

Letter Report

# **Bridge Inspection Program**

*February 2008*



**Legislative Audit Bureau**

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Janice Mueller  
State Auditor

February 27, 2008

Senator Jim Sullivan and  
Representative Suzanne Jeskewitz, Co-chairpersons  
Joint Legislative Audit Committee  
State Capitol  
Madison, Wisconsin 53702

Dear Senator Sullivan and Representative Jeskewitz:

At your request, we have completed a limited-scope review of the Department of Transportation's (DOT's) bridge inspection program. In fiscal year 2006-07, DOT spent approximately \$2.3 million to inspect Wisconsin's 5,188 state-owned bridges, including an estimated \$1.0 million to hire private consultants with specialized inspection expertise.

Federal and state law require DOT to inspect all bridges owned or maintained by the State at least once every 24 months. We found that 98.1 percent of routine inspections were completed on time between January 2003 and November 2007. During this period, 98.9 percent of routine inspections conducted on structurally deficient bridges, which are bridges that have deteriorated or developed structural problems, were completed within the required 24-month intervals. Both of these inspection rates have improved since our 2001 evaluation of DOT's bridge inspection program (report 01-17).

DOT has not implemented procedures for monitoring routine bridge maintenance work performed by county highway departments or verifying the cost of completed maintenance work. Therefore, we include a recommendation for DOT to develop policies and procedures to track the type and cost of routine bridge maintenance work performed by counties, which totaled \$5.7 million in 2006.

In general, the condition of state-owned bridges has improved in recent years. The percentage of state-owned bridges that are structurally deficient declined from 7.4 percent in 2002 to 4.2 percent in 2007, when there were 219 such bridges statewide. However, 34 state-owned bridges are more than 80 years old, exceeding the typical 75-year life span of bridges.

We appreciate the courtesy and cooperation extended to us by DOT in conducting this review.

Sincerely,

Janice Mueller  
State Auditor

JM/DS/ss

Enclosure



## **BRIDGE INSPECTION PROGRAM**

The Department of Transportation (DOT) is required by federal and state law to inspect all bridges owned or maintained by the State at least once every 24 months. Bridge inspections are performed to ascertain the structure's current condition and anticipate future problems. They also allow DOT to rate a bridge's safety, provide a continuous record of a bridge's condition and rate of deterioration, and help DOT determine whether to impose vehicle weight limits or to close a bridge. DOT uses inspection results to initiate routine bridge maintenance activities, such as repairing damaged bridge railings, or to plan large rehabilitation projects, such as reconstructing the entire bridge. Almost all routine maintenance work identified by inspectors is performed by county highway departments, which are then reimbursed by DOT for their time and materials.

In October 2001, the Legislative Audit Bureau released an evaluation of DOT's bridge inspection program (report 01-17). We found that bridge inspections were not always completed in a timely manner, DOT generally did not monitor counties' expenditures for routine bridge maintenance work that had been identified by bridge inspectors, and updated traffic count information was typically not used to help determine a bridge's condition.

On August 1, 2007, a steel deck truss bridge on an interstate highway over the Mississippi River in Minneapolis collapsed, resulting in the deaths of 13 people and injuring more than 100 others. As a result of this collapse, attention focused on the safety of bridges throughout the nation. In August 2007, DOT identified 16 deck truss bridges in Wisconsin with designs similar to that of the bridge that collapsed in Minneapolis. Subsequently, two of those bridges were replaced by bridges with updated designs that had been planned before the collapse. DOT conducted special inspections of Wisconsin's 14 deck truss bridges in August 2007 and determined they were safe for public travel.

At the request of the Co-chairs of the Joint Legislative Audit Committee, we conducted a limited-scope review of DOT's bridge inspection program that focused on:

- whether DOT performed routine inspections of all state-owned bridges at least once every 24 months from January 2003 through November 2007;
- how DOT staff oversee the completion of bridge maintenance work identified by bridge inspectors and completed by counties;
- the extent to which current traffic count information is included in bridge inspection reports and DOT bridge data; and
- the inspection history and condition of a randomly chosen sample of 50 bridges that were classified as structurally deficient in 2000.

To complete this review, we interviewed DOT bridge inspectors and Federal Highway Administration officials, examined DOT's bridge inspection policies and procedures, and analyzed DOT's bridge inspection data. We also spoke with representatives of the counties and private firms that maintain and rehabilitate state-owned bridges. We did not analyze the inspection and maintenance of bridges that are not DOT's responsibility, including bridges on county and town roads and municipal streets, which are the responsibility of local governments, and bridges that carry only railroad, pedestrian, or bicycle traffic.

## **Bridge Inspection Process**

Responsibility for inspecting state-owned bridges is divided among DOT staff in eight offices within five regions. In addition to these eight offices, DOT's central office in Madison develops inspection policies and provides specialized knowledge and equipment for inspections statewide. DOT also contracts with private consultants for certain complex inspections. For inspection purposes, a bridge is defined in administrative rules as a structure longer than 20 feet that carries vehicular traffic over a depression or obstruction. However, DOT considers some larger bridges to comprise multiple bridge units, each of which is inspected individually, as if it were a separate bridge. As of November 2007, Wisconsin had 4,916 single-unit state-owned bridges and 34 multi-unit bridges with a combined 272 units, for a total of 5,188 state-owned bridge units statewide. In our analyses, we considered each bridge unit to be a separate bridge.

Figure 1 shows the location of the five regions and eight regional offices, as well as the number of state-owned bridges in each region as of November 2007.

Federal Highway Administration staff with whom we spoke indicated general satisfaction with DOT's bridge inspection program and believe it is among the best in the nation. DOT's written bridge inspection procedures are also generally consistent with the regulations and guidelines promulgated by the Federal Highway Administration and the American Association of State Highway Transportation Officials, which is a nonprofit and nonpartisan national organization. The Federal Highway Administration and DOT's central office annually conduct a quality assurance review in two of the eight regional offices to ensure that inspection guidelines are followed; bridges are inspected thoroughly, consistently, and in a timely manner; and inspectors are qualified under state and federal regulations.

Before inspecting a bridge, an inspector typically examines the bridge's design plans and prior inspection reports, notes the bridge's age and its condition at the time of the prior inspection, and reviews recently completed repair and maintenance work. This information allows the inspector to formulate a plan for inspecting the bridge, including any features or structural configurations that may need special attention.

Figure 1

**Department of Transportation Regions**  
November 2007



Most routine inspections take less than one day to complete, and some take less than an hour, although inspections of bridges with complex designs or structural problems can last several days. Inspectors visually assess all aspects of a bridge's condition, including the bridge deck, which is the surface on which vehicles travel; the superstructure, which includes the girders and other features that support the bridge deck; and the substructure, which includes the piers and other features that support the superstructure. Inspectors determine, for example, whether:

- cracks that may affect the bridge's structural integrity are present;
- concrete piers and supports are deteriorating;

- water flowing under the bridge has deteriorated the substructure or soil around the bridge;
- metal girders are corroded, cracked, or need repainting;
- potholes are forming on the bridge deck, or the pavement around the bridge is rough; and
- routine bridge maintenance is needed, such as cleaning the bridge deck water drains of debris, resealing the joints between concrete slabs on the bridge deck, or trimming overgrown brush around the bridge.

After each routine inspection, bridge inspectors complete a standardized report that is entered into DOT's bridge inspection database and to which the central office has access. They note the overall condition of the bridge deck, superstructure, and substructure; determine more specific condition ratings for various bridge parts, such as the concrete, steel beams and braces, and railings; list routine maintenance recommendations; and provide written comments about the bridge. The bridge inspection database gives the inspectors access to information about past inspections and the prior condition of bridges.

