

# State-Aid Bridge News

January 11, 2012

## Bridge Asset Management Update

### 2011 Bridge Inspection Data

As you may or may not be aware, Pontis of any flavor in the counties and cities is a thing of the past due to the roll-out of the web-based Structure Inspection Management System (SIMS). As in the past, when all bridge inspections have been entered and approved, notify Lisa Hartfiel at 651-366-4557 ([lisa.hartfiel@state.mn.us](mailto:lisa.hartfiel@state.mn.us)) or Thomas Martin at 651-366-4556 ([thomas.martin@state.mn.us](mailto:thomas.martin@state.mn.us)).

### 2011 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/inspection/certofbridgeinsp.pdf>

Submit the completed and signed form to Lisa no later than February 15, 2012.

### 48-month Culvert Inspections

Some culverts that were approved for 48 month frequency last year may have been put back on 24 month frequency due to additional criteria added by FHWA. Please run the Inspection Frequency Report on the website.

<http://dotapp7.dot.state.mn.us/bridgereports/Logon.aspx>

## Structure Information Management System (SIMS) News

### All SIMS account IDs will expire on February 28, 2012

### All inspection data must be entered and approved no later than February 15, 2012

If you do not meet the February 15, 2012 deadline, you will be out of compliance with Minnesota Statute 165.03, Subd. 3. Please contact Lisa or Thomas if you will not be able to meet the deadline.

### Helpful reports available on SIMS 'Manager' side

Local agencies can find helpful reports under the 'Reports' dropdown on the SIMS Manager ([mn.bridgemanage.com](http://mn.bridgemanage.com)). There are seven system reports available, however three will be most useful for local agencies; "Next 2 Months", "Past Due" and "Due by Feb. 15". These reports will only report those bridges that fit the conditions detailed in the 'Description' column on the page. Of course, users know that by running a query without any criteria, their inventory will be listed and each bridge yet to be approved by the Program Administrator (PA) will have an asterisk next to the bridge number.

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## SIMS Implementation

See website for latest information including tutorials, How to Videos, <http://www.dot.state.mn.us/bridge/sims/index.html>

## Upcoming SIMS Training

2012 SIMS hands-on training sessions have been tentatively scheduled for Mankato and Bemidji in January, Arden Hills in February, and Saint Cloud in March. E-mail notifications to SIMS users will be sent out regarding this training soon. If your training needs are more immediate, user manuals and video tutorials are available at the SIMS website: <http://www.dot.state.mn.us/bridge/sims/index.html>.

## Approving Reports

MnDOT's May 2011 launch of the new Structure Information Management System (SIMS), which replaced the Pontis system, not only is a new interface for inspectors to enter inspection data, but also is an electronic bridge file that serves Program Administrators (PA). Within the SIMS program, PAs now have new procedures to review and maintain compliance of their bridge inspection program as directed by Minnesota Rule [8810.9400](#) and Minnesota Statute [165.03](#).

The value to Program Administrators is removing the need to print hard copies of all annual bridge inspection reports, and then having to review and sign them. Inspection reports can be reviewed and signed electronically right within the SIMS application. **Only** approved inspection reports by the PA in SIMS will update the official bridge record and fulfill FHWA compliance.

Instructions on how to approve reports in SIMS can be found at the following website. There is also a short 2 minutes video that illustrates the process as well:

[http://www.dot.state.mn.us/bridge/sims/pdf/PA Report Approval.pdf](http://www.dot.state.mn.us/bridge/sims/pdf/PA%20Report%20Approval.pdf)  
<http://www.dot.state.mn.us/bridge/sims/videos.html>

## Recent SIMS Enhancements:

### Update Reports

How do you update an inspection report once the report has been approved? Answer – use the new Update Report! This new report type in SIMS allows inspectors to update or add condition states, notes, pictures, files, etc. to the bridge after a routine inspection has been approved for the year. By using the Update Report, the original routine inspection date for that year will not be altered.

### Critical Deficiency Reports

The FHWA requires that all states develop a process to monitor critical deficiencies found during bridge inspections, which are defined as any structural or safety related deficiency that requires immediate follow-up inspection or action, through resolution. MnDOT Technical Memorandum 11-12-B-04 defines and establishes this process. SIMS now initiates this process electronically based on inspector condition ratings from a routine inspection, or any type of inspection, in the following ways:

1. If an NBI condition rating for Deck, Superstructure, Substructure, Channel, or Culvert is assigned to either 2, 1, or 0,
2. If the critical finding smart flag #964 is put in Condition State 2

Once an inspector selects to submit the routine inspection report for review, an alert e-mail will immediately be sent to the MnDOT Bridge Office and the inspector will see a pop-up screen instructing them to also complete a Critical Deficiency Report.



