

State-Aid Bridge News

January 16, 2009

- **Bridge Management Update**

Inspection Data deadline

If you are using web-based Pontis data entry (Citrix webportal): When all bridge inspections have been entered into Pontis, notify Lisa Hartfiel in the Mn/DOT Bridge Office no later than February 15, 2009.

If you are using a stand alone Pontis data set: Please send your updated data to Lisa no later than February 15, 2009.

If you will not be able to meet the February 15 submittal deadline, please contact Lisa to make other arrangements.

Those agencies owning 10 or less structures should email, mail, or fax a copy of their completed inspections with markups to Lisa.

Certification of Inspection Form

All agency Bridge Inspection Program Administrators must submit a "Certification of Bridge Safety Inspection" form upon completion of all bridge inspections. The form is located at:

<http://www.dot.state.mn.us/bridge/DocumentsFormsLinks/ByBridgeOffice/CertificateOfBridgeInspection.pdf>

Submit the completed and signed form to Lisa.

Web-based (Citrix) Inspection Data Entry

If you have questions or experience any difficulties using the Citrix webportal (such as expired user id), please contact Lisa.

48-month Culvert Inspections

The FHWA requested that implementation of the 48-month culvert inspection interval not take place until after the 2008 data submittal deadline in February 2009. Therefore, a new Bridge Safety Inspection Interval Request Form will be available March 1, 2009. An updated version of the Inspection Frequency Report on the Bridge Office Web site will also be available.

Tom Davidson Retirement

Tom Davidson retired from the Bridge Management Unit in December 2008. He had over 30 years experience with MN/DOT. We will miss him, and wish him well. Please remove Tom from your contact list and direct correspondence to Lisa Hartfiel or Jim Pierce.

- **Bridge Costs Update**

A brief summary of the 2008 CY (calendar year) bridge costs shown below indicates a marked increase in the cost of the PCB (prestressed concrete beam) bridge. In the past we have typically seen more gradual increases in costs for the PCB Bridge. The other main bridge types had moderate price increases as compared to our CY 2007 costs. Pedestrian welded steel truss bridges also had a marked increase, but the price history of the welded steel truss type often fluctuates quite a bit from year to year.

- PCB structures were up 12% (\$102.42/sf in 2007 vs. \$115.16/sf in 2008)
- C-SLAB (cast in-place concrete slab spans) structures were up 7% (\$94.51/sf in 2007 vs. \$101.18/sf in 2008)
- STEEL structures were up 4% (\$150.23/sf in 2007 vs. \$156.14/sf in 2008)

- **Bridge Inspection Update**

2009 Bridge Safety Inspection Seminar Dates and Locations

Feb 11	Grand Rapids
Feb 18	Detroit Lakes
Feb 25	Metro-Arden Hills
March 5	Owatonna
March 25	Metro-Arden Hills
March 26	St. Cloud

Program Administrators and Team Leaders only need to attend 2 seminars every years.

Local Snooper Rental Procedure

Mn/DOT snoopers may be rented through the Bridge Office by local agencies to perform bridge inspections. To obtain more information or to schedule a snooper, contact Jennifer Zink at the Mn/DOT Bridge Office at 651-366-4573 or e-mail at jennifer.zink@dot.state.mn.us.

The snooper should NOT be used for maintenance purposes that have the potential to damage the bucket or the arms. ONLY Mn/DOT bucket operators are to operate Mn/DOT snoopers. The respective Mn/DOT District in which the local agency resides will provide an operator based on availability of staff. Traffic control must be provided by the local agency.

Snooper rental charges are waived for the 30' snooper. Only snooper driver and bucket operator expenses will be charged to the local agency in this case.