In addition to routine inspections, which are most common, DOT also conducts several other types of inspections, including:

- in-depth, which are intensive inspections that use special equipment or techniques to follow up on deficiencies noted during routine inspections;
- fracture critical, which are inspections to assess the condition of bridge components, such as girders, whose failure may result in a bridge's collapse;
- underwater dive, which are inspections to access and monitor bridge elements that are below the water level; and
- interim, which are inspections to monitor a known or suspected deficiency, conducted at intervals less than every two years.

## **Expenditures and Staffing**

The bridge inspection program is part of DOT's state highway maintenance, repair, and traffic operations program, which maintains and repairs state highways and bridges; removes snow and mows roadsides; and maintains pavement markings, traffic signs, traffic signals, and highway lighting. In recent years, funding increases for the highway maintenance, repair, and traffic operations program have not kept pace with increases in other DOT programs. From fiscal year (FY) 2002-03 through FY 2006-07, funding increased by:

- 3.7 percent for the state highway maintenance, repair, and traffic operations program;



- 8.9 percent for the state highway rehabilitation program, which improves existing highways and bridges; and
- 23.7 percent for the major highway development program, which constructs new highways and makes significant improvements to existing highways.

To help address funding limitations in prior years and to take into account additional miles of new highways and increased traffic levels, 2007 Wisconsin Act 20, the 2007-09 Biennial Budget Act, provides \$203.9 million of segregated state funds in FY 2007-08 for the state highway maintenance, repair, and traffic operations program, which is a 13.7 percent increase from the \$179.4 million budgeted in FY 2006-07. Program funding will increase to \$212.2 million, or by 4.1 percent, in FY 2008-09.

DOT does not maintain detailed expenditure information for the bridge inspection program and, therefore, used time-reporting records to estimate expenditures for the salaries and fringe benefits of its bridge inspection staff, as well as other program costs incurred, such as travel, supplies, and private consultant costs.

In FY 2006-07, bridge inspection expenditures, including state staff and consultant costs, were approximately \$2.3 million, while expenditures for routine bridge maintenance were \$6.9 million, as shown in Table 1. Total expenditures for bridge inspections and routine bridge maintenance increased by 7.1 percent from FY 2002-03 through FY 2006-07.

Table 1  
**Estimated Expenditures for Bridge Inspections and Routine Bridge Maintenance**

|   | FY 2002-03         | FY 2003-04         | FY 2004-05         | FY 2005-06         | FY 2006-07         |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Bridge Inspections</b>               |                    |                    |                    |                    |                    |
| State Staff                             | \$ 994,500         | \$1,101,700        | \$1,156,100        | \$1,199,600        | \$1,317,100        |
| Consultants                             | 1,154,400          | 1,378,800          | 1,912,400          | 1,138,100          | 1,010,300          |
| Subtotal                                | 2,148,900          | 2,480,500          | 3,068,500          | 2,337,700          | 2,327,400          |
| <b>Routine Bridge Maintenance</b>       |                    |                    |                    |                    |                    |
| State Staff and Related Work            | 1,196,100          | 895,500            | 1,023,300          | 1,276,300          | 1,160,800          |
| Work Performed by Counties <sup>1</sup> | 5,257,000          | 5,453,400          | 4,757,800          | 4,962,100          | 5,722,600          |
| Subtotal                                | 6,453,100          | 6,348,900          | 5,781,100          | 6,238,400          | 6,883,400          |
| <b>Total</b>                            | <b>\$8,602,000</b> | <b>\$8,829,400</b> | <b>\$8,849,600</b> | <b>\$8,576,100</b> | <b>\$9,210,800</b> |

<sup>1</sup> Expenditures for calendar years 2002 through 2006.

Federal and state regulations require DOT bridge inspectors to attend training and be registered as professional engineers, or have at least five years of bridge inspection experience, or be certified by the National Institute for Certification in Engineering Technologies. We examined quality assurance reviews that were performed by the Federal Highway Administration and DOT's central office from 2003 through 2006. These reviews indicated that all DOT inspectors met at least minimum qualifications to conduct inspections. Although more than 60 DOT staff are qualified to complete inspections, most are not directly involved with the bridge inspection program. Bridge inspectors at DOT's eight regional offices complete most inspections, but none inspects bridges on a full-time basis. They are also responsible for:

- overseeing bridge maintenance work completed by counties;
- advising local governments on how to conduct local bridge inspections; and
- preparing planning documents for bridge rehabilitation and replacement projects.

As shown in Table 2, DOT staff in 13.72 full-time equivalent (FTE) positions inspected bridges in FY 2006-07, based on DOT's time-reporting records. This includes 11.58 FTE staff in the five regions and 2.14 FTE staff in DOT's central office. Total positions changed little from FY 2002-03 through FY 2006-07.

Table 2

**Bridge Inspection FTE Staff Positions**

| Region         | FY 2002-03   | FY 2003-04   | FY 2004-05   | FY 2005-06   | FY 2006-07   |
|----------------|--------------|--------------|--------------|--------------|--------------|
| North Central  | 1.29         | 1.88         | 1.91         | 1.81         | 1.66         |
| Northeast      | 1.41         | 1.48         | 1.63         | 1.41         | 1.77         |
| Northwest      | 1.60         | 1.93         | 2.02         | 2.06         | 2.38         |
| Southeast      | 1.91         | 2.46         | 2.20         | 2.87         | 3.13         |
| Southwest      | 3.22         | 2.70         | 2.91         | 3.04         | 2.64         |
| Central Office | 3.68         | 2.60         | 2.49         | 1.81         | 2.14         |
| <b>Total</b>   | <b>13.11</b> | <b>13.05</b> | <b>13.16</b> | <b>13.00</b> | <b>13.72</b> |

As shown in Table 3, bridge inspection expenditures for state staff, including salaries and fringe benefits, travel, and supplies, were an estimated \$1.3 million in FY 2006-07. DOT indicated that increased salary and fringe benefit costs accounted for most of the 32.4 percent increase in expenditures from FY 2002-03 through FY 2006-07.

Table 3

**Estimated State Staffing Expenditures for the Bridge Inspection Program**

| Region         | FY 2002-03       | FY 2003-04         | FY 2004-05         | FY 2005-06         | FY 2006-07         |
|----------------|------------------|--------------------|--------------------|--------------------|--------------------|
| North Central  | \$ 97,900        | \$ 155,100         | \$ 169,400         | \$ 152,800         | \$ 165,700         |
| Northeast      | 107,800          | 114,200            | 130,300            | 131,300            | 179,200            |
| Northwest      | 136,300          | 178,200            | 186,700            | 198,100            | 231,500            |
| Southeast      | 150,300          | 215,200            | 208,000            | 273,700            | 294,000            |
| Southwest      | 240,300          | 232,100            | 262,900            | 287,500            | 257,900            |
| Central Office | 261,900          | 206,900            | 198,800            | 156,200            | 188,800            |
| <b>Total</b>   | <b>\$994,500</b> | <b>\$1,101,700</b> | <b>\$1,156,100</b> | <b>\$1,199,600</b> | <b>\$1,317,100</b> |

Federal law permits the use of private bridge consultants to conduct inspections, but DOT remains responsible for ensuring that consultant-led inspections are conducted in accordance with federal regulations and inspection guidelines and are completed by qualified inspectors. Consultants are typically hired when an inspection requires specialized expertise or equipment. For example, consultants conduct most underwater inspections, as well as some in-depth inspections on large bridges. Consultants have also been hired to complete routine inspections on large bridges in the Southeast Region when DOT staff availability was limited or specialized equipment was needed, although none were hired for this purpose in 2007.

As shown in Table 4, estimated consultant expenditures varied during the five-year period we reviewed and were highest in FY 2004-05, when they totaled \$1.9 million, primarily because the central office contracted for a large number of underwater dive inspections. The North Central Region had no consultant expenditures during the five-year period because all consultant work in that region was completed through contracts managed by the central office.