The workflow associated with the Critical Deficiency Report is documented in the instructions and video located at the following links:

[http://www.dot.state.mn.us/bridge/sims/pdf/Critical Deficiency Report.pdf](http://www.dot.state.mn.us/bridge/sims/pdf/Critical%20Deficiency%20Report.pdf)<http://www.dot.state.mn.us/bridge/sims/videos.html>

### **Structural Assessment Form Tab**

Inspectors and Program Administrators may have already noticed a new tab (Str Assessment Form) when entering an inspection report under the Enter Inspection tab. This is a MnDOT standard form for completing a structural evaluation of a bridge due to an inspection. It is included for all inspection report types in SIMS for Program Administrator use. This is an OPTIONAL form. Approval of reports is not dependent upon its completion. The tab can be hidden at any time under the Tabs tab and can also be removed from the printed report.

### **E-mail Alerts**

New e-mail alerts are implemented in SIMS that notify the Program Administrator of upcoming inspections, past due inspections, and bridges with load rating and/or posting needs. The e-mails will be sent by SIMS to the Program Administrators monthly for inspections due and past due and biannually for load rating/posting needs.

The timelines for past due inspection e-mails are: 30 days, 30-90 days, 90-180 days, and 180+ days.

The parameters set for the Load Rating e-mail would be: the inventory load rating date is blank, the inventory load rating date is prior to 1970, the NBI Superstructure, Substructure, Culvert, or Structure Evaluation Appraisal ratings are 4 or less, the inspection element Section Loss Smart Flag (Element 363) is rated in Condition State 4, or the inspection element Signing Smart Flag (Element 981) is rated in Condition State 5. These parameters are in conjunction with our current Load Posting report through Pontis. Once a load rating review date is submitted and entered by Bridge Management into the inventory, the agency would not receive an e-mail again for that particular bridge or set of bridges until either one or more of the parameters changes OR if the load rating review date is older than 5 years.

The following is an example of the Inspections Due e-mail the Program Administrator would expect to see:

#### **Inspections Due - 30 Days:**

SUBJECT: Inspections Due

The following message is being sent on behalf of the Minnesota Department of Transportation Bridge Office. This message contains important information related to bridge inspections and/or inventory data.

XXXXX COUNTY- BRIDGE 69510

XXXXX COUNTY - BRIDGE 69527

The bridge(s) listed above is/are due for inspection and/or inventory updates within 30 days pursuant to the National Bridge Inspection Standards. If the bridge has been inspected, or if any inventory information has changed, please input the new information into the Structure Information Management System (SIMS) and submit any additional inventory updates to MnDOT Bridge Office - Asset Management Unit. Bridge inspections or updates that are "In Progress" must be approved in SIMS by the agency Program Administrator within 90 days of the inspection date for bridges on the trunk highway system and 180 days for bridges on the local system.

### **Upcoming SIMS Changes**

A few additional enhancements are on the horizon for SIMS in the next few months: ability to carry photos from one year to the next in a report, addition of a Scour Report, additional tabs for waterway inspection and channel cross-sectioning in all report types, incorporation of historical Pontis reports, and renewed function of the Pontis reports on the MnDOT Bridge Office website with current SIMS data. If you have any questions about these or any other changes made, please contact SIMS Help: [SimsHelp.dot@state.mn.us](mailto:SimsHelp.dot@state.mn.us)

## Bridge Inspection Update

### Bridge Safety II Class Update

The NHI Bridge Safety II Class is confirmed for the scheduled dates of March 5 – 16, 2012 at the MnDOT Training Center, Shoreview, MN. There will be some prerequisites that participants will have to complete before becoming eligible to attend this class. NHI will be forwarding that information to MnDOT in the near future.

**Important:** This class is not posted on the NHI website yet because they are still finalizing the contract with the vendor. Please keep referring to the NHI website for this class and to register once the class is posted: [http://www.nhi.fhwa.dot.gov/training/course\\_search.aspx](http://www.nhi.fhwa.dot.gov/training/course_search.aspx). The actual course number and title is: FHWA-NHI-130055 Safety Inspection of In-Service Bridges.

