
		0%	75%	--	0%	--	--	0%	100%	25%	--	--	--	--	50%	0%	25%
	Menominee	4	4	--	2	--	--	2	1	4	--	--	--	--	4	4	4

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		0%	0%	12%	0%	0%	0%	5%	0%	13%	76%	0%	0%	5%	61%	0%	17%
	Oconto	23	23	4	7	2	2	6	3	23	21	21	1	21	23	23	23
		5%	18%	33%	0%	0%	--	2%	0%	0%	52%	0%	9%	15%	60%	0%	10%
	Outagamie	22	24	2	10	3	--	16	2	24	21	21	11	20	20	20	20
		0%	8%	15%	0%	0%	3%	0%	0%	29%	55%	0%	100%	0%	21%	0%	8%
	Shawano	24	24	7	10	1	8	10	5	24	20	20	1	20	24	24	24
		10%	21%	--	0%	3%	4%	0%	0%	3%	44%	0%	0%	0%	11%	0%	4%
	Sheboygan	29	29	--	14	3	3	20	5	29	25	25	1	25	28	28	28
		0%	0%	0%	0%	0%	6%	0%	--	0%	58%	0%	20%	0%	43%	4%	0%
	Winnebago	25	25	10	11	1	8	10	--	24	19	19	5	17	23	23	23
		0%	0%	--	0%	0%	--	0%	--	21%	38%	0%	--	7%	7%	0%	0%
4	Adams	14	14	--	5	1	--	7	--	14	13	14	--	14	14	14	14
		6%	13%	0%	0%	0%	--	0%	0%	0%	69%	0%	0%	13%	47%	0%	0%
	Green Lake	16	16	1	8	2	--	9	2	16	16	16	2	16	15	15	15
		0%	0%	--	0%	0%	--	0%	50%	6%	19%	0%	0%	0%	17%	0%	6%
	Juneau	36	36	--	7	2	--	12	1	35	27	28	8	28	36	36	36
		0%	0%	--	0%	0%	--	0%	27%	6%	71%	0%	0%	12%	50%	0%	6%
	Marathon	17	17	--	9	2	--	6	4	16	17	17	1	17	16	16	16

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		0%	0%	7%	0%	--	0%	0%	0%	6%	73%	0%	--	7%	100%	0%	7%
	Marquette	15	16	5	6	--	3	7	1	16	15	15	--	14	15	15	15
		4%	4%	6%	0%	1%	10%	0%	0%	11%	81%	0%	0%	7%	15%	0%	0%
	Portage	28	28	11	9	2	8	12	3	27	27	27	11	27	27	27	27
		9%	3%	49%	0%	--	--	3%	--	0%	18%	0%	0%	0%	36%	3%	15%
	Waupaca	34	34	4	6	--	--	15	--	34	28	28	1	27	33	33	33
		0%	0%	0%	0%	23%	0%	0%	--	0%	26%	0%	0%	11%	16%	0%	0%
	Waushara	19	19	1	7	1	1	9	--	19	19	19	1	19	19	19	19
		0%	0%	0%	0%	0%	--	0%	8%	5%	7%	0%	0%	0%	20%	0%	15%
	Wood	22	22	2	6	3	--	11	6	22	14	14	1	14	20	20	20
		17%	17%	0%	13%	--	0%	0%	--	0%	25%	0%	0%	13%	50%	0%	0%
5	Buffalo	18	18	1	3	--	1	9	--	18	8	7	2	8	18	18	18
		10%	5%	29%	0%	0%	--	0%	25%	5%	8%	0%	--	0%	0%	0%	0%
	Crawford	20	20	4	8	2	--	7	2	20	13	13	--	13	20	20	20
		0%	0%	0%	0%	--	5%	0%	--	7%	30%	3%	0%	12%	12%	0%	5%
	Jackson	46	47	7	18	--	8	1	--	45	33	33	32	33	42	41	42
		11%	12%	35%	0%	17%	31%	0%	0%	39%	83%	0%	0%	33%	100%	0%	29%
	La Crosse	18	18	10	4	9	6	9	1	18	6	6	2	6	7	7	7