Inspection Document Websites

NBIS Part 650 Subpart C: www.fhwa.dot.gov/bridge/nbis.htm

Mn/DOT Bridge Inspection Manual Version 1.7 – April 2008:
www.dot.state.mn.us/bridge/Manuals/Inspection/BridgeInspectionManual.pdf

Mn/DOT Bridge Safety Inspection Certification Policy (2008):
<http://www.dot.state.mn.us/bridge/DocumentsFormsLinks/ByBridgeOffice/MnDOT-Bridge-Safety-Inspection-Certification-Policy.pdf>

Mn/DOT Technical Memorandum No. 04-08-B-01: Guidelines for Bridge Inspection Frequency:
www.dot.state.mn.us/tecsup/tmemo/

Mn/DOT Technical Memorandum No. 08-01-B-01: Guidelines for In-Depth Inspection of Fracture Critical Bridges, Special Inspections for Other Bridges, and for Underwater Inspections:
www.dot.state.mn.us/tecsup/tmemo/

Mn/DOT Technical Memorandum No. 08-02-B-02: “Critical Deficiencies” Found During Bridge Inspections: www.dot.state.mn.us/tecsup/tmemo/

FHWA Bridge Inspector’s Reference Manual, 2002:
www.dot.state.mn.us/bridge/DocumentsFormsLinks/index.html

FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges – December 1995: www.dot.state.mn.us/bridge/DocumentsFormsLinks/index.html

AASHTO Manual for the Condition Evaluation of Bridges, 2000, 2nd Edition, through 2003 Interims: Available for purchase at www.transportation.org

Minnesota Statute 165.03 Strength of Bridge; Inspection: www.leg.state.mn.us/leg/statutes.asp

- **Local Bridge Replacement Program Update**

Local Bridge Replacement Program has funded 153 bridges in 2008. This year priority was given to projects replacing fracture critical bridges. The counties replaced 14 fracture critical bridges and approximately 10 more are in the federal program to be replaced within the next three years. The entire \$50 million of 2008 bridge bond funds has been dedicated to bridge projects. This appropriation was prioritized in the following manner:

\$25 million set aside for the Lowry Ave Bridge (CSAH 153) over the Mississippi River in Hennepin County; \$13 million for the match of the local Federal STIP bridge projects; \$7 million for fracture critical bridges; and \$5 million for the projects on the bridge waiting list with priority given to bridges that are closed, load posted, and road in lieu projects.

The waiting list for bridge bonds or town bridge funds currently has 102 projects requesting approximately \$21 million in bond and town bridge funding. These are projects with approved plans. Currently on the bridge priority master list there are still 640 unfunded projects identified for 2008 requesting \$71 million in bond funds and an additional 390 projects for 2009-2010 making the total bond requests for the next two years \$151 million.

Counties and cities should update their 5-year bridge program and send it in to Patti Loken with the updated resolutions if they are adding new bridges to their program. You can send in updated cost estimates for projects currently on the master list at anytime.

- **Local Bridge and Roadway Projects with Retaining Walls**

When planning and developing a local project that calls for retaining walls, we encourage you to consult the State Aid Bridge Unit to assist you in the selection of the appropriate wall type. Prior to advancing to final plan development we would be happy to confirm that your proposed wall system meets the design and construction requirements of Mn/DOT.

There are many available retaining wall types to select from, each with specific advantages, disadvantages, limitations, and cost competitiveness as dictated by the site conditions. Proposing the correct wall system during the preliminary plan development phase will eliminate costly final plan changes, project addendums, and the potential for costly change orders during construction.

Note, the appropriate retaining wall system will meet the design, detailing and construction requirements/limitations set forth by Mn/DOT and the wall industry.

The following are the most common retaining wall types used on local projects:

- Cantilever cast-in-place reinforced concrete
- Counterforted cast-in-place reinforced concrete
- MSE (mechanically stabilized earth walls)
- MBW (modular block wall)
- Cantilever sheet pile wall

Mn/DOT has many excellent resources available to guide you through the process in selecting the appropriate retaining wall system. In fact, Chapter 11 Abutments, Piers & Walls of the Mn/DOT LRFD Bridge Design Manual at <http://www.dot.state.mn.us/bridge/Manuals/LRFD/section11.pdf> is a great resource to start with. We would also direct you to the Bridge Standards and Research Unit of the Bridge Office or the Foundation Unit of the Office of Materials and Road Research for additional technical information regarding the various wall systems.

- **Gusset Plate Review of Existing Local Truss Bridges Update**

We're pleased to report that all three of our bridge consultants, SRF Consulting Group, LHB, and WSB have essentially completed the gusset checks of the first set of 9 higher volume bridges. We're also very pleased to report that all of the gusset check work was completed under budget. In fact, one of the consultant contracts was recently amended to include another higher volume bridge, with all work to be completed within their initial contract budget.