If you have questions regarding registration for this course, please contact:

Norman W. Plasch  
Mn/DOT Technical Training Program Coordinator  
Engineering Services Division  
395 John Ireland Boulevard MS #672, Office 710  
St. Paul, Minnesota 55155  
Phone: 651-366-3301  
Cell: 651-336-1621  
Fax: 651-366-3425  
[norm.plasch@state.mn.us](mailto:norm.plasch@state.mn.us)

### 2012 Bridge Safety Seminars

February 7	City of Blaine Public Works Facility
February 16	Hampton Inn Bemidji
February 22	MnDOT Headquarters Saint Cloud
March 6	AmericInn Hotel & Conference Center Mankato
March 15	Ramada Hotel & Conference Center Rochester
March 20	Carlton County Public Works Carlton
March 29	Hiway Federal Credit Union Saint Paul

To maintain MnDOT certification as a Bridge Safety Inspection “Program Administrator” or “Team Leader”, attendance is required at a minimum of two bridge inspection seminars during each four year re-certification period. However, those who are not required to attend are welcome and encouraged to do so.

**We highly encourage all Local Agency Program Administrators and Team Leaders to attend one of the scheduled 2012 bridge safety inspection seminars listed above. This year’s seminar will cover many of the important changes and ongoing efforts to improve Minnesota’s local bridge inspection program. The seminar will feature topics on the FHWA metrics audit program, inspection manual and policy updates, SIMS Q and A, SIMS demo, condition rating overview, and hydraulic analysis and discussion.**

Registration questions – Norm Plasch, MnDOT Phone (651) 366-3301, Cell (651) 336-1621.

Questions about seminar content – Pete Wilson, MnDOT Phone (651) 366-4574.

### MnDOT Bridge Inspection QC/QA Plan REVISED

MnDOT’s Bridge Inspection Quality Control and Quality Assurance Plan was revised in December of 2011. The purpose of this document is to maintain accuracy and consistency of bridge inspections and bridge inspection reporting and evaluate program effectiveness, uniformity, and compliance with federal and state rules relating to bridge inspections. This document will assist Program Administrators with managing their bridge inspection and bridge maintenance responsibilities. A summary of the major revisions include:

-addition of a linked Table of Contents



6. U30' SNOOPER ExceptionU: Local agencies will UNOTU be charged a rental fee since this snooper was paid for by State Aid money. Snooper operator and driver will still charge their time and expenses to the local agency.

## Local Timber Bridge Update

Last year we identified approximately 180 local timber bridges on the inventory that are classified as structurally deficient and are not load posted. We also indicated that approximately 50% of these timber bridges are deficient due to poor condition of timber piling, and 10%-20% are deficient due to poor condition of timber pile caps. A further look at the inventory also showed that we have approximately 2000 local timber bridges; this does not include timber railroad bridges, pedestrian bridges, and culverts. Of the 2000, approximately 500 bridges have an NBI condition rating of 4 or less, and approximately 400 have an NBI of 5.

Note, based on NBI timber structural evaluation, a bridge with an NBI of 5 has substantial decay (25%), NBI of 4 has extensive decay (26%-50%), NBI of 3 has severe decay (51%-75%), NBI of 1 should be closed with possible corrective action, and NBI of 0, the bridge should be closed. Based on experience from our local bridge consultants, the state of deterioration of a timber structure could go from NBI of 4 to an NBI of 1 or 0 in only a 2 to 3 year time period. A rough cost estimate to replace our local timber bridges in NBI state 5 and 4 would be \$200 million (approximately 900 bridges).

In response to this unfortunate reality, the following actions have been initiated to assist our local timber bridge owners and/or their highway authority.

- SHV (special hauling vehicle) Load Rating Contract 1, evaluated 244 timber bridges, and 207 of them required load posting.
- SHV (special hauling vehicle) Load Rating Contract 2, scheduled to evaluate another 215 timber bridges, for re-load rating and load posting.
- MCEA Bridge Committee recommended the MCEA Legislative Committee to seek additional Bridge Bonding for the 2012 Legislative Session for timber bridge rehabilitation/replacement.
- 2011 Bridge Safety Inspection Seminars included topics on advanced timber inspection techniques.
- Seeking research to develop and implement advanced timber inspection techniques into routine local bridge inspections to provide information that can be used to adjust load ratings, develop repair strategies and improve maintenance.
- Seeking research to develop a manual for cost effective repair techniques of Minnesota's local timber bridges.
- Developed and distributed a list of deficient local timber bridges with no load postings to all owners/authorities to assist them with prioritizing re-load rating and posting work, repair, rehabilitation, or replacement needs.