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		7%	5%	18%	2%	0%	20%	0%	6%	18%	33%	0%	17%	0%	58%	0%	3%
	Monroe	44	44	13	19	5	6	14	3	44	27	27	6	27	33	33	33
		22%	15%	0%	0%	0%	--	0%	0%	4%	26%	0%	--	0%	4%	0%	0%
	Richland	27	28	8	12	4	--	12	1	28	19	19	--	19	26	26	26
		4%	0%	--	0%	--	--	0%	--	12%	42%	4%	0%	4%	35%	4%	30%
	Trempealeau	26	26	--	11	--	--	1	--	26	24	24	23	24	23	23	23
		0%	3%	50%	0%	2%	--	0%	0%	0%	25%	0%	--	0%	8%	0%	29%
	Vernon	38	38	11	11	10	--	8	1	37	28	28	--	28	38	38	38
		0%	0%	6%	5%	2%	0%	9%	25%	0%	42%	0%	17%	0%	7%	2%	2%
6	Chippewa	43	43	18	13	7	9	15	2	43	26	26	12	26	43	43	43
		0%	0%	0%	0%	--	0%	0%	0%	0%	46%	0%	--	0%	0%	0%	0%
	Clark	28	28	7	6	--	4	9	2	28	28	28	--	28	28	28	28
		5%	0%	32%	0%	3%	9%	0%	0%	2%	63%	0%	0%	22%	60%	5%	17%
	Dunn	43	43	11	6	4	4	25	6	42	32	33	2	32	42	42	42
		0%	0%	63%	0%	6%	0%	0%	4%	4%	64%	0%	0%	0%	24%	0%	10%
	Eau Claire	24	24	9	12	6	1	9	5	23	11	11	2	11	21	21	21
		0%	25%	29%	0%	0%	--	0%	0%	0%	38%	0%	0%	0%	0%	0%	0%
	Pepin	8	8	2	3	1	--	5	1	8	8	8	8	8	6	6	6

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		2%	4%	42%	0%	3%	--	0%	0%	13%	72%	0%	--	10%	21%	2%	5%
	Pierce	45	45	14	10	14	--	21	3	45	43	43	--	42	43	43	43
		12%	6%	46%	0%	1%	--	0%	0%	6%	58%	0%	0%	3%	26%	0%	16%
	St. Croix	33	33	10	12	7	--	12	2	32	31	31	1	31	31	31	31
		0%	0%	--	0%	--	--	0%	0%	0%	38%	0%	--	0%	38%	0%	0%
	Taylor	16	16	--	5	--	--	6	1	16	13	13	--	13	16	16	16
		0%	33%	--	5%	--	--	0%	0%	7%	30%	0%	0%	0%	27%	0%	13%
7	Florence	15	15	--	6	--	--	8	1	15	10	10	9	10	15	15	15
		0%	10%	--	0%	--	--	0%	--	0%	13%	0%	11%	0%	47%	10%	23%
	Forest	30	30	--	8	--	--	11	--	30	24	24	9	24	30	30	30
		0%	0%	--	0%	--	--	0%	0%	6%	67%	0%	0%	0%	29%	0%	0%
	Iron	19	19	--	3	--	--	2	2	18	9	9	9	9	17	17	17
		0%	13%	--	0%	0%	--	0%	--	15%	80%	0%	0%	0%	35%	0%	40%
	Langlade	40	40	--	9	1	--	12	--	40	20	20	1	20	40	40	40
		6%	23%	4%	0%	29%	31%	0%	0%	13%	64%	0%	11%	12%	42%	3%	42%
	Lincoln	32	32	13	5	3	9	8	3	32	25	25	9	25	31	31	31
		0%	18%	0%	0%	10%	--	4%	0%	13%	25%	0%	--	3%	45%	5%	5%
	Oneida	39	40	1	9	2	--	14	5	40	40	40	--	40	40	40	40

