



STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

KIRK T. STEUDLE
DIRECTOR

January 5, 2010

Mr. Robert Emerson
State Budget Director
Department of Management and Budget
111 South Capitol, 6th Floor
Lansing, Michigan 48909

Dear Mr. Emerson:

In accordance with the State of Michigan, Financial Management Guide, Part VII, enclosed is a summary table identifying our responses and corrective action plan to address the recommendations in the Office of the Auditor General's Performance Audit of the Bridge Inspection Program. This audit covered the period of October 1, 2006 through December 31, 2008

Questions regarding the summary table or corrective action plan should be directed to Gregory C. Johnson, Chief Operations Officer, at 517-373-4656, or Jerry J. Jones, Commission Auditor, at 517-373-2384.

Sincerely,

Signature Redacted

Kirk T. Steudle
Director

Enclosure

Performance Audit of the Bridge Inspection Program
Michigan Department of Transportation
Summary of Agency Responses to Recommendations
Audit Period: October 1, 2006 through December 31, 2008

SUMMARY TABLE

1. Audit Recommendations the agency has complied with:

None.

2. Audit Recommendations the agency agrees with and will comply:

FINDING

1. Scour Evaluations and POAs for Scour Critical Bridges

RECOMMENDATION

We recommend that MDOT complete or ensure the completion of all scour evaluations and POAs for scour critical bridges.

AGENCY RESPONSE

We concur with the recommendation.

MDOT has been aggressively pursuing completion of scour evaluations by December 31, 2009. Therefore, MDOT's response should be read in conjunction with the report finding to assure that the report reader has an understanding of the current conditions.

MDOT mitigates or replaces scour critical bridges whenever possible. In the past five years, MDOT has rehabilitated (with scour mitigation) or replaced over 450 bridges on river crossings. Countermeasures have been placed on 99 MDOT bridges that were previously scour critical. Out of the total of MDOT's remaining 386 bridges rated scour critical, 104 have rip-rap placed to protect the bridges foundations or river channel. MDOT completed all the scour evaluations on its system by December 23, 2009.

Local agencies currently have 223 scour critical bridges, of which 17 have rip-rap placed to protect the bridge foundation or river channel. Countermeasures were placed to improve 121 local agency bridges that were previously scour critical. Local agencies had 525 scour evaluations to complete on their system as of January 4, 2010.

MDOT has already taken the following actions in regard to scour critical bridges:

1. MDOT has developed scour evaluation procedures, which are published in MDOT's drainage manual.
2. To better ensure that all bridge owners manage their scour evaluation needs, MDOT developed a "Scour Critical Bridge" report in the MBRS. The report provides up-to-

date information from the Michigan bridge database showing scour evaluation and POA needs for all bridge owners.

3. MDOT developed a POA report within the MBIS that is used by all bridge owners to prepare POAs for their scour critical bridges.
4. MDOT provides technical advisement to all bridge owners on doing scour evaluation and preparing POAs.
5. MDOT provides guidance and instruction for doing scour evaluations and POAs in the form of Bridge Advisories available on MDOT's Bridge Operations Website.
6. MDOT partners with the Local Technical Assistance Program (LTAP) to put on a workshop for local agency bridge owners on how to do scour evaluations and prepare POAs.
7. MDOT has followed up with all local agencies to confirm that they understand the requirements and they have plans to meet the prescribed deadlines.

In regard to the audit recommendation:

1. MDOT completed all the remaining scour evaluations on its system by December 23, 2009, and will prepare POAs by December 31, 2010, as agreed to with the FHWA.
2. On December 3, 2009, MDOT in conjunction with the Federal Highway Administration sent follow-up letters to local agency bridge owners that have bridges that need to be evaluated for scour, or that are scour critical and require a Plan of Action.

MDOT will continue to monitor the progression of all local agency bridge owners to complete the 525 remaining scour evaluations on their systems as of January 4, 2010, and prepare POAs by December 31, 2010.

Local agencies that do not meet the deadlines will be held in non-compliance, and MDOT is working with the Office of the Attorney General to review MDOT's options to assure that local agency bridge owners complete scour evaluations and POAs, as required.

FINDING

2. Inspection Timeliness

RECOMMENDATION

We recommend that MDOT ensure that local bridge owners and MDOT regional offices complete routine bridge inspections and inspections of the underwater structural elements of all bridges in a timely manner.