## Local Bridge Load Rating Update for the Special Hauling Vehicles (SHV's)

The first SHV load rating contract has been completed. The consultants, Stantec (formerly known as Bonestroo), LHB, WSN, and HDR, did a quality job re-load rating 581 local bridges for the SHV (legal 4-7 axle single unit truck with up to 78,000 lbs. gross vehicle weight).

Of the 581 bridges evaluated, 66% required load posting. We attribute the relatively large percentage of load postings to the high number of short span bridges susceptible to the SHV truck. Also many of the bridges evaluated had not been load rated for 30 years.

Not surprising, the short span timber and steel beam bridges were most affected by the SHV trucks. Approximately 240 timber bridges were evaluated and 85% required load posting. The contract also looked at approximately 150 steel beam bridges and 73% required posting. The load rating work has validated the vulnerability of local timber bridges and the growing need to remove, repair, rehabilitate or replace them.

Currently the second SHV load rating contract is under way. This contract calls for five different local bridge consultants which includes Stantec, LHB, WSN, EE, and TKDA. The team of consultants will reload rate approximately 710 local bridges. We had 15 very qualified consultants that submitted their proposals for this work and approximately one half of them were national firms.

The work covers 78 counties with the heaviest amount of work in the Metro, District 6, and District 7. The load rating work under this second contract will be completed by January 2013. Again, the Bridge Office will be refining the list of remaining bridges to be evaluated for SHV and is developing the next set of consultant contracts to continue this effort into 2014-2015. Our data shows that Metro, District 6, 7, and 8 will have the lion's share of bridges to be evaluated in the upcoming years.

Note, the bridge selection process used considered operating rating (less than HS27), load rating date (30 plus years old), structure type, superstructure/substructure conditions, and replacement schedule (within two years of being replaced).

## **“Critical Deficiencies” Found During Bridge Inspections**

With a state wide focus on timber pile supported structures and many reports of local owners and their consultants discovering severely decayed or damaged timber piling, the time seems appropriate to revisit MnDOT's Tech Memo on “Critical Deficiencies” found during bridge inspections, [MnDOT Engineering Services Division Technical Memorandum No. 11-12-B-04](#).

The purpose of the tech memo is intended to provide guidelines for bridge inspectors and owners if a critical deficiency is discovered during a bridge inspection. The guidelines define “critical deficiency”, describe the procedures, and responsibilities of the bridge inspector/consultant engineer, county engineer, and MnDOT. Note, the tech memo was born from FHWA requirements that all states monitor critical deficiencies, and due to past incidences where prompt attention during bridge inspection may have prevented a bridge failure.

A critical deficiency is any condition that threatens public safety and if not promptly corrected could result in a collapse or partial collapse of a bridge. Examples of critical deficiencies would include failure of a substructure due to undermining, crushed / hollow timber piling, significant pile deformation due to earth pressure, missing piles, deep delamination of concrete bearing areas under girders, and failure of a truss floor beam. On average MnDOT receives 10 critical finding notices per year.

If a critical finding is discovered a notification procedure for the bridge inspector/consultant engineer, county/city engineer, and MnDOT Bridge Office is invoked. The duties of the bridge inspector/consultant engineer are to determine if the bridge should be immediately closed. The inspector/consultant engineer works with the county/city engineer in this determination.

If the bridge requires full or partial closure, the county/city engineer puts up traffic control and notifies the public and bridge owner (railroad, township, etc...). Within 7 days of the incident they must submit the inspection report to the MnDOT Bridge Office. The county/city engineer is responsible for promptly scheduling repairs to the bridge. If the bridge remains open to traffic, the county/city engineer is responsible to determine the correct load rating and ensure proper posting if required. After the repairs are complete the inspection reports and bridge inventory must be updated. All new load ratings must be submitted to the MnDOT bridge Office. If the bridge is closed to traffic they must also notify the MnDOT Bridge Office.