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		0%	29%	12%	0%	0%	--	0%	17%	3%	13%	0%	0%	0%	9%	0%	9%
	Price	34	34	2	13	2	--	13	3	34	23	23	21	23	34	34	34
		0%	0%	3%	0%	0%	0%	0%	0%	10%	23%	0%	0%	0%	18%	0%	0%
	Vilas	30	30	4	15	3	1	14	3	30	26	27	27	27	28	27	27
		37%	26%	38%	0%	0%	--	0%	33%	11%	85%	0%	0%	0%	58%	5%	5%
8	Ashland	19	19	3	7	1	--	12	2	19	13	13	13	13	19	19	19
		14%	7%	0%	0%	0%	10%	0%	0%	0%	42%	0%	20%	0%	27%	0%	8%
	Barron	29	29	7	5	2	7	15	5	29	26	26	5	26	26	26	26
		5%	0%	0%	0%	0%	--	0%	--	14%	67%	0%	0%	0%	5%	14%	24%
	Bayfield	22	22	1	6	1	--	10	--	22	18	18	3	18	21	21	21
		9%	18%	27%	0%	0%	--	0%	0%	9%	40%	0%	0%	7%	32%	0%	0%
	Burnett	22	22	3	3	1	--	9	2	22	15	14	1	15	22	22	22
		14%	18%	6%	0%	0%	2%	0%	0%	57%	84%	0%	--	0%	29%	7%	7%
	Douglas	28	28	11	8	1	8	7	3	28	25	25	--	25	28	28	28
		21%	33%	100%	0%	0%	0%	0%	0%	7%	54%	0%	0%	4%	26%	11%	7%
	Polk	28	28	1	12	4	2	14	1	28	24	24	3	23	27	27	27
		20%	4%	0%	0%	--	--	0%	17%	0%	50%	0%	--	0%	64%	0%	32%
	Rusk	25	25	1	7	--	--	11	3	25	16	19	--	18	25	25	25

		Condition % backlogged # of observations															
		Traffic								Shoulders							
District	County	Centerline	Edgeline	Delineators	Other Signs (emergency)	Protective Barriers	Raised Pavement Markers	Reg./Warn. Signs (emergency)	Special Pavement Markings	Hazardous Debris	Cracking (paved)	Cross Slope (paved)	Dropoff (paved)	Potholes (paved)	Dropoff (unpaved)	Erosion (unpaved)	Cross Slope (unpaved)
		10%	11%	0%	3%	--	--	3%	14%	0%	24%	0%	0%	0%	62%	0%	26%
	Sawyer	39	39	1	7	--	--	18	2	39	33	33	2	32	39	39	39
		41%	44%	2%	0%	0%	16%	0%	--	11%	75%	0%	60%	5%	70%	0%	19%
	Washburn	27	27	12	9	1	9	15	--	27	24	24	10	22	27	26	27

Counties 2004: Drainage and Roadsides

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
1	Columbia	83%	--[2]	23%	--	--	0%	--	36%	100%	59%	72%	100%	40%	0%
		4	--	22	--	--	1	--	7	25	17	25	25	25	25
	Dane	22%	0%	0%	0%	100%	6%	--	0%	46%	56%	7%	93%	0%	0%
		8	3	30	1	1	5	--	6	41	41	41	41	41	41
	Dodge	100%	43%	11%	35%	100%	100%	--	22%	100%	83%	29%	100%	21%	0%
		4	4	22	4	2	1	--	6	24	23	24	24	24	24
	Grant	0%	3%	0%	--	33%	0%	--	--	86%	33%	5%	10%	0%	0%
		5	3	18	--	3	2	--	--	21	21	21	20	21	21
	Green	0%	0%	0%	--	--	--	--	--	14%	71%	0%	100%	0%	0%
		3	1	5	--	--	--	--	--	7	7	7	7	7	7
	Iowa	13%	2%	0%	--	--	0%	--	0%	83%	24%	4%	42%	0%	5%
		8	3	19	--	--	5	--	6	24	25	24	24	22	22
	Jefferson	0%	0%	0%	--	--	0%	--	0%	80%	45%	0%	15%	0%	0%
		3	3	18	--	--	1	--	3	20	20	20	20	20	20

[2] Where no numbers are given, there were no observations of this feature in this county for 2004.