Table 4

**Estimated Consultant Expenditures for the Bridge Inspection Program**

| Region         | FY 2002-03         | FY 2003-04         | FY 2004-05         | FY 2005-06         | FY 2006-07         |
|----------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| North Central  | \$ 0               | \$ 0               | \$ 0               | \$ 0               | \$ 0               |
| Northeast      | 0                  | 37,700             | 105,300            | 183,400            | 40,700             |
| Northwest      | 0                  | 0                  | 0                  | 0                  | 143,800            |
| Southeast      | 1,076,800          | 578,200            | 632,400            | 259,900            | 371,900            |
| Southwest      | 0                  | 94,500             | 0                  | 0                  | 0                  |
| Central Office | 77,600             | 668,400            | 1,174,700          | 694,800            | 453,900            |
| <b>Total</b>   | <b>\$1,154,400</b> | <b>\$1,378,800</b> | <b>\$1,912,400</b> | <b>\$1,138,100</b> | <b>\$1,010,300</b> |

**Inspection Frequency**

We reviewed DOT's bridge inspection data from January 2003 through November 2007 to determine whether routine inspections of all state-owned bridges had been completed at least once every 24 months, as required by federal and state law. To do so, we determined when the initial routine inspection of a given bridge had occurred during this time period and then calculated the time until each subsequent inspection was completed. The Federal Highway Administration indicated that a routine inspection that is completed one or two months late is not a serious infraction of federal law and is unlikely to endanger the public.

As shown in Table 5, 98.1 percent of routine inspections were completed within 24 months of a prior inspection. This is an improvement from the 84.1 percent of on-time inspections our 2001 evaluation found to have been completed from January 2000 through August 2001. DOT's ability to complete timely bridge inspections has been enhanced by its bridge inspection database, which creates automated reports that allow inspectors to determine when each bridge must be inspected.

Table 5

**Inspection Frequency of State-Owned Bridges**  
January 2003 through November 2007

| Region         | Number of Inspections | Percentage of Inspections Completed Within: |                 |                     |
|----------------|-----------------------|---|-----------------|---------------------|
|                |                       | 24 Months or Less                           | 25 to 26 Months | More than 26 Months |
| North Central  | 1,047                 | 99.4%                                       | 0.4%            | 0.2%                |
| Northeast      | 1,556                 | 95.1  | 3.6             | 1.3                 |
| Northwest      | 1,998                 | 99.4  | 0.6             | 0.0                 |
| Southeast      | 1,600                 | 97.7  | 1.6             | 0.7                 |
| Southwest      | 2,211                 | 98.9  | 1.0             | 0.1                 |
| <b>Overall</b> | <b>8,412</b>          | <b>98.1</b>                                 | <b>1.4</b>      | <b>0.5</b>          |

We found that 1.4 percent of routine inspections were completed one or two months late, and 38 inspections, or 0.5 percent, were completed more than 26 months after a prior inspection. Of these 38 inspections, 37 occurred within 32 months of a prior inspection, while 1 occurred 37 months after the prior inspection. DOT provided several reasons why inspection frequencies may have exceeded the required 24 months, including:

- specialized equipment, such as a “reach all” vehicle to inspect the underside of a bridge, is sometimes not readily available;
- unfavorable weather conditions may delay planned inspections; and
- certain bridges may have been overlooked during DOT’s organizational transition in May 2005 from eight districts to five regions.

Adhering to required inspection frequencies is particularly important for bridges that have deteriorated or developed structural problems. Although such structurally deficient bridges require routine inspections as frequently as other bridges, federal legislation currently under consideration would require them to be inspected annually. We reviewed the inspection histories of all 219 state-owned bridges that were classified as structurally deficient as of November 2007.

As shown in Table 6, 98.9 percent of routine inspections of the 219 structurally deficient bridges were completed within the required 24-month intervals from January 2003 through November 2007. This is an improvement from the 92.0 percent of on-time inspections of structurally deficient bridges that our 2001 evaluation found to have been completed from January 2000 through August 2001. However, our current audit found that five inspections, or 1.1 percent, were completed late, including one inspection that was completed eight months late.

Table 6

**Inspection Frequency of Structurally Deficient State-Owned Bridges**  
January 2003 through November 2007

| Region         | Number of Inspections | Percentage of Inspections Completed Within: |                 |                     |
|----------------|-----------------------|---|-----------------|---------------------|
|                |                       | 24 Months or Less                           | 25 to 26 Months | More than 26 Months |
| North Central  | 53                    | 100.0%                                      | 0.0%            | 0.0%                |
| Northeast      | 79                    | 100.0                                       | 0.0             | 0.0                 |
| Northwest      | 129                   | 99.2  | 0.8             | 0.0                 |
| Southeast      | 96                    | 95.8  | 3.1             | 1.1                 |
| Southwest      | 105                   | 100.0                                       | 0.0             | 0.0                 |
| <b>Overall</b> | <b>462</b>            | <b>98.9</b>                                 | <b>0.9</b>      | <b>0.2</b>          |

As noted, Wisconsin currently has 14 deck truss bridges that are structurally similar to the Minneapolis bridge that collapsed in August 2007. We reviewed DOT's data and found that 100.0 percent of the routine inspections of these bridges were completed within the required 24-month intervals from January 2003 through November 2007.

In October and November 2007, DOT installed electronic sensors on the 14 bridges, which are located in the Northwest and Southwest regions, to collect information 24 hours per day on the motion and amount of strain placed on the bridges. DOT is removing the sensors from the bridges during February and March 2008 and has contracted with consultants to analyze the results, which will be used to determine whether any unusual stresses are affecting the bridges.

As recommended by the Federal Highway Administration, DOT plans to more closely monitor the steel gusset plates that help hold together steel truss bridges, because preliminary information indicates that the inappropriate design of one such plate may have caused the Minneapolis bridge to collapse. Bridge inspectors will continue to examine these steel gusset plates during future inspections. In addition, DOT plans to evaluate the design capacity of all components on steel truss and fracture critical bridges, which have components whose failure may result in a bridge's collapse. This evaluation will occur if a bridge is renovated and either the bridge's traffic levels increase or weight is added to the bridge's supporting elements, such as when a heavier bridge deck is added during construction.

### **Routine Bridge Maintenance**

While examining bridges, inspectors identify any needed routine bridge maintenance work. Timely routine maintenance work does not improve a bridge's structural integrity, but it postpones the need for more costly rehabilitation projects and may extend a bridge's life span. DOT's bridge inspectors provide county highway departments with work orders that list all

routine bridge maintenance work to be completed and the estimated cost of the work. After the work is done, county highway departments submit invoices to the DOT region in which they are located, which then reimburses the counties. DOT may also contract with private contractors for large routine maintenance projects or if county highway departments lack the staff or equipment to complete the work. In addition, Wisconsin shares the costs of maintenance work done on border bridges equally with neighboring states.

Routine bridge maintenance is funded as part of DOT's state highway maintenance, repair, and traffic operations program. DOT does not maintain detailed expenditure information for the time state staff spend on activities other than inspections, such as identifying maintenance needs, ensuring county highway departments complete the work, and planning future maintenance needs. Therefore, it used time-reporting records to estimate state staff expenditures associated with routine bridge maintenance, including salaries, fringe benefits, travel, and supplies. Expenditures for work done by contractors and other states were estimated statewide but could not be provided for each region.

As shown in Table 7, estimated expenditures for routine bridge maintenance activities totaled \$1.2 million in FY 2006-07, including \$900,500 incurred by state staff and \$260,300 incurred by contractors and other states. Expenditures incurred by state staff increased steadily from FY 2002-03 through FY 2006-07, while expenditures for work completed by contractors and other states varied from year to year.