The MnDOT Bridge Office in coordination with the State Aid Bridge Unit, MnDOT regional bridge construction engineer, and the local bridge consultant will provide immediate assistance in evaluating the critical deficiency. The MnDOT Bridge Office will also record the critical finding into the bridge management system, and provide follow-up by monitoring the situation until corrective action has been completed.

## FHWA NBIS Oversight 2011 & Beyond

It may be a good time to refresh your memory by referencing related articles on pages 5 thru 7 of the 2011 State Aid Bridge News Letter, [http://www.dot.state.mn.us/bridge/stateaid/pdf/SA\\_BR\\_News\\_Jan\\_2011.pdf](http://www.dot.state.mn.us/bridge/stateaid/pdf/SA_BR_News_Jan_2011.pdf). As you recall the FHWA's oversight of the NBIS is changing to a data driven, risk based process with a goal for national consistency. The new annual process will engage review of the database of reports; and define generally four different degrees of compliance (namely compliance, substantial compliance, non-compliance, or conditional compliance) actions for 23 metrics linked to the NBIS provisions.

The 23 metrics are grouped into five different areas including bridge inspection organization, qualifications of personnel, inspection frequency, inspection procedures, and inventory. Note these items are not new to the NBIS, the FHWA is simply now assigning a compliance status to each metric. Also note the FHWA can assess compliance at three possible assessment levels, minimum, intermediate, and in-depth. Note the definition of the 4 degrees of compliance and 3 levels of assessment is unique to the specific metric being examined, IE. reference the NBIS Metrics document posted on the Ohio County Engineers Association Website, <http://www.ceao.org/Bridge%20QAR/23%20metrics.pdf>.

With the background information above, the FHWA NBIS Metrics oversight review for 2011 indicated compliance for metric items such as bridge inspection organization, qualifications of personnel, underwater and detailed special inspection frequency, complex bridges, fracture critical inspection frequency, inspection procedures (QC/QA) and inventory (prepare and maintain). Metrics in substantial compliance included inspection procedures (team leader & bridge files). Metrics in conditional compliance included routine inspection frequency, inspection procedures (load rating, post or restrict, scour critical), and inventory (update data). No metrics were reported with a status of non-compliance; however, the metrics found to be conditional compliance are inspection procedures-load rating, load posting, scour critical bridges) subject to satisfactory implementation of an approved "plan of corrective action" (PCA).

**The NBIS Metrics approach will continue to be educated at the bridge safety inspection seminars, and through the MnFHWA and MnDOT Bridge Office Inspection Unit.**

## Local Historic Bridge Preservation Update

### Local Historic Bridge Study

Under the support of Commissioner's staff, MnDOT State Aid, MnDOT Cultural Resources Unit, and the MnDOT Bridge Office, efforts are underway to develop a project to study and evaluate the preservation needs of locally owned historic bridges. A multidisciplinary (qualified bridge historian with experienced bridge engineer) consultant team will be employed to meet with local historic bridge owners to determine opportunities for preservation, funding, and to gather information on the current condition and planning decisions for the bridges.

The study will not specifically identify select and non-select bridges for preservation, but it is likely that some bridges will emerge from the study as better candidates for long-term preservation than others. cursory needs could be assessed for these bridges that are the best candidates for long-term preservation, and these needs could be used as a basis for trying to establish a dedicated funding source.

### Historic Bridge Lean Kaizen Event

In early December 2011 MnDOT sponsored a Lean Kaizen Event to define a timely environmental/section 106 review process, improve trust between partners, and to increase visibility and changes of the historic bridge process. Note, "Lean" is a state initiative for improving performance and results in government agencies. A Lean Kaizen event is a 5 day process improvement event. Under the direction of a Lean Facilitator, a team of agency staff comes together with a goal to increase the efficiency of the current process.

The team for the Historic Bridge Lean Kaizen Event included individuals from SHPO, MnDOT Bridge Office, Cultural Resources Unit, State Aid Office, District 1 & 6 Offices, FHWA, Hennepin County Transit, and other MnDOT Offices. With a vision to achieve proactive preservation of Minnesota's historic bridges to retain our engineering and cultural heritage, developed a future map of the historic bridge project development process that should help reduce process time, reduce frustration and most importantly increase trust between partners.