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		0%	1%	0%	0%	--	--	--	--	94%	69%	0%	31%	0%	0%
	Layfayette	1	2	15	2	--	--	--	--	16	16	16	16	16	15
		0%	0%	0%	0%	--	0%	--	0%	54%	63%	4%	39%	0%	0%
	Rock	10	4	27	1	--	3	--	7	28	27	28	28	28	28
		22%	30%	14%	55%	20%	100%	--	7%	97%	65%	31%	90%	53%	6%
	Sauk	8	5	27	1	2	1	--	1	32	31	32	30	32	32
		0%	0%	2%	7%	0%	0%	--	1%	64%	62%	0%	52%	7%	0%
2	Fond du Lac	5	6	19	6	3	2	--	2	28	26	29	27	29	27
		0%	0%	1%	40%	18%	5%	0%	0%	86%	76%	5%	5%	0%	0%
	Kenosha	4	8	18	8	6	13	2	1	22	21	22	22	22	22
		50%	7%	15%	9%	--	19%	0%	0%	96%	43%	4%	18%	4%	0%
	Milwaukee	3	23	11	3	--	20	5	9	28	28	28	28	28	28
		0%	1%	0%	17%	0%	4%	--	0%	38%	36%	0%	23%	0%	0%
	Ozaukee	1	4	10	3	1	6	--	7	13	11	13	13	13	10
		18%	1%	0%	4%	86%	0%	--	--	56%	59%	3%	0%	0%	0%
	Racine	8	8	27	8	5	7	--	--	27	29	29	29	28	29
		0%	1%	0%	20%	0%	6%	0%	1%	78%	56%	16%	51%	0%	0%
	Walworth	9	6	30	8	1	7	1	10	36	36	37	37	34	36

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		29%	26%	0%	0%	0%	0%	0%	0%	27%	53%	33%	60%	0%	0%
	Washington	6	4	26	3	3	12	1	10	26	30	30	30	30	28
		20%	0%	0%	10%	56%	0%	0%	1%	76%	49%	2%	18%	0%	4%
	Waukesha	5	19	40	4	5	20	1	13	49	51	51	50	49	46
		11%	1%	0%	6%	43%	13%	0%	0%	88%	45%	82%	58%	0%	0%
3	Brown	9	10	30	4	5	9	1	9	33	33	33	33	33	33
		20%	0%	0%	0%	--	0%	0%	--	88%	71%	24%	18%	0%	0%
	Calumet	4	1	15	2	--	1	1	--	17	17	17	17	17	17
		25%	4%	1%	--	50%	30%	--	--	56%	76%	0%	13%	6%	0%
	Door	4	3	15	--	2	2	--	--	16	17	17	16	17	17
		0%	1%	0%	0%	50%	0%	--	--	100%	56%	100%	67%	0%	0%
	Kewaunee	3	1	9	1	1	1	--	--	9	9	9	9	9	9
		40%	1%	2%	--	--	20%	--	0%	76%	87%	24%	35%	0%	6%
	Manitowoc	4	4	17	--	--	3	--	1	17	15	17	17	17	17
		0%	0%	1%	--	0%	--	--	--	84%	21%	0%	0%	5%	5%
	Marinette	4	3	19	--	1	--	--	--	19	19	19	19	19	19
		--	20%	4%	--	--	0%	--	--	75%	50%	25%	25%	0%	0%
	Menominee	--	1	4	--	--	1	--	--	4	4	4	4	4	4

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		20%	37%	1%	20%	50%	0%	--	1%	78%	30%	0%	65%	4%	0%
	Oconto	5	2	21	2	1	3	--	3	23	23	23	23	23	23
		13%	1%	0%	--	29%	17%	0%	--	48%	33%	0%	4%	0%	0%
	Outagamie	7	10	17	--	3	7	2	--	23	12	24	24	21	24
		8%	4%	2%	23%	0%	20%	--	--	75%	50%	0%	54%	0%	0%
	Shawano	11	3	24	8	1	4	--	--	24	24	24	24	24	22
		0%	1%	0%	0%	36%	0%	--	--	79%	55%	7%	72%	3%	0%
	Sheboygan	5	6	29	2	4	5	--	--	29	29	28	29	29	29
		0%	0%	0%	2%	0%	0%	--	0%	42%	0%	4%	4%	0%	0%
	Winnebago	9	3	18	8	1	4	--	7	24	23	25	24	22	25
		20%	32%	2%	--	0%	--	--	--	93%	31%	36%	7%	0%	0%
4	Adams	3	2	13	--	2	--	--	--	14	13	14	14	14	14
		0%	36%	1%	--	50%	--	--	--	100%	7%	0%	7%	0%	0%
	Green Lake	3	2	11	--	1	--	--	--	15	15	15	15	15	15
		0%	5%	0%	--	0%	--	--	--	72%	0%	0%	64%	0%	0%
	Juneau	9	2	28	--	2	--	--	--	36	36	36	36	36	36
		40%	1%	2%	--	--	20%	--	0%	76%	87%	24%	35%	0%	6%
	Marathon	4	4	17	--	--	3	--	1	17	15	17	17	17	17