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Table 7  
Estimated Expenditures for Routine Bridge Maintenance<sup>1</sup>

| Region             | FY 2002-03         | FY 2003-04       | FY 2004-05         | FY 2005-06         | FY 2006-07         |
|--------------------|--------------------|------------------|--------------------|--------------------|--------------------|
| North Central      | \$ 94,300          | \$126,200        | \$ 129,900         | \$ 162,100         | \$ 170,400         |
| Northeast          | 79,900             | 131,700          | 137,500            | 163,000            | 197,800            |
| Northwest          | 140,600            | 98,400           | 102,200            | 126,600            | 167,900            |
| Southeast          | 96,500             | 131,000          | 165,300            | 150,400            | 137,200            |
| Southwest          | 154,000            | 160,800          | 94,900             | 86,300             | 101,600            |
| Central Office     | 40,700             | 101,500          | 122,900            | 146,600            | 125,600            |
| Subtotal           | 606,000            | 749,600          | 752,700            | 835,000            | 900,500            |
| Contractors        | 32,600             | 53,900           | 26,100             | 248,100            | 103,400            |
| Other States       | 553,200            | 88,700           | 238,000            | 186,000            | 154,000            |
| Other <sup>2</sup> | 4,300              | 3,300            | 6,500              | 7,200              | 2,900              |
| Subtotal           | 590,100            | 145,900          | 270,600            | 441,300            | 260,300            |
| <b>Total</b>       | <b>\$1,196,100</b> | <b>\$895,500</b> | <b>\$1,023,300</b> | <b>\$1,276,300</b> | <b>\$1,160,800</b> |

<sup>1</sup> Does not include the costs of maintenance work performed by counties.

<sup>2</sup> Includes state-furnished bridge materials and payments to public utilities for electricity used during maintenance work.

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DOT uses a model to determine annual budgets for all maintenance work to be completed in each county, and the regional offices allocate this funding to various activities performed by counties on state highways, including roadway maintenance, roadside maintenance, and routine bridge maintenance. Every year since the model was established in 1992, the amount budgeted has been less than the amount that the model has indicated is needed to complete all maintenance activities. DOT central office staff and bridge inspectors in two of the five regions indicated that there are insufficient funds to pay for all maintenance work identified during bridge inspections. As a result, the inspectors prioritize recommended work and in some instances may postpone work that does not affect a bridge's safety. For example:

- The Southwest Region's Madison office categorizes maintenance work on a scale of one (work should be completed within one month) to four (work should be completed within one year) and indicated that there is typically enough funding to complete the higher-priority work.
- The Northwest Region's Eau Claire office compiles and prioritizes a list of maintenance work at the end of each year and then decides which work can be completed with the available funding. For example, erosion of bridge elements requires immediate attention, whereas work such as deck sealing and brush clearing has a lower priority.

As shown in Table 8, total expenditures for routine bridge maintenance work performed by counties increased from \$5.3 million in calendar year (CY) 2002 to \$5.7 million in CY 2006, or by 7.5 percent. In CY 2006, the most recent year for which information is available, expenditures for routine bridge maintenance ranged from \$490,900 in the North Central Region to \$1.7 million in the Northeast Region. Appendix 1 shows CY 2006 bridge maintenance expenditures in each county.

Table 8

**Expenditures for Routine Bridge Maintenance Work Performed by Counties**

| Region        | 2002               | 2003               | 2004               | 2005               | 2006               |
|---------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| North Central | \$ 572,800         | \$ 459,200         | \$ 602,300         | \$ 437,600         | \$ 490,900         |
| Northeast     | 1,531,900          | 1,687,400          | 1,584,100          | 1,561,500          | 1,730,400          |
| Northwest     | 680,400            | 716,300            | 642,200            | 866,300            | 852,300            |
| Southeast     | 1,046,700          | 1,060,200          | 765,000            | 843,900            | 1,121,700          |
| Southwest     | 1,425,200          | 1,530,300          | 1,164,200          | 1,252,800          | 1,527,300          |
| <b>Total</b>  | <b>\$5,257,000</b> | <b>\$5,453,400</b> | <b>\$4,757,800</b> | <b>\$4,962,100</b> | <b>\$5,722,600</b> |



Although bridge inspectors with whom we spoke are generally satisfied with the work performed by the counties, they indicated that some counties lack the necessary staff and resources to complete quality work in a timely manner. Our 2001 evaluation indicated that DOT's central office may wish to develop procedures to monitor and document work completed by counties. To date, it has not done so. As a result, DOT's various regional offices have established their own procedures for verifying that counties complete identified routine maintenance work. For example, the Southwest Region's Madison office recently hired a staff member to visit bridges and ensure routine maintenance work for which counties have requested reimbursement was actually completed. In the Northwest Region's Eau Claire office, staff examine bridges immediately after high-priority work is completed, while minor work is checked during the next inspection.

DOT does not have a standard procedure for counties to request reimbursement for routine bridge maintenance work, and invoices submitted to DOT's regional offices typically do not indicate the specific type and cost of work performed on each bridge. Our 2001 evaluation noted that DOT may wish to provide assistance to the regional offices to ensure counties do not overcharge for maintenance work. To date, DOT has not done so. As a result, some regional offices have established their own procedures for tracking the amount counties charge for completing the work. For example:

- The Southwest Region's Madison office implemented a database to collect information on the cost of routine maintenance work performed by the counties. After counties complete work identified by inspectors, they send an invoice that indicates the type of work that was performed on each bridge and the cost of the work. This information is entered into the database and can be used to track the costs of various types of maintenance work or the total cost of work performed on specific bridges.
- The Northwest Region's Eau Claire office requires counties to report the cost of maintenance work that has been completed on each bridge, including the number of hours spent on particular tasks, the hourly rate of the county staff who performed the work, and the equipment used. Information in these reports is used to help estimate the costs of future work.
- The Northeast Region is in the process of requiring counties to report on the labor, equipment, and material costs of maintenance work performed on each bridge and the date the work was performed. As of December 2007, 8 of 11 counties in the region were providing these reports.

DOT staff acknowledge that counties could potentially overcharge DOT for routine bridge maintenance work or bill for work that was not completed, given the current procedures and systems in place in some areas of the state. Having information about the type and cost of the routine bridge maintenance work counties complete on each bridge would not only help ensure that program funds are spent appropriately, it would also allow bridge inspectors to more accurately estimate the cost of future work.

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**☑ Recommendation**

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*We recommend the Department of Transportation develop policies and procedures to allow regional office staff to better track the type and cost of routine bridge maintenance work performed by counties on each state-owned bridge.*

## **Condition of Wisconsin's Bridges**

DOT's bridge inspection database contains information that describes the condition of each state-owned bridge, including its age, structural features, and average daily traffic. Completing routine maintenance work or larger rehabilitation projects can improve a bridge's condition. We reviewed the overall condition of Wisconsin's bridges and determined whether conditions have changed over time.

Bridges are typically built to last for approximately 75 years, although a bridge's life span can be affected by a variety of factors, including traffic levels and maintenance work. Table 9 shows the ages of state-owned bridges. We found that more than one-third were 20 years old or less in November 2007, while 34 bridges, or 0.7 percent, have been in service for more than 80 years. Appendix 2 contains additional information on the condition of bridges that have been in service for more than 80 years.

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Table 9

### **Ages of State-Owned Bridges November 2007**

| Age of Bridge                 | Number of Bridges | Percentage    |
|-------------------------------|-------------------|---------------|
| 10 years or less <sup>1</sup> | 1,045             | 20.1%         |
| 11 to 20 years                | 844               | 16.3          |
| 21 to 30 years                | 603               | 11.6          |
| 31 to 40 years                | 978               | 18.8          |
| 41 to 50 years                | 1,138             | 21.9          |
| 51 to 60 years                | 278               | 5.4           |
| 61 to 70 years                | 118               | 2.3           |
| 71 to 80 years                | 150               | 2.9           |
| More than 80 years            | 34                | 0.7           |
| <b>Total</b>                  | <b>5,188</b>      | <b>100.0%</b> |

<sup>1</sup> Includes a number of bridges that are still under construction.