Along with the historic bridge project development process the team developed a kaizen task list. The list of tasks include standard templates for purpose and need, rehab study concept alternatives, and evaluation criteria. The kaizen task list also includes on demand historic bridge training for project managers, local agency engineers, MnDOT district bridge engineers, etc... Other hallmark tasks include the development and execution of an MOU for a project management team establishment for both local and state historic bridge projects. The team would consist of representatives from the MnDOT District Office, Bridge Office, State Aid Office, Cultural Resources Unit, and the FHWA. The MOU is intended to empower a team approach to collaborate (engineer & historian collaborate closely) on key decisions along the way to keep the development process moving forward and in an efficient manner.

Eventually the full report on the Historic Bridge Lean Kaizen Event will be posted on the external MnDOT website, IE <http://www.dot.state.mn.us/historicbridges/>. Note the MnDOT Cultural Resources Unit will be using the new process developed during the Kaizen event for a local historic bridge project located in Alba Township, Jackson County.

## Innovative Local Bridge Construction Update

### **Geo-Synthetic Reinforced Soil Abutments:**

In our 2010 State Aid Bridge Newsletter we discussed the pursuit of special funds from the FHWA Innovative Bridge Research and Deployment (IBRD) Program to demonstrate geosynthetic reinforced soil (GRS) abutments. The site selected for GRS abutments is located in Rock County, County Road 55 over a short line railroad. Of the 66 project applications for 2010 IBRD funds, Rock County's proposed demonstration project was selected and approved for \$350,000 IBRD funds. The list of approved projects is posted on the FHWA IBRD website at <http://www.fhwa.dot.gov/bridge/ibrd/2010projects.cfm>.

Again, GRS abutments is an alternative foundation system to conventional driven pile supported abutments. GRS abutments use alternating layers of compacted fill and sheets of geotextile reinforcement to provide support for the bridge. They're well suited for single span bridges of less than 120 ft, and are not advisable for water crossings where the potential for scour is critical.

GRS is a "FHWA approved technology" for innovative and accelerated bridge construction. It has been demonstrated on projects across the country as a cost effective, efficient, and long term performance system. Please reference the following links relating to this FHWA program.

<http://www.fhwa.dot.gov/publications/research/infrastructure/structures/11026/11026.pdf>,  
<http://www.fhwa.dot.gov/publications/research/infrastructure/structures/11027/11027.pdf>,  
[http://www.fhwa.dot.gov/everydaycounts/summit/grs\\_ibs.cfm](http://www.fhwa.dot.gov/everydaycounts/summit/grs_ibs.cfm) , [www.gcswall.com](http://www.gcswall.com)

### **Deck Bulb Tee Beam Project:**

The purpose of this project is to share common interests with other State DOT's in the Midwest area to develop a local/state bridge structure with rapid construction applicability and a service life exceeding 100 years. Through the Transportation Engineering and Road Research Alliance (TERRA) a transportation pooled fund study (state partner commitment 4 years, 2011- 2014) was developed to study adjacent decked bulb-t beams. Note, our partnership commitment is supported with MnDOT State Planning and research funding.

The project sponsoring agency is the Michigan DOT. Partners and members to the technical advisory committee include Dave Conkel, MnDOT, David Kiekbusch, Wisconsin DOT, Benjamin M. Tang, Oregon DOT, and Abu-Hawash, Ahmad, Iowa DOT. The principal investigator for this project is Mr. Nabil Grace, PhD., University Distinguished Professor, Director of Center for Innovative Materials Research (CIMR), Lawrence Tech, College of Engineering, Michigan.

The deck bulb- tee beam (an I- beam shape, with a wide top flange that can serve as a deck surface, shallow depth-to-span ratio) study will include comparing alternative non-corrosive materials, including, but not limited to carbon fiber, stainless steel and stainless clad reinforcement materials. The study's analysis and evaluation will include the evaluation of top flange connection details including the use of ultra-high performance concrete (UHPC, compressive strengths up to 29000 psi. [http://www.cement.org/tech/cct\\_con\\_design\\_uhpc.asp](http://www.cement.org/tech/cct_con_design_uhpc.asp)) to fill the joint

between the adjacent deck bulb-tee beams.

## **PBES**

What is PBES? PBES stands for Prefabricated Bridge Elements and Systems, PBES are structural components of a bridge that are built offsite, or adjacent to the alignment - and includes features that reduce the onsite construction time and mobility impact time that occurs if conventional construction methods were used. Oftentimes, remote site locations, limited construction seasons, material availability, and consistent quality in workmanship present opportunities where the use of PBES can provide more practical and economical solutions over conventional construction methods. The use of prefabricated bridge elements and systems (PBES) is one strategy that can meet the objectives of ABC (accelerated bridge construction).