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		17%	83%	0%	--	0%	25%	--	0%	100%	0%	6%	0%	0%	0%
	Marquette	4	3	12	--	1	2	--	1	16	16	16	16	16	16
		60%	0%	3%	12%	0%	0%	--	0%	79%	15%	0%	7%	0%	0%
	Portage	4	2	27	9	1	10	--	9	28	27	27	28	28	28
		0%	0%	0%	8%	0%	--	--	--	56%	33%	3%	3%	0%	0%
	Waupaca	7	4	26	7	2	--	--	--	34	33	34	34	34	34
		25%	3%	0%	0%	0%	--	--	0%	95%	16%	5%	0%	0%	0%
	Waushara	8	3	18	1	2	--	--	1	19	19	19	19	19	19
		0%	3%	0%	0%	0%	5%	--	--	59%	0%	0%	45%	0%	0%
	Wood	2	4	20	2	1	3	--	--	22	22	22	22	22	22
		17%	--	5%	--	--	--	--	--	94%	33%	33%	11%	6%	6%
5	Buffalo	10	--	17	--	--	--	--	--	18	18	18	18	18	18
		20%	1%	0%	--	0%	0%	--	--	65%	45%	25%	0%	0%	0%
	Crawford	5	3	19	--	1	2	--	--	20	20	20	20	20	20
		15%	0%	0%	--	--	--	0%	1%	81%	4%	83%	0%	2%	0%
	Jackson	16	1	37	--	--	--	1	8	47	46	47	47	47	47
		50%	4%	3%	--	33%	25%	0%	11%	78%	67%	0%	28%	6%	11%
	La Crosse	6	3	14	--	3	4	1	6	18	18	18	18	18	18

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		22%	0%	1%	25%	50%	0%	--	11%	86%	55%	2%	19%	5%	0%
	Monroe	16	1	43	1	2	3	--	6	44	44	42	43	44	42
		20%	1%	2%	--	0%	0%	--	--	43%	52%	14%	11%	11%	0%
	Richland	13	5	26	--	3	2	--	--	28	27	28	27	28	27
		0%	--	0%	--	--	--	--	--	92%	68%	96%	12%	4%	0%
	Trempealeau	8	--	21	--	--	--	--	--	26	25	26	25	26	26
		5%	0%	1%	--	0%	--	--	--	47%	53%	13%	3%	5%	0%
	Vernon	19	1	38	--	2	--	--	--	38	38	38	37	38	38
		19%	0%	0%	0%	25%	0%	--	2%	67%	31%	2%	0%	0%	0%
6	Chippewa	19	2	31	1	3	3	--	7	43	42	42	43	43	43
		0%	9%	0%	0%	--	0%	--	--	38%	29%	7%	11%	0%	0%
	Clark	7	2	25	5	--	1	--	--	26	28	28	27	28	28
		0%	0%	0%	--	0%	0%	--	0%	84%	37%	2%	17%	0%	0%
	Dunn	12	6	39	--	1	1	--	4	43	41	43	42	43	43
		27%	14%	1%	--	100%	11%	--	0%	79%	25%	46%	0%	0%	0%
	Eau Claire	8	6	16	--	1	4	--	5	24	24	24	22	24	24
		--	0%	0%	--	--	--	--	--	67%	88%	50%	0%	0%	0%
	Pepin	--	2	6	--	--	--	--	--	6	8	8	8	8	8