We also recommend that MDOT document its follow-up activity or the rationale for its lack of follow-up activity related to late or potentially late bridge inspections.

AGENCY RESPONSE

We concur with the recommendations.

MDOT is very cognizant of the importance of the inspection schedule and getting bridge condition data entered into the bridge database timely. In 2002, MDOT committed to build two web-based inspection and management applications. One was the Michigan Bridge Inspection System (MBIS) and the other was the Michigan Bridge Reporting System (MBRS). Since their rollouts in 2004 and 2005, the systems have reduced the time it takes inspectors to document observed conditions, improved the quality of the database, and allowed the data from inspections to become available sooner. MBIS was awarded the AASHTO Francois Award for Innovation in 2005 and MDOT continues to utilize and enhance the systems to ensure timeliness of bridge inspections. We believe it is also important to note that the FHWA determined that Michigan's Bridge Inspection Program is in substantial compliance with the National Bridge Inspection Standards (NBIS).

In 2008, MDOT added special inspections to the MBIS and new reports were generated regarding these inspections. The special inspections include fracture critical inspections, underwater inspections, fatigue sensitive inspections, and other special inspections. MBIS also sorts bridges according to the inspection due date so bridge inspection team leaders know which bridges are coming due for inspection, and it also sends automated e-mails to all bridge owners 90 days before a bridge inspection is due. In addition, MDOT enhanced the inspection date fields in MBIS to improve the department's ability to track inspection due dates for special inspections.

MBIS provides reports that document the inspection schedule and routine inspections due in the next three months. MDOT runs a non-compliance check for local agencies every two months. This report is reviewed for data discrepancies and a non-compliance letter is sent to those who are more than 90 days past due for the inspection. The non-compliance letter notifies the agency they are in non-compliance with the NBIS, and that they are restricted from using Federal Aid to fund upcoming road and bridge projects. When there is an apparent data error or the agency is overdue less than 90 days, MDOT contacts the local agency to correct the situation. The NBIS allows 180 days after the inspection due date for local agencies to enter the inspection data into the database, but MDOT pro-actively begins the review process 60 days after the inspection due date to ensure local agencies are compliant by the data input deadline. In many cases, the local agency has completed inspection work on time, but has not yet entered the information into the database due to working on load rating or other data evaluation. MDOT sends additional delinquency notices to bridge owners on an intermittent basis until the bridge inspections are completed.

To further enhance inspection timeliness and documentation of follow-up, MDOT will do the following:

1. By April 1, 2010, Bridge Inspection Reports will be provided to senior management, including the Chief Operations Officer, Region Engineers, and Highway Operations Bureau Directors, for appropriate follow-up and corrective action as warranted. The

reports provided to senior management will identify for each bridge the inspection due date, actual inspection date, date the bridge condition data was entered into the database, and any bridge with increased inspection frequency. Both management and staff have been informed of the reporting and review requirements in various discussions since the report has been issued. The reporting and review requirements have also been discussed at subsequent Operation Executive Staff and Region/Bureau Management Team meetings.

2. MBRS inspection timeliness reports will include special inspections such as fracture critical inspections and underwater inspections.
3. MDOT will also review the automated inspection coming due notifications process within MBIS and will enhance the level of detail provided in the notifications to all bridge owners.
4. MDOT will add automated e-mails for advance notification to all bridge owners for upcoming fracture critical inspections, underwater inspections, and fatigue sensitive detail inspections.
5. Local agencies that do not meet the bridge inspection and data entry deadlines will be held in non-compliance and MDOT is working with the Office of the Attorney General to review MDOT's options to assure that routine bridge inspections and inspections of the underwater structural elements of local agency bridges are completed timely.
6. MDOT will establish an as-needed contract for bridge inspections that will be used for doing NBIS required bridge inspections when a local agency is more than six months late for a bridge inspection.
7. MDOT will review and strengthen our follow-up procedures to ensure documentation of MDOT's follow-up.

FINDING

3. Inspection Frequencies, Load Ratings, and QTL Comments

RECOMMENDATION

We recommend that MDOT ensure QTLs comply with MDOT's bridge inspection frequency guidelines at all times.