DOT may close a bridge to all traffic or restrict the weight limit of vehicles using the bridge if inspectors determine that structural conditions warrant this action. In November 2007, only one state-owned bridge was closed, because it had not yet been torn down since the bridge that replaced it was built.

As a result of an inspection that discovered concerns with one bridge pier, DOT closed the McCleary Bridge, near Wausau in Marathon County, in August 2007. Bridge construction had been completed in June 2005, at an estimated cost of \$9.2 million. In October 2007, DOT determined the west side of the bridge was safe for motorists and reopened two of the bridge's four lanes. Structural repairs are ongoing, and DOT anticipates work will be completed in May 2008.

Bridges that are deteriorating can often remain open and safe as long as they are not used by excessively heavy vehicles. Statutes generally prohibit vehicles weighing more than 80,000 pounds from being operated on state highways. However, 2005 Wisconsin Act 167, which was enacted in March 2006, increased the maximum vehicle weight to 98,000 pounds, provided that a vehicle permit is obtained from DOT and a vehicle meets certain statutory requirements regarding the distribution of its weight across several axles.

DOT will restrict the use of a bridge if it cannot handle the expected vehicle weight. It will also reassess the weight that a bridge can accommodate if inspectors notice bridge elements are deteriorating or if construction work adds extra weight to a bridge. DOT indicated that the number of bridges with weight restrictions has increased as a result of 2005 Wisconsin Act 167, including 56 state-owned bridges that have maximum vehicle weights of 90,000 pounds. In November 2007, 76 state-owned bridges had weight restrictions, including:

- 4 bridges in the North Central Region;
- 15 bridges in the Northeast Region;
- 22 bridges in the Northwest Region;
- 10 bridges in the Southeast Region; and
- 25 bridges in the Southwest Region.

Federal and state legislation currently under consideration may affect how and when Wisconsin determines bridge weight restrictions. DOT indicated that the weight a bridge can handle is initially determined when the bridge is designed, and thereafter as needed. The National Highway Bridge Reconstruction and Inspection Act of 2007, introduced in Congress in October 2007, would require states to calculate weight capacity at least once every two years for certain bridges. In addition, 2007 Assembly Bill 238, which was introduced as a result of the Legislative Council's 2006 Special Committee on Highway Weight Limits, would require DOT to study the benefits and costs of Wisconsin truck size and weight limit laws, which may result in changes to those laws and the need for additional bridge weight restrictions or bridge rehabilitation projects.

## Deficient Bridges

The Federal Highway Administration requires states to report annually on various aspects of each bridge using a standardized scale. Based on this information, a bridge may be classified as structurally deficient. Although a structurally deficient bridge is not necessarily unsafe, it may require immediate rehabilitation to remain open, may be restricted to lighter vehicles, or may be closed.

As shown in Table 10, 4.4 percent of all state-owned bridges in Wisconsin were structurally deficient in 2006, which is a decline from 7.4 percent in 2002. In 2006, the most recent year for which national information is available, Wisconsin had the second-lowest percentage of structurally deficient bridges among seven midwestern states and the sixteenth-lowest percentage nationwide. In November 2007, 219 state-owned bridges in Wisconsin, or 4.2 percent, were classified as structurally deficient. Appendix 3 shows the number of structurally deficient bridges in each DOT region and county as of November 2007.

Table 10

### Percentage of State-Owned Bridges Classified as Structurally Deficient

|                  | 2002       | 2003       | 2004       | 2005       | 2006       |
|------------------|------------|------------|------------|------------|------------|
| Minnesota        | 4.7%       | 3.7%       | 3.5%       | 3.5%       | 3.1%       |
| <b>Wisconsin</b> | <b>7.4</b> | <b>6.7</b> | <b>5.4</b> | <b>5.1</b> | <b>4.4</b> |
| Indiana          | 2.1        | 2.1        | 2.0        | 3.4        | 4.4        |
| Ohio             | 4.6        | 4.4        | 4.3        | 4.9        | 4.6        |
| Iowa             | 5.0        | 5.4        | 5.2        | 5.3        | 6.3        |
| Illinois         | 8.3        | 7.4        | 7.8        | 8.2        | 8.7        |
| Michigan         | 17.9       | 17.0       | 16.3       | 15.8       | 15.2       |
| U.S.             | 8.8        | 8.6        | 8.5        | 8.5        | 8.4        |

We reviewed a random sample of 50 state-owned bridges that were structurally deficient in 2000 to evaluate whether their conditions subsequently changed. As of January 2008, 23 of the 50 bridges had been replaced with new structures. The replaced bridges ranged in age from 42 to 91 years old at the time of replacement. Of the 27 bridges that have not been replaced, approximately one-half had major construction work completed since 2000, and 20 were no longer classified as structurally deficient, likely because of construction or routine maintenance work.

A bridge may also be classified as functionally obsolete, indicating that it was designed to standards that engineers no longer use. Over time, improvements are made to design requirements in order to improve bridge safety. For example, bridges designed today have wider shoulders than those designed several decades ago. A functionally obsolete bridge is not necessarily unsafe or in danger of collapse.

As shown in Table 11, 7.5 percent of all state-owned bridges in Wisconsin were classified as functionally obsolete in 2006, which is a slight decline from 7.7 percent in 2002. In 2006, Wisconsin had the second-lowest percentage of functionally obsolete bridges among seven midwestern states, and the eighth-lowest percentage nationwide. However, in November 2007, 10.2 percent of all state-owned bridges in Wisconsin, or 527 bridges, were classified as functionally obsolete. DOT indicated that the increase occurred in 2007 because inaccurate calculations had been made in previous years, and correcting these errors resulted in a larger number of bridges being classified as functionally obsolete. Appendix 3 shows the number of functionally obsolete bridges in each DOT region and county as of November 2007.

Table 11

**Percentage of State-Owned Bridges Classified as Functionally Obsolete**

|                  | 2002       | 2003       | 2004       | 2005       | 2006       |
|------------------|------------|------------|------------|------------|------------|
| Minnesota        | 6.4%       | 5.6%       | 5.5%       | 5.4%       | 5.6%       |
| <b>Wisconsin</b> | <b>7.7</b> | <b>8.5</b> | <b>8.2</b> | <b>7.6</b> | <b>7.5</b> |
| Iowa             | 11.0       | 9.1        | 8.8        | 8.4        | 7.7        |
| Indiana          | 9.1        | 9.4        | 9.3        | 8.8        | 8.6        |
| Illinois         | 10.8       | 10.5       | 10.0       | 9.7        | 9.2        |
| Michigan         | 14.0       | 14.5       | 14.3       | 13.6       | 15.0       |
| Ohio             | 12.4       | 15.0       | 14.9       | 15.1       | 15.6       |
| U.S.             | 15.0       | 14.9       | 14.8       | 14.7       | 14.7       |

**Bridge Sufficiency Ratings**

A bridge’s sufficiency rating provides a measure of its overall condition and helps determine its priority for rehabilitation or replacement. The sufficiency rating is a number from 0 to 100, with 100 indicating a bridge in perfect condition. It is determined by a number of factors, including a bridge’s structural features and safety, its serviceability and the extent to which it is functionally obsolete, and the extent to which it is essential for public use.

As shown in Table 12, approximately three-fourths of state-owned bridges in all five DOT regions had sufficiency ratings of at least 80.0 as of December 2007. The average sufficiency rating statewide has remained largely consistent in recent years, increasing from 85.2 in 2003 to 85.5 in 2007.