Listed below is a brief recap/update of the gusset check work:

Polk County Br 5767, the analysis, rating, and QA/QC of all members and gussets is complete. Some damaged members (due to flood debris removal) were found on this bridge. They have analyzed these members with reduced section properties and conservative analysis methods and have found that the members are lightly loaded and the rating factors are still high.

Polk County Br 5871, the analysis, rating, and QA/QC of all members and gussets is complete. No significant findings were found on this bridge and all operating rating factors were above 1.3.

Polk County Br 7097, the analysis, rating, and QA/QC of all members and gussets is complete. The rating of the gusset connection at the bearing locations was found to have an operating rating factor (under the buckling limit state) less than the 1.3 limit specified in Mn/DOT's gusset review procedure. Using the refined analysis procedure they found that the operating factors were much greater than 1.3. Ratings for the posting vehicles for this gusset have been completed.

St. Louis County Br 7649, the analysis, rating, and QA/QC of all members and gussets is complete. Nothing unusual was found on this bridge.

Wabasha County Br 6563, the analysis, rating, and QA/QC of all members and gussets is complete. Again, nothing of note showed up in the analysis for this bridge.

City of Duluth Br L6116 (Aerial Lift Bridge), the analysis, rating, and QA/QC of all members and gussets are near completion. The bridge analysis was particularly time consuming due to the complexity of the lift span and associated machinery and equipment. The bridge is currently shut down for a maintenance project, allowing the field inspection/verification work to proceed.

Clay County Bridge 6646, the member analysis, rating and QA/QC review is near completion. Their final report will be submitted to Mn/DOT next week.

Norman County Bridge 6676, the member analysis, rating and QA/QC review is near completion. Their final report will be submitted to Mn/DOT next week.

Lac Qui Parle County Bridge 4955, the member analysis, rating and QA/QC review is near completion. Their final report will be submitted to Mn/DOT next week.

The State Aid Bridge Unit of the Bridge Office will be holding meetings with the consultants on the first week of February to discuss the final report documents and conclude with final comments and any necessary revisions for contract closeout on February 13th, 2009.

In conjunction with concluding the first round of consultant contracts we will be developing the next set of contracts as well. Again, we envision selecting 3 local bridge consultants to analysis & rate our next set of local truss bridges. However, this time we will be assigning up to 5 bridges per consultant, realizing the savings and efficiencies our consultants have demonstrated.

To date we have been able to eliminate two truss bridges off the scheduled for gusset checks since they are now funded and scheduled for replacement. We look forward to administering the next contract for an additional 15 or so truss bridges starting in late spring 2009.

- **Bridge Construction Elevations for Deck Forming**

If your agency is engaged in the construction of a concrete or steel beam bridge, you will probably either hear from the bridge contractor or your inspector that they need the “construction elevation run” to set the deck forms. Construction elevation runs are computer printouts (from various geometry programs) that depict the top of slab elevation and bottom of deck form elevations at 5 foot increments along each beam and gutter locations.

The computations in determining the deck elevations will consider vertical profile, bridge deck cross slope, and compensate for the theoretical beam deflection under the weight of the concrete deck. One can quickly see that computing deck elevations along a straight beam under a curved, variable super elevated, skewed, and/or tapered deck, the computations become much more time consuming and complex.

Today, the Mn/DOT Bridge Office continues to use the construction elevation program, which is an archaic DOS based program, but remains very dependable for most levels of bridge deck complexities. The request for the computer runs should occur early in the construction to allow time for preparation and timely delivery. Ideally the deck elevations should be computed concurrent with the QA/QC of the final bridge plans. Because of this, and the fact that bridge construction elevations closely parallel the design of the bridge, we are now requesting that our local bridge consultants provide this information upon request of the local agencies.

To help facilitate this process, the State Aid Bridge Unit is willing to issue the Mn/DOT construction elevation program with useful program input templates to our local bridge consultants. Along with issuing the program we will provide some general one on one training as requested. Please know that we are not experienced in computer technical support, but we can provide assistance on the correct use of the construction elevation program.