We also recommend that MDOT regularly monitor the appropriateness of the bridge inspection frequencies and load ratings for bridges experiencing significant deterioration.

We further recommend that MDOT ensure that QTLs adequately describe the physical deterioration of poorly rated bridges in MBIS.

AGENCY RESPONSE

We concur with the recommendations.

MDOT does require the use of the guidelines regarding bridge inspection frequency. However, the infinite variety of conditions encountered during inspection will always require the inspector to use engineering judgment and discretion in the application of the rules. FHWA rules and regulations and commentary in the AASHTO manual for Condition Evaluation document that it takes considerable judgment by the bridge inspector or engineer to determine appropriate inspection frequency or need to load rate a bridge. When determining the inspection frequency, the inspector takes into consideration many factors including the condition of the bridge, the type of the bridge, the redundancy of the structural supports, the deterioration rate of the bridge elements, and the type of deficiencies that could be expected. By December 31, 2010, MDOT will work with FHWA to clarify and strengthen the bridge inspection frequency guidelines to assure inspectors clearly understand, in a consistent manner, when the conditions warrant increased inspection frequencies.

Regarding the appropriateness of bridge inspection frequencies and load ratings for bridges experiencing significant deterioration, MDOT concurs that oversight is important, and the department has a quality control/quality assurance program that aids in ensuring this. MDOT regularly monitors inspectors' compliance with AASHTO's requirement for documenting bridge deterioration. MDOT requires quality control checks and they are followed up by quality assurance checks to regularly monitor inspectors' compliance with AASHTO's requirement for documenting bridge deterioration. Quality control is done by the bridge engineers, as prescribed by the NBIS, and quality assurance is currently done by MDOT central office and by consultant contract under MDOT direction. Quality assurance reviews continue to be performed to help assure the timeliness and accuracy of bridge inspection frequencies and to help assure that inspections adequately describe the physical condition of the bridge.

To further enhance the department's monitoring of state and local agency bridge inspection frequencies and load rating, by April 1, 2010, Bridge Inspection Reports will be provided to senior management, including the Chief Operations Officer, Region Engineers, and Highway Operations Bureau Directors, for appropriate follow-up and corrective action as warranted. The reports provided to senior management will identify for each bridge the inspection due date, actual inspection date, date the bridge condition data was entered into the database, and any bridge with increased inspection frequency.

MDOT does have procedures in place to help assure inspectors adequately describe the physical deterioration of poorly rated bridges in MBIS. Condition ratings are required by NBIS, are used nationwide, and provide a uniform way to describe the physical condition of specific bridge elements. Additionally, all of the ratings required by FHWA must be entered into the inspection application MBIS before the computer will allow the report to be saved. By April 1, 2010, MDOT will review the feasibility of enhancing MBIS so that it will identify and flag those bridges that warrant comment and help assure the inspector does not unintentionally leave a comment field blank.

FINDING

4. False Decking

RECOMMENDATION

We recommend that MDOT inspect the underside of bridges with false decking and establish procedures requiring this inspection.

We also recommend that MDOT ensure that all bridges with false decking are correctly identified in the MBIS.

We further recommend that MDOT ensure that its QTLs correctly report their inspection results for bridges with false decking into MBIS.

AGENCY RESPONSE

We concur with the recommendations. Each year FHWA trained, experienced bridge engineers conduct NBIS reviews. Although this report has found that MDOT procedures need strengthening in certain areas, overall, MDOT was found to be in substantial compliance with NBIS.

The placement of false decking is done by MDOT specifically to protect the safety of the motoring public. False decking is put in place if there is potential for concrete to separate from the underside of a bridge. Less than 2% of MDOT bridges have false decking and it is important to note that false decking does not need to be removed to ensure the integrity of the bridge. The structural integrity of a bridge is not at risk because of false decking and the structural integrity of the bridge is not compromised because concrete has or may separate from the bridge.

The audit indicated that five bridges were rated even though MDOT did not inspect the underside of the bridges. It is important to note that bridges with false decking can be rated. Many times, false decking does not cover the entire deck bottom. Therefore, these bridge decks can be appropriately assessed by using visible portions and other components as provided for in the Bridge Inspectors Reference Manual and MDOT's Bridge Rating Guidelines.