Table 12

**Sufficiency Ratings for State-Owned Bridges  
December 2007**

| Rating         | North Central Region | Northeast Region | Northwest Region | Southeast Region | Southwest Region |
|----------------|----------------------|------------------|------------------|------------------|------------------|
| 0 to 19.9      | 0.2%                 | 0.8%             | 0.3%             | 1.1%             | 0.2%             |
| 20.0 to 39.9   | 1.2                  | 1.4              | 1.1              | 0.4              | 0.8              |
| 40.0 to 59.9   | 3.4                  | 3.2              | 5.5              | 3.4              | 3.4              |
| 60.0 to 79.9   | 17.6                 | 14.8             | 18.6             | 23.0             | 19.4             |
| 80.0 to 100.0  | 77.6                 | 79.8             | 74.5             | 72.1             | 76.2             |
| <b>Total</b>   | <b>100.0%</b>        | <b>100.0%</b>    | <b>100.0%</b>    | <b>100.0%</b>    | <b>100.0%</b>    |
| Average Rating | 85.9                 | 86.9             | 84.2             | 84.8             | 86.1             |

We analyzed changes in sufficiency ratings during our review of 50 state-owned bridges that were structurally deficient in 2000. The sufficiency ratings of bridges that underwent major construction work, such as a new bridge deck, increased by an average of 11.4 points, while the sufficiency ratings of bridges without major construction work increased by an average of 2.0 points. DOT indicated that a bridge's sufficiency rating could increase as a result of routine maintenance work or changes in traffic use.

Sufficiency ratings are used to determine if bridges are eligible for federal Highway Bridge Program funds. Bridges on public roads become eligible for these funds if they:

- are classified as structurally deficient or functionally obsolete;
- have not been constructed or had major reconstruction in the past ten years; and
- have a sufficiency rating of 80.0 or less, making them eligible for rehabilitation funds, or less than 50.0, making them eligible for replacement funds.

Federal Highway Bridge Program funds typically pay for a portion of rehabilitation and replacement project costs. As of December 2007, 118 state-owned bridges were eligible for federal bridge rehabilitation funding, while 9 state-owned bridges—all of which were built in the 1930s and are located in DOT's Northeast Region—were eligible for federal bridge replacement funds. DOT received \$31.4 million in Highway Bridge Program funds in federal fiscal year 2007-08, most of which will be spent on local bridges. DOT annually spends approximately \$100.0 million to rehabilitate and replace state-owned bridges.

Federal Highway Administration guidelines suggest that average daily traffic counts, which affect sufficiency ratings, be updated every three years for interstate highways and other principal highways, while average daily traffic counts for other types of highways should be updated every six years. In general, DOT adheres to these guidelines, although it updates the average daily traffic counts on minor highways only once every ten years. In 2006, these minor highways carried less than 20.0 percent of total traffic on all state highways.

Our 2001 evaluation found that average daily traffic counts were maintained in a database that was not electronically linked to DOT's bridge inspection database, and that approximately two-thirds of the average daily traffic counts in the bridge inspection database were outdated. We recommended that DOT include the most recent average daily traffic counts in the bridge inspection database and use them to determine state-owned bridges' sufficiency ratings. Doing so could potentially give DOT access to additional federal funds to repair deteriorating bridges, although DOT believed the amount would not increase significantly.

In our current review, we found that average daily traffic count information continues to be maintained in a database that is not electronically linked to the bridge inspection database, because DOT does not believe it is cost-effective to link them. Central office staff indicated that bridge inspectors are supposed to manually update the average daily traffic count information when inspection results are entered in the bridge inspection database. We found, however, that inspectors throughout the state do not uniformly do so.

We calculated the extent to which the average daily traffic counts were updated in DOT's bridge inspection database within the last six years, which is the longest period suggested by the Federal Highway Administration. As shown in Table 13, the average daily traffic counts for 70.2 percent of state-owned bridges were last updated from 2002 through 2007. The proportion of average daily traffic counts that were last updated in this six-year period varied from 76.4 percent in the North Central Region to 62.0 percent in the Northeast Region. Statewide, almost one-third of the average daily traffic counts in the bridge inspection database are more than six years old.

Table 13

**Period in Which Bridge Average Daily Traffic Counts Were Last Updated<sup>1</sup>**  
**Percentage of State-Owned Bridges**

| Region        | 1980 through<br>1990 | 1991 through<br>2001 | 2002 through<br>2007 |
|---------------|----------------------|----------------------|----------------------|
| North Central | 2.7%                 | 20.9%                | 76.4%                |
| Northeast     | 11.2                 | 26.8                 | 62.0                 |
| Northwest     | 4.5                  | 20.8                 | 74.7                 |
| Southeast     | 3.1                  | 32.8                 | 64.1                 |
| Southwest     | 4.6                  | 22.1                 | 73.3                 |
| Statewide     | 5.1                  | 24.7                 | 70.2                 |

<sup>1</sup> In DOT's bridge inspection database.

Sufficiency ratings tend to decline as traffic counts increase, but other factors, such as structural features and safety, typically influence the sufficiency rating more than the average daily traffic count. DOT and the Federal Highway Administration indicated that higher average daily traffic counts may affect a bridge's sufficiency rating only when traffic levels exceed certain thresholds, such as 500 and 5,000 vehicles per day. In December 2007, 160 bridges with average daily traffic counts taken before 2002 had sufficiency ratings that were only slightly higher than the levels needed to be eligible for federal funding, if other criteria are also met. DOT acknowledged the importance of the database containing updated average daily traffic counts, and it anticipates that the database will be completely updated by April 1, 2008.





Appendix 1

**Calendar Year 2006 Expenditures for  
Routine Bridge Maintenance Performed by Counties**  
By Region

| Region               | Amount             |
|----------------------|--------------------|
| <b>North Central</b> |                    |
| Adams                | \$ 7,000           |
| Florence             | 12,700             |
| Forest               | 100                |
| Green Lake           | 9,800              |
| Iron                 | 200                |
| Langlade             | 6,900              |
| Lincoln              | 45,100             |
| Marathon             | 152,600            |
| Marquette            | 54,600             |
| Menominee            | 0                  |
| Oneida               | 14,800             |
| Portage              | 28,000             |
| Price                | 29,800             |
| Shawano              | 10,400             |
| Vilas                | 10,300             |
| Waupaca              | 37,600             |
| Waushara             | 6,700              |
| Wood                 | 64,300             |
| <b>Subtotal</b>      | <b>\$490,900</b>   |
| <b>Northeast</b>     |                    |
| Brown                | \$ 257,100         |
| Calumet              | 1,500              |
| Door                 | 610,800            |
| Fond du Lac          | 41,200             |
| Kewaunee             | 5,500              |
| Manitowoc            | 42,800             |
| Marinette            | 151,800            |
| Oconto               | 4,500              |
| Outagamie            | 34,400             |
| Sheboygan            | 6,800              |
| Winnebago            | 574,000            |
| <b>Subtotal</b>      | <b>\$1,730,400</b> |

| Region | Amount |
|--------|--------|
|--------|--------|

**Northwest**

|                 |                  |
|-----------------|------------------|
| Ashland         | \$ 11,800        |
| Barron          | 129,500          |
| Bayfield        | 57,200           |
| Buffalo         | 7,100            |
| Burnett         | 6,400            |
| Chippewa        | 51,800           |
| Clark           | 16,400           |
| Douglas         | 35,000           |
| Dunn            | 48,000           |
| Eau Claire      | 36,900           |
| Jackson         | 11,100           |
| Pepin           | 5,700            |
| Pierce          | 225,100          |
| Polk            | 13,400           |
| Rusk            | 15,900           |
| Sawyer          | 14,200           |
| St. Croix       | 96,400           |
| Taylor          | 20,200           |
| Trempealeau     | 22,600           |
| Washburn        | 27,600           |
| <b>Subtotal</b> | <b>\$852,300</b> |