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		6%	2%	0%	--	0%	--	--	--	78%	49%	64%	18%	0%	0%
	Pierce	16	5	39	--	2	--	--	--	40	45	45	44	43	45
		18%	51%	2%	--	100%	0%	--	0%	63%	41%	0%	16%	0%	0%
	St. Croix	11	5	29	--	2	1	--	3	32	32	32	32	32	32
		50%	8%	0%	--	50%	100%	--	--	63%	50%	44%	20%	0%	0%
	Taylor	5	3	14	--	1	1	--	--	16	16	16	15	16	16
		33%	--	0%	--	0%	--	--	--	40%	27%	0%	7%	0%	0%
7	Florence	5	--	14	--	1	--	--	--	15	15	15	15	15	15
		0%	0%	0%	--	0%	--	--	--	67%	3%	80%	20%	0%	3%
	Forest	5	2	27	--	1	--	--	--	30	30	30	30	30	30
		0%	33%	0%	--	0%	0%	--	--	21%	12%	56%	0%	0%	0%
	Iron	9	3	17	--	1	3	--	--	19	17	18	18	18	18
		0%	45%	0%	--	83%	--	--	--	53%	45%	98%	43%	0%	5%
	Langlade	7	1	37	--	1	--	--	--	40	40	40	40	40	40
		19%	2%	10%	0%	--	8%	--	6%	81%	23%	50%	25%	6%	9%
	Lincoln	11	1	31	8	--	5	--	7	32	30	32	32	32	32
		55%	9%	2%	--	25%	--	--	--	73%	28%	98%	5%	3%	0%
	Oneida	11	8	37	--	3	--	--	--	40	40	40	40	40	40

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		0%	23%	0%	0%	25%	0%	--	--	18%	0%	100%	0%	0%	0%
	Price	9	3	25	2	3	1	--	--	34	34	34	34	34	32
		0%	0%	0%	--	--	0%	--	--	52%	28%	83%	3%	0%	0%
	Vilas	5	4	23	--	--	3	--	--	29	29	30	30	30	30
		0%	5%	5%	0%	33%	60%	--	--	42%	16%	5%	32%	5%	0%
8	Ashland	6	3	16	1	2	2	--	--	19	19	19	19	19	19
		0%	0%	1%	--	0%	0%	--	0%	62%	11%	90%	10%	0%	0%
	Barron	6	4	26	--	1	3	--	6	29	28	29	29	29	29
		20%	9%	1%	0%	100%	--	--	--	45%	9%	0%	36%	5%	0%
	Bayfield	7	2	20	1	1	--	--	--	22	22	22	22	22	22
		45%	--	4%	--	--	--	--	--	45%	36%	0%	33%	0%	0%
	Burnett	10	--	17	--	--	--	--	--	22	22	22	21	22	22
		9%	13%	6%	17%	0%	0%	--	0%	96%	11%	36%	68%	0%	0%
	Douglas	10	4	25	1	1	2	--	1	28	28	28	28	28	28
		0%	2%	0%	--	0%	50%	--	--	43%	52%	93%	0%	0%	0%
	Polk	11	3	27	--	1	2	--	--	28	27	28	28	28	28
		67%	0%	6%	--	--	--	--	--	60%	40%	4%	4%	40%	0%
	Rusk	5	1	23	--	--	--	--	--	25	25	25	24	25	25

		Condition % backlogged # of observations													
		Drainage						Roadsides							
District	County	Culverts	Curb & Gutter	Ditches	Drains	Flumes	Storm Sewer	Barriers	Fences	Litter	Mowing	Mowing for Vision	Noxious Weeds	Woody Vegetation Control	Woody Vegetation Control for Vision
		25%	22%	0%	--	0%	0%	--	--	61%	26%	24%	0%	0%	0%
	Sawyer	4	2	28	--	1	2	--	--	38	39	38	38	39	38
		17%	--	1%	0%	--	--	--	0%	96%	4%	48%	15%	4%	0%
	Washburn	5	--	23	3	--	--	--	6	26	27	27	27	27	26

Appendix: Backlog thresholds

Thresholds denote the point at which that feature becomes part of the potential maintenance workload for the next 12 months. For continuous features or features measured by the mile, this includes both sides of the road for a mile. At this point, the mile of road is backlogged for this feature. For discrete features (e.g., culverts), the measure is for the overall inventory of features. These are not safety measures.