Also, if false decking is placed on a bridge, the deck bottom surface is automatically rated as deficient and that individual rating is incorporated in the overall rating of the bridge. All MDOT bridges have an inspection frequency appropriate for the condition of the bridge, and some bridges actually are inspected at more frequent intervals depending on the bridge rating, to ensure safety of the motoring public. In addition, even when false decking exists on a bridge, the bottom flange of the beams can be inspected, and since false decking is typically placed over the traveled lanes, the inspector typically can view the beams' ends where most deterioration occurs. In addition, determination of the condition of a bridge deck can be made from the top surface of the deck as well as the bottom surface.

The NBIS and American Association of State Highway Transportation Officials (AASHTO) Manual for Condition Evaluation discuss the various types of bridge inspections. NBIS and the AASHTO Manual do not specifically address false decking; however, the qualified team

leader (QTL) uses engineering judgment in assessing the overall condition and integrity of the bridge deck and the level of inspection required. To determine the overall condition of the bridge deck, other components of the deck are used to reach an overall condition rating as provided for in the Bridge Inspectors Reference Manual and MDOT’s Bridge Rating Guidelines. The inspector takes into consideration the condition of the bridge, the type of bridge, the amount of traffic crossing over the bridge, the redundancy of the structural supports, the deterioration rate of the bridge elements, and the type of deficiencies expected. False decking should be removed when the QTL has determined the removal is necessary to assess the overall safety of the structure.

In addition, although separately rating the bottom of the bridge deck is not a NBIS or an AASHTO Manual requirement, MDOT has developed a “bottom of the deck rating” as a Michigan-specific tool to assist in the overall required deck assessment. This is in compliance with the Appraisal Coding Guide referenced in the audit.

In recent years, MDOT has taken an aggressive approach to repair or replace bridges with poor bridge decks. In the past ten years, MDOT has rehabilitated or replaced over 1,500 bridges. As a result of this strategy, bridge condition has increased 11 percent since 1998 as shown Figure 1. The number of bridges in good/fair condition in the Metro Region has increased over 21 percent as shown in Figure 2. Metro Region is where the majority of bridges with false decking are located.

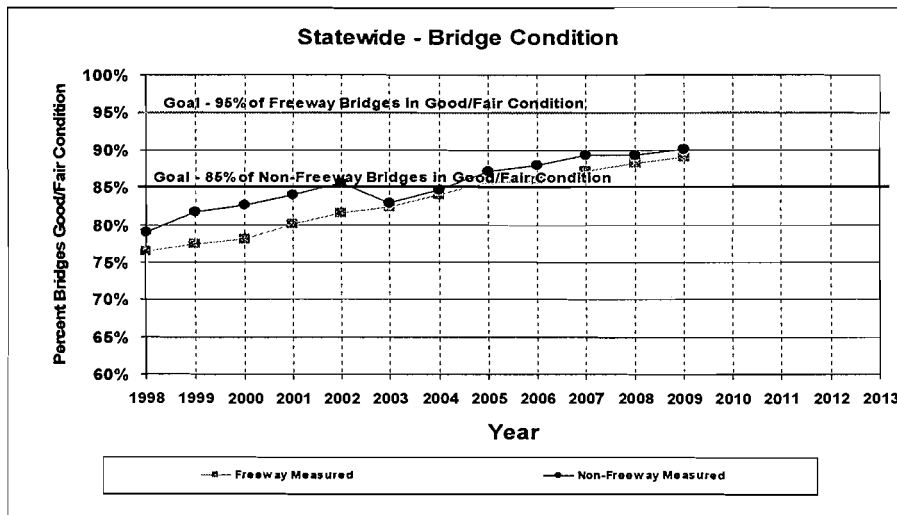


Figure 1 – Condition Improvement of MDOT bridges.