**Southeast**

|                 |                    |
|-----------------|--------------------|
| Kenosha         | \$ 59,300          |
| Milwaukee       | 594,200            |
| Ozaukee         | 46,200             |
| Racine          | 43,800             |
| Walworth        | 118,000            |
| Washington      | 68,300             |
| Waukesha        | 191,900            |
| <b>Subtotal</b> | <b>\$1,121,700</b> |

| Region           | Amount             |
|------------------|--------------------|
| <b>Southwest</b> |                    |
| Columbia         | \$ 683,200         |
| Crawford         | 70,600             |
| Dane             | 83,400             |
| Dodge            | 14,700             |
| Grant            | 60,300             |
| Green            | 7,100              |
| Iowa             | 111,000            |
| Jefferson        | 11,700             |
| Juneau           | 31,600             |
| La Crosse        | 60,200             |
| Lafayette        | 41,800             |
| Monroe           | 98,000             |
| Richland         | 60,200             |
| Rock             | 74,000             |
| Sauk             | 76,700             |
| Vernon           | 42,800             |
| <b>Subtotal</b>  | <b>\$1,527,300</b> |
| <b>Total</b>     | <b>\$5,722,600</b> |



Appendix 2

**Location and Condition of State-Owned Bridges More Than 80 Years Old**

November 2007

| County      | Bridge Location                                | Spans             | Year Built | Sufficiency Rating <sup>1</sup> | Structurally Deficient | Functionally Obsolete | Weight Restrictions | Average Daily Traffic Count <sup>2</sup> |
|-------------|--|-------------------|------------|---------------------------------|------------------------|-----------------------|---------------------|--|
| Ashland     | State Highway 112                              | White River       | 1926       | 96.5                            |                        |                       |                     | 1,650                                    |
| Clark       | State Highway 98/Elm Dr.                       | Bear Creek        | 1920       | 72.2                            |                        |                       |                     | 3,033                                    |
| Columbia    | State Highway 44                               | Fox River         | 1901       | 95.4                            |                        |                       |                     | 580                                      |
| Columbia    | US Highway 51                                  | Rocky Run Creek   | 1923       | 87.8                            |                        |                       |                     | 4,000                                    |
| Crawford    | State Highway 131/Pine St.                     | Kickapoo River    | 1922       | 45.3                            | X                      |                       | X                   | 1,500                                    |
| Douglas     | State Highway 105/Union St.                    | St. Louis River   | 1910       | 42.6                            |                        | X                     | X                   | 1,909                                    |
| Fond du Lac | US Highway 151                                 | Pipe Creek        | 1924       | 59.1                            |                        |                       |                     | 4,170                                    |
| Iowa        | State Highway 130                              | Otter Creek       | 1923       | 83.8                            |                        |                       |                     | 990                                      |
| Juneau      | US Highway 12/State Highway 16                 | Webster Creek     | 1920       | 98.5                            |                        |                       |                     | 2,500                                    |
| Kenosha     | State Highway 142                              | Des Plaines River | 1926       | 80.6                            |                        |                       |                     | 3,651                                    |
| La Crosse   | State Highway 162                              | Dutch Creek       | 1927       | 56.7                            | X                      |                       |                     | 908                                      |
| Lafayette   | State Highway 78                               | Cherry Creek      | 1924       | 60.3                            |                        |                       |                     | 300                                      |
| Lincoln     | State Highway 64/W. Main St.                   | Prairie River     | 1904       | 67.1                            |                        | X                     |                     | 12,810                                   |
| Lincoln     | 4th St.  | Wisconsin River   | 1922       | 46.6                            | X                      | X                     |                     | 14,270                                   |
| Lincoln     | State Highway 64/State Highway 107/W. Main St. | Wisconsin River   | 1927       | 49.3                            |                        |                       |                     | 8,520                                    |
| Marathon    | State Highway 107                              | Little Rib River  | 1923       | 89.2                            |                        |                       |                     | 1,220                                    |
| Marinette   | US Highway 141/Main St.                        | Wausaukee River   | 1925       | 45.5                            | X                      |                       | X                   | 6,050                                    |
| Outagamie   | US Highway 15                                  | Black Otter Creek | 1921       | 92.0                            |                        |                       |                     | 12,810                                   |
| Portage     | US Highway 10/Main St.                         | Plover River      | 1926       | 57.9                            |                        |                       |                     | 19,202                                   |

| County      | Bridge Location                                  | Spans             | Year Built | Sufficiency Rating <sup>1</sup> | Structurally Deficient | Functionally Obsolete | Weight Restrictions | Average Daily Traffic Count <sup>2</sup> |
|-------------|--|-------------------|------------|---------------------------------|------------------------|-----------------------|---------------------|--|
| Racine      | State Highway 38                                 | Root River        | 1925       | 73.6                            |                        |                       |                     | 9,810                                    |
| St. Croix   | State Highway 128/Oak St.                        | Tiffany Creek     | 1925       | 79.5                            |                        |                       |                     | 2,770                                    |
| Taylor      | State Highway 73                                 | Hay Creek         | 1926       | 82.0                            |                        |                       |                     | 839                                      |
| Trempealeau | US Highway 53/Main St.                           | Beaver Creek      | 1925       | 9.5                             | X                      | X                     | X                   | 5,140                                    |
| Vernon      | State Highway 162/N. Ridge Rd.                   | Coon Creek        | 1927       | 68.2                            |                        |                       |                     | 690                                      |
| Vernon      | State Highway 162                                | Coon Creek        | 1927       | 69.8                            |                        | X                     |                     | 690                                      |
| Walworth    | State Highway 120                                | Como Creek        | 1919       | 58.8                            |                        |                       | X                   | 7,082                                    |
| Walworth    | State Highway 36                                 | White River       | 1924       | 50.6                            | X                      |                       | X                   | 4,700                                    |
| Waukesha    | US Highway 18                                    | Bark River        | 1919       | 82.4                            |                        |                       |                     | 3,800                                    |
| Waukesha    | US Highway 18                                    | Bark River        | 1924       | 73.5                            |                        |                       |                     | 6,300                                    |
| Waukesha    | State Highway 16/Wisconsin Ave.                  | Oconomowoc River  | 1924       | 37.8                            |                        | X                     |                     | 18,630                                   |
| Waukesha    | State Highway 83                                 | Oconomowoc River  | 1916       | 74.7                            |                        | X                     |                     | 3,050                                    |
| Waupaca     | US Highway 10/State Highway 49/State Highway 110 | Walla Walla Creek | 1923       | 56.7                            |                        | X                     |                     | 16,900                                   |
| Waupaca     | State Highway 49/State Highway 161/Main St.      | Little Wolf River | 1927       | 84.1                            |                        |                       |                     | 4,360                                    |
| Winnebago   | State Highway 114/Commercial St.                 | Fox River         | 1927       | 80.1                            |                        |                       |                     | 16,100                                   |

<sup>1</sup> As of December 2007.

<sup>2</sup> Based on the year in which the counts were most recently updated in DOT's bridge database.