However, regardless of the program or spreadsheet the consultant uses to compute the construction elevations, they will be held responsible for the accuracy of the deck elevations. The State Aid Bridge Unit will continue to assist the consultants with this work until at which time they become proficient users of the construction elevation program and/or their own programs and spreadsheets to compute deck elevations.

- **New Mn/DOT Standard Culverts and Retaining Walls**

New Mn/DOT standard box culvert reinforcement tables, culvert details, and end sections will be available by the end of 2009. Also new Mn/DOT standard cast in-place concrete cantilever retaining walls will be available at this time. These new culvert and retaining wall standards will be designed using LRFD (load resistance factor design) as required by the FHWA for these structures with which preliminary engineering is initiated after October 1, 2010.

The new culvert standards will accommodate culverts with up to 16 foot widths and approximately 20 feet of overburden. Custom designs will be required for culverts with widths greater than 16 feet to 20 feet and will only be considered upon request. Custom culvert designs will require the use of square culvert end sections only. Please contact the State Aid Bridge Unit when developing a project that may call for a large culvert requiring a custom design.

- **Local Bridge Issues**

The following important local bridge issues are currently being discussed between State Aid, the Bridge Office and the County Engineers Bridge Committee. Overall there is an effort to balance cost, risk, and need to satisfy the many FHWA compliance and process requirements.

- Update local bridge ratings
- Address SHV (special hauling vehicles) on the local roadway system
- Permitting local bridges
- Management of the existing local bridge system
- Local bridge scour codes
- Historic local bridges

We will keep you updated on these issues as we come to consensus and move the outcomes forward to the MCEA Board of Directors for consideration. As always, your input into these items is greatly appreciated.

- **Accelerated Bridge Construction (ABC) and the Box Beam Bridge**

The State Aid Bridge Unit recently presented at the 2008 Minnesota Public Engineers Technology Conference & Tradeshow on ABC and the outcomes of the Blue Earth County Box Beam Bridge. The benefits of ABC, roadblocks to ABC, contractor's perspective of ABC and the lessons learned across the country and here in Minnesota were discussed.

Because ABC is conducive to innovative technology and contracting methods, many examples of innovative bridge technology were discussed. Examples of recent innovative bridge technology and ABC in Minnesota would be the on going use of the Mn/DOT inverted tee beam bridge & now the adjacent box beam bridge.

Interestingly enough, like other states in the country, we too are finding that the first cost of implementation is significantly higher than traditional construction. However, we are also now seeing the costs decreasing with the number of times the technology has been implemented. An example of this is the repeated use of the inverted tee beam bridge. The trend suggests that the inverted tee beam bridge will soon be competitive with the slab span bridge.

Like the inverted tee beam bridge, the first implementation of the box beam bridge was no different. Yes, the construction costs were significantly higher than traditional construction. As we developed this project we did recognize the potential for greater costs, since our intent was to demonstrate the New York style local bridge with all of its' typical design features and speed of construction. Some of the features include metal traffic rail, sheet pile abutments with 1/16" sacrificial steel, prestressed concrete box beams with composite concrete deck, transverse post tensioned deck system, and etc.

Many lessons were learned during the construction of this bridge, and many conclusions can be drawn from the experience. Some of the more notable lessons learned to reduce costs in the future are to consider fabricating the box beams using self consolidating concrete to reduce labor, consider thinner gauge sheet walls, explore the need for painting the sheet walls, and explore a non composite system for low volume roadways. One of the more notable conclusions was how crucial it is to have good coordination between the contractor, fabricator and the engineer to assure you get timely shop drawing reviews, and timely delivery of materials to achieve accelerated bridge construction.

We would again like to thank Erickson Engineers, FHWA, Mn/DOT and Blue Earth County for extra effort, patience, and determination to see this unique bridge project successfully constructed. The learning curve was high for many of us in the use of transverse post tensioning and high pressure grouting, driving sheet piling to serve as an abutment, cold weather concreting, metal railing installation, and more. We also look forward to the continued consideration for box beam bridges and other opportunities to use prefabricated bridges to reduce costs and accelerate construction.

The power point presentation on ABC and the box beam bridge can be down loaded from the State Aid Bridge Website at <http://www.dot.state.mn.us/bridge/StateAidBridge/index.html>

- **State Aid Bridge Contacts:**

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