Element	Feature	Thresholds
Pavement, asphalt	Alligator cracking	10% or more of the surface has unsealed alligator cracking (within a mile)
	Block cracking	10% or more of the surface has unsealed block cracking (within a mile)
	Edge raveling	Visible cracking is present for 10% or more of the mile
	Flushing	Flushing is present in more than small, isolated areas (within a mile)
	Longitudinal cracking	Any unsealed longitudinal cracking (within a mile)
	Longitudinal distortion	Significant distortion affects 1% or more of roadway (within a mile)
	Patch deterioration	Any patch is deteriorated enough to affect ride quality (within a mile)
	Rutting	Ruts are ¼ inch or deeper (within a mile)
	Surface raveling	The aggregate and/or asphalt binder has worn away and the surface texture is rough or pitted (within a mile)
	Transverse cracking	Any unsealed transverse cracks at least 6’ in length (within a mile)
	Transverse distortion	Significant distortion affects 1% or more of roadway (within a mile)
Pavement, concrete	Distressed joints/ cracks	Distress in wheel path greater than 2 inches wide (within a mile)
	Longitudinal joint distress	Faulting or signs of distress are present (within a mile)
	Patch deterioration	Any patch is deteriorated enough to affect ride quality (within a mile)
	Slab breakup	Slab is divided into at least 2-3 large blocks, affecting 10% or more of the slab (within a mile)
	Surface distress	Any measurable surface distress is present (within a mile)
	Transverse faulting	Any measurable faulting (within a mile)
Traffic and safety devices (selected)	Centerline/edgeline markings	Line with > 20% paint missing (within a mile)
	Delineators	Missing OR not visible at posted speed OR damaged (by delineator)
	Protective barriers	Not functioning as intended (linear feet of barrier)
	Other signs (emergency)	Missing OR not visible at posted speed (by sign)
	Other signs (routine)	Beyond service life (by sign)
	Raised pavement markers	Missing OR damaged (by RPM)
	Regulatory/warning signs	Missing OR not visible at posted speed (by sign)
	Reg./warning signs (routine)	Beyond service life (by sign)
	Special pavement markings	Missing OR not functioning as intended (by marking)

Element	Feature	Thresholds
Shoulders	Cracking	200 linear feet or more of unsealed cracks > ¼ inch (by mile)
	Cross-slope	200 linear feet or more of cross-slope at least 2x planned slope with the maximum cross slope of 8% (by mile)
	Drop-off/ buildup	200 linear feet or more with drop-off or build-up > 1.5 inches (by mile)
	Erosion	200 linear feet or more with erosion >2 inches deep (by mile)
	Hazardous Debris	Any items large enough to cause a safety hazard (by mile)
	Potholes/ raveling	Any potholes OR raveling > 1 square foot by 1 inch deep (by mile)
Drainage	Culvert	Culverts that are >25% obstructed OR where a sharp object-e.g., a shovel-can be pushed through the bottom of the pipe OR pipe is collapsed or separated (by culvert)
	Curb & gutter	Curb & gutter with severe structural distress OR >1 inch structural misalignment OR >1 inch of debris build-up in the curb line (by linear feet of curb & gutter)
	Ditches	Ditch with greater than minimal erosion of ditch line OR obstructions to flow of water requiring action (by linear feet of ditch)
	Flumes	Not functioning as intended OR deteriorated to the point that they are causing erosion (by flume)
	Storm sewer system	Inlets, catch basins, and outlet pipes with >=50% capacity obstructed OR <80% structurally sound OR >1 inch vertical displacement or heaving OR not functioning as intended (by inlet, catch basin & outlet pipes)
	Drains	Under- and edge-drains with outlets, endwalls or end protection closed or crushed OR water flow or end protection is obstructed (by drain)
Roadsides	Barriers	Noise barrier or retaining wall not functioning as intended (by LF of barrier)
	Fences	Fence missing OR not functioning as intended (by LF of fence)
	Litter	Any pieces of litter on shoulders and roadside visible at posted speed, but not causing a safety threat. (by mile)
	Graffiti	Any graffiti and non-natural encroachments visual at posted speed. (by mile)
	Mowing	Any roadside has mowed grass that is too short, too wide or is mowed in a no-mow zone (by mile)
	Mowing for vision	Any instances in which grass is too high or blocks a vision triangle (by mile)
	Noxious weeds	Any visible clumps (by mile)
	Woody vegetation control	Any instances in which a tree is present in the clear zone OR trees and/or branches overhang the roadway or shoulder creating a clearance problem (by mile)
	Woody vegetation control for vision	Any instances in which woody vegetation blocks a vision triangle (by mile)