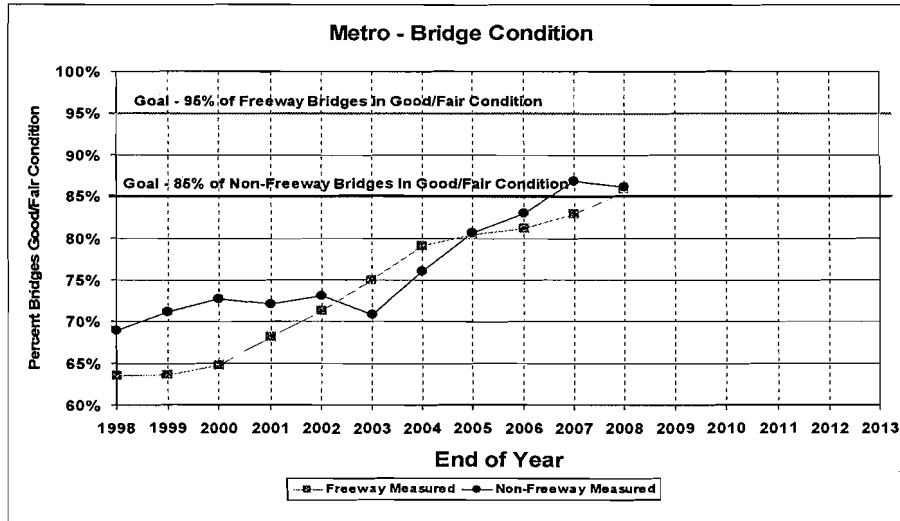


Figure 2 – Condition Improvement of Metro Region bridges.

MDOT continues to pursue a strategy to improve all bridge decks and remove the false decking. MDOT's Five-Year Plan is aggressively addressing false decking and, in recent years, MDOT has made the following enhancements to the bridge inspection program to identify bridges with false decking and to assess the condition of the bottom side of bridge decks:

1. Although not required by federal regulations, in 2007 MDOT added a deck bottom surface rating to better evaluate bridge decks. Because the typical inspection cycle is two years, during the time of the audit the bridge database and comment fields for all bridges were not completely updated using the new rating.
2. Although not required by federal regulations, in 2007 MDOT added a specific inventory item and condition rating for false decking. Again, because the typical inspection cycle is two years, during the time of the audit, the bridge database and comment fields for all bridges were not completely updated using the new condition rating.
3. MDOT has created a program that provides funding to do in-depth bridge inspections. These in-depth inspections of bridges would include all bridges having significant false decking. The program, initiated in FY 2008, is funded at \$1.6 million. The program will continue into FY 2010 funded at \$2 million.
4. MDOT has developed alternate false decking methods that will better facilitate future bridge inspections, such as the use of mesh material, as shown in Figure 3. By April 1, 2010, MDOT will place the alternate false decking, using mesh material, on several bridges and will evaluate the performance and effectiveness of the method.
5. MDOT's Metro Region hired a consultant to identify all bridges having false decking within the Region, and show the location of the false decking on the bridge. This work has been completed.

To further enhance the inspection of bridges with false decking and ensure that bridge inspectors correctly report inspection results, MDOT will also do the following:

1. MDOT will continue to populate the smart flag condition rating for false decking in MDOT's MBIS and has also instructed inspectors to document the area of false decking placed on the bridge. This process will be completed by December 31, 2010.
2. MDOT will indicate on the inspection report if a portion of the false decking was removed to facilitate bridge inspection. This process will be completed within the two-year inspection cycle.
3. By April 1, 2010, Bridge Inspection Reports will be provided to senior management, including the Chief Operations Officer, Region Engineers, and Highway Operations Bureau Directors, for appropriate follow-up and corrective action as warranted. The reports provided to senior management will identify information for each bridge, such as the inspection due date, actual inspection date, date the bridge condition data was entered into the database, any bridge with increased inspection frequency, and whether the bridge has false decking or not. Both management and staff have been informed of the reporting and review requirements in various discussions since the report has been issued. The reporting and review requirements have also been discussed at subsequent Operation Executive Staff and Region/Bureau Management Team meetings.
4. MDOT will clarify and strengthen the use of the Request for Action (RFA) process to indicate need for removal of false decking to facilitate bridge inspection. Though not part of the NBIS, MDOT has a process inspectors use to communicate action items for bridge structures. The RFA process establishes a higher priority than a standard work item and the inspector uses a form to describe the tasks and directs it to the individual with the responsibility to perform the activity. In using this process for the removal of false decking, the inspector documents the needed time frame on the form and attaches supporting documents needed to complete the task.