Appendix 3

**Number and Percentage of Deficient State-Owned Bridges**  
November 2007

| Region/County        | Total Bridges | Structurally Deficient Bridges |            | Functionally Obsolete Bridges |            |
|----------------------|---------------|--------------------------------|------------|-------------------------------|------------|
|                      |               | Number                         | Percentage | Number                        | Percentage |
| <b>North Central</b> |               |                                |            |                               |            |
| Adams                | 8             | 0                              | 0.0%       | 0                             | 0.0%       |
| Florence             | 8             | 0                              | 0.0        | 0                             | 0.0        |
| Forest               | 11            | 0                              | 0.0        | 0                             | 0.0        |
| Green Lake           | 10            | 0                              | 0.0        | 0                             | 0.0        |
| Iron                 | 18            | 2                              | 11.1       | 0                             | 0.0        |
| Langlade             | 12            | 1                              | 8.3        | 1                             | 8.3        |
| Lincoln              | 53            | 1                              | 1.9        | 7                             | 13.2       |
| Marathon             | 164           | 7                              | 4.3        | 10                            | 6.1        |
| Marquette            | 37            | 0                              | 0.0        | 0                             | 0.0        |
| Menominee            | 3             | 0                              | 0.0        | 0                             | 0.0        |
| Oneida               | 14            | 0                              | 0.0        | 1                             | 7.1        |
| Portage              | 85            | 1                              | 1.2        | 0                             | 0.0        |
| Price                | 21            | 1                              | 4.8        | 3                             | 14.3       |
| Shawano              | 56            | 3                              | 5.4        | 3                             | 5.4        |
| Vilas                | 11            | 0                              | 0.0        | 0                             | 0.0        |
| Waupaca              | 68            | 2                              | 2.9        | 9                             | 13.2       |
| Waushara             | 21            | 1                              | 4.8        | 0                             | 0.0        |
| Wood                 | 51            | 4                              | 7.8        | 6                             | 11.8       |
| <b>Subtotal</b>      | <b>651</b>    | <b>23</b>                      | <b>3.5</b> | <b>40</b>                     | <b>6.1</b> |
| <b>Northeast</b>     |               |                                |            |                               |            |
| Brown                | 250           | 5                              | 2.0        | 18                            | 7.2        |
| Calumet              | 13            | 0                              | 0.0        | 1                             | 7.7        |
| Door                 | 17            | 4                              | 23.5       | 4                             | 23.5       |
| Fond du Lac          | 77            | 1                              | 1.3        | 8                             | 10.4       |
| Kewaunee             | 18            | 0                              | 0.0        | 0                             | 0.0        |
| Manitowoc            | 91            | 1                              | 1.1        | 3                             | 3.3        |
| Marinette            | 49            | 2                              | 4.1        | 4                             | 8.2        |
| Oconto               | 40            | 1                              | 2.5        | 1                             | 2.5        |
| Outagamie            | 83            | 2                              | 2.4        | 5                             | 6.0        |
| Sheboygan            | 85            | 0                              | 0.0        | 4                             | 4.7        |
| Winnebago            | 157           | 4                              | 2.5        | 23                            | 14.6       |
| <b>Subtotal</b>      | <b>880</b>    | <b>20</b>                      | <b>2.3</b> | <b>71</b>                     | <b>8.1</b> |

| Region/County    | Total Bridges | Structurally Deficient Bridges |            | Functionally Obsolete Bridges |             |
|------------------|---------------|--------------------------------|------------|-------------------------------|-------------|
|                  |               | Number                         | Percentage | Number                        | Percentage  |
| <b>Northwest</b> |               |                                |            |                               |             |
| Ashland          | 19            | 0                              | 0.0%       | 0                             | 0.0%        |
| Barron           | 65            | 3                              | 4.6        | 0                             | 0.0         |
| Bayfield         | 34            | 0                              | 0.0        | 0                             | 0.0         |
| Buffalo          | 76            | 6                              | 7.9        | 10                            | 13.2        |
| Burnett          | 15            | 0                              | 0.0        | 0                             | 0.0         |
| Chippewa         | 138           | 8                              | 5.8        | 17                            | 12.3        |
| Clark            | 43            | 0                              | 0.0        | 0                             | 0.0         |
| Douglas          | 61            | 0                              | 0.0        | 1                             | 1.6         |
| Dunn             | 92            | 7                              | 7.6        | 3                             | 3.3         |
| Eau Claire       | 115           | 6                              | 5.2        | 7                             | 6.1         |
| Jackson          | 75            | 7                              | 9.3        | 2                             | 2.7         |
| Pepin            | 17            | 1                              | 5.9        | 1                             | 5.9         |
| Pierce           | 58            | 2                              | 3.4        | 5                             | 8.6         |
| Polk             | 13            | 0                              | 0.0        | 1                             | 7.7         |
| Rusk             | 30            | 1                              | 3.3        | 0                             | 0.0         |
| Sawyer           | 20            | 1                              | 5.0        | 0                             | 0.0         |
| St. Croix        | 107           | 5                              | 4.7        | 6                             | 5.6         |
| Taylor           | 25            | 4                              | 16.0       | 2                             | 8.0         |
| Trempealeau      | 75            | 3                              | 4.0        | 5                             | 6.7         |
| Washburn         | 20            | 0                              | 0.0        | 1                             | 5.0         |
| <b>Subtotal</b>  | <b>1,098</b>  | <b>54</b>                      | <b>4.9</b> | <b>61</b>                     | <b>5.6</b>  |
| <b>Southeast</b> |               |                                |            |                               |             |
| Kenosha          | 57            | 3                              | 5.3        | 6                             | 10.5        |
| Milwaukee        | 527           | 33                             | 6.3        | 198                           | 37.6        |
| Ozaukee          | 50            | 1                              | 2.0        | 1                             | 2.0         |
| Racine           | 58            | 1                              | 1.7        | 2                             | 3.4         |
| Walworth         | 119           | 4                              | 3.4        | 2                             | 1.7         |
| Washington       | 75            | 0                              | 0.0        | 2                             | 2.7         |
| Waukesha         | 182           | 23                             | 12.6       | 16                            | 8.8         |
| <b>Subtotal</b>  | <b>1,068</b>  | <b>65</b>                      | <b>6.1</b> | <b>227</b>                    | <b>21.3</b> |



| Region/County    | Total<br>Bridges | Structurally Deficient Bridges |             | Functionally Obsolete Bridges |              |
|------------------|------------------|--------------------------------|-------------|-------------------------------|--------------|
|                  |                  | Number                         | Percentage  | Number                        | Percentage   |
| <b>Southwest</b> |                  |                                |             |                               |              |
| Columbia         | 98               | 4                              | 4.1%        | 8                             | 8.2%         |
| Crawford         | 68               | 6                              | 8.8         | 6                             | 8.8          |
| Dane             | 290              | 20                             | 6.9         | 41                            | 14.1         |
| Dodge            | 66               | 3                              | 4.5         | 7                             | 10.6         |
| Grant            | 74               | 3                              | 4.1         | 8                             | 10.8         |
| Green            | 29               | 1                              | 3.4         | 0                             | 0.0          |
| Iowa             | 58               | 1                              | 1.7         | 2                             | 3.4          |
| Jefferson        | 73               | 3                              | 4.1         | 5                             | 6.8          |
| Juneau           | 80               | 4                              | 5.0         | 2                             | 2.5          |
| La Crosse        | 107              | 2                              | 1.9         | 8                             | 7.5          |
| Lafayette        | 42               | 0                              | 0.0         | 1                             | 2.4          |
| Monroe           | 153              | 3                              | 2.0         | 5                             | 3.3          |
| Richland         | 78               | 3                              | 3.8         | 3                             | 3.8          |
| Rock             | 120              | 0                              | 0.0         | 20                            | 16.7         |
| Sauk             | 82               | 3                              | 3.7         | 8                             | 9.8          |
| Vernon           | 73               | 1                              | 1.4         | 4                             | 5.5          |
| <b>Subtotal</b>  | <b>1,491</b>     | <b>57</b>                      | <b>3.8</b>  | <b>128</b>                    | <b>8.6</b>   |
| <b>Total</b>     | <b>5,188</b>     | <b>219</b>                     | <b>4.2%</b> | <b>527</b>                    | <b>10.2%</b> |