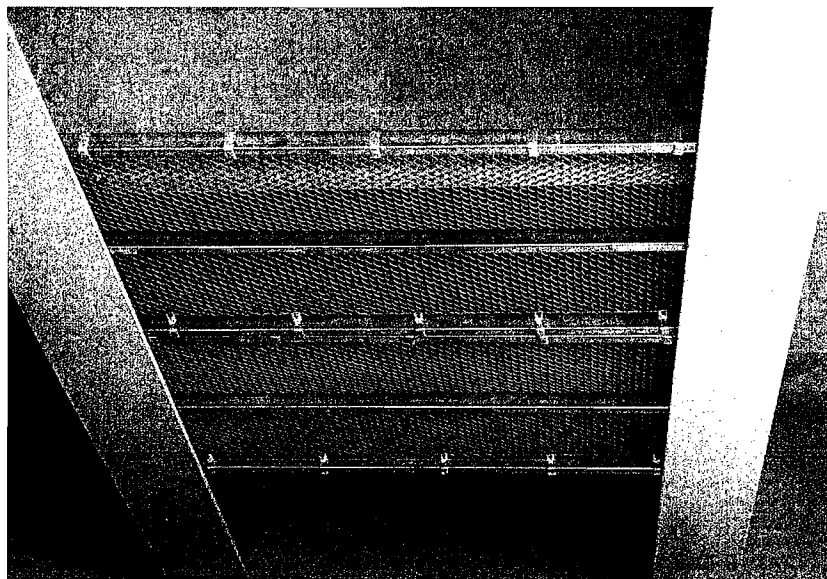


Figure 3 – Alternate False Decking Method that Facilitates Bridge Inspection

FINDING

5. QTL Requirements

RECOMMENDATION

We recommend that MDOT ensure that inspection team leaders meet State and federal QTL requirements.

AGENCY RESPONSE

We concur with the recommendation. MDOT now has procedures in place to help ensure that only those who meet the requirements of the NBIS as a QTL perform bridge inspection. To ensure that QTLs meet federal and State bridge inspector training requirements, the Michigan Bridge Inspection System (MBIS) requires the inspector to enter their credentials once a year. This automated validation ensures the inspector has access to only the documents and forms they are qualified to complete. The NBIS require bridge owners to have the inspection done by qualified staff, and it is the bridge owner's responsibility to confirm the inspector's credentials at the time they retain them to do the inspection work. When local agency bridge owners are found to be using staff with expired credentials, federal funding can be withheld by MDOT until the agency has the required staff.

In the instances (a through c) noted in the finding, MDOT reports the following:

- a. This was not a MDOT inspector. This individual is a registered professional engineer who had been doing bridge inspection for local agencies for many years prior to the change in the regulations. In accordance with the FHWA "Questions and Answers on the National Bridge Inspection Standards 23 CFR 650 subpart C", (<http://www.fhwa.dot.gov/bridge/nbis/index.htm#7>), Q309-6, the FHWA does allow for long serving, highly qualified engineers to have a wavier to the requirement for this comprehensive training course. MDOT declined to exercise the FHWA exception and denied the inspector's request for wavier, however, MDOT did grant a time extension for the engineer to complete the training and performed independent QC on the individual's work until the training requirements were met. The independent QC was performed on 15 of 60 bridges (25%) inspected by the engineer. This individual has since decided to not take the bridge inspection class and his name has been removed from the MBIS application, preventing data entry.
- b. This inspector worked for MDOT and had the requisite credentials and training to work as a QTL; however, this individual left MDOT and MDOT did not retain the training records. While MDOT cannot now provide documentation, this person met the QTL requirements while working for MDOT. In addition, the inspector was employed by the Pennsylvania DOT as a bridge inspector prior to working for MDOT.
- c. In the two instances noted, one was a MDOT inspector and now has the training, credentials, and certifications to fully meet the NBIS requirements. In the other instance, the inspector was a local agency employee. During a standard quality assurance check, the local agency employee was found to have incorrectly entered the number of hours of recurrent training by using course work that did not apply to bridge inspection. The situation was brought to the attention of the city administration and the

federal funding was suspended. The local agency has since hired a qualified consultant to complete inspections until the staff attends the required training.

By April 1, 2010, MDOT will develop a process to ensure the retention of all records pertaining to the QTL qualification.

3. **Audit Recommendations the agency disagrees with:**

None.