Because of these reasons, the FHWA's goal is to shift the paradigm of the bridge industry such that PBES becomes the standard choice for bridge procurement. The use of PBES is applicable for both state and local bridge projects. Typical PBES would include adjacent precast concrete superstructure components, modular steel girder and composite superstructure systems, precast concrete substructure components; three sided precast concrete buried structures, timber slab spans, and even precast concrete culverts.

The Minnesota precast concrete culvert system is a shining example of PBES as an economical and time saving local bridge. Through repetitive implementation, the precast concrete culvert system became the local bridge of choice in the 1990's. The more time consuming and expensive cast-in-place concrete culverts are rarely used today. Like the cast-in-place culvert system, the future may be near when our conventionally constructed local bridges, such as the cast-in-place concrete slab span bridge, are replaced with PBES superstructure systems composed of adjacent prefabricated elements (IE. precast concrete adjacent box beam units, and precast concrete inverted tee beams). On the local system cost efficiency is imperative, and it will be through repetitive implementation that PBES will begin to move towards being the local bridge of choice.

At this time we would encourage all local bridge owners, and their consultants to consider PBES in planning their bridge projects. Both, MnDOT, FHWA and other states across the nation are moving towards PBES. National PBES standard plans, details, design calculations, and construction concepts are being developed to the 80 -90% level, to allow states to customize solutions. Extensive education, research and innovative materials and systems continue to emerge on PBES, reference FHWA PBES website <http://www.fhwa.dot.gov/everydaycounts/technology/bridges/intro.cfm>.

## **HPC (High Performance Concrete)**

The MnDOT Bridge Office, in conjunction with the Office of Materials and concrete material suppliers have developed a HPC (high performance concrete) for bridge decks. The HPC was implemented into several state projects in 2010-2011 and resulted in substantially less full depth transverse bridge deck cracks.

The HPC specifications incorporates specific requirements regarding shrinkage, gradation, chloride permeability and other material properties, all of which must be tested in laboratory. Given the time and effort necessary to complete the testing, the HPC may not be appropriate for very small projects or projects in remote locations, but should be considered for implementation on the majority of all other bridge deck placements. There appears to be minimal cost difference between a traditional concrete deck with overlay and a full depth placement with HPC.

When planning local bridge projects we would encourage local bridge owners and their bridge consultants to discuss the possibility of implementing HPC with MnDOT Regional Bridge Construction Engineers listed below, or Ron Mulvaney, MnDOT Concrete Unit, 651-366-5575.

North Region Bridge Construction Engineer ( Districts 1,2,3,4): Paul Kettleson, 651-366-4561  
Metro Region Bridge Construction Engineer ( Metro District): Paul Kivisto, 651-366-4563  
South Region Bridge Construction Engineer (Districts 6,7,8): Dustin Thomas, 651-366-4565

## **DB (Design Build), Anoka County Main Street/ 125<sup>th</sup> Avenue (CSAH 14)**

Anoka County is engaged in Minnesota's first ever local project using design-build contract delivery methods. The design build partnering process includes Anoka County, City of Blaine & Coon Rapids, MnDOT Metro State Aid, MnDOT Bridge Office (State Aid Bridge), Contractor C.S. McCrossan, Local Bridge Consultants WSB (owner's bridge design oversight engineer), and SRF (contractor's bridge design engineer), Geotechnical Engineers Braun & AET, and other stakeholders. Along with roadway and traffic safety improvements, the project included

constructing a bridge overpass of the BNSF rail line, MSE retaining walls, and a pedestrian culvert tunnel. The project is scheduled for completion in 2012.

To date MnDOT has successfully completed 7 major transportation projects using the design build process. Currently MnDOT has 5 DB projects under construction, 2 DB projects under procurement, and 2 future projects scheduled for DB. It is anticipated that DB will be employed on local projects into the future and when faster project completion is warranted. There also exists possible opportunities to use DB on local bridge projects for cost and time savings.

## **AGC Local Bridge Construction Awards**

For a decade MnDOT and AGC (Associated General Contractors of Minnesota) have been recognizing high quality state bridge construction projects. Recognizing that some of the best bridge work is performed on local routes, the MnDOT Bridge Office would like to include local bridge projects in the bridge awards program.

Typically a memo from the State Bridge Engineer goes out in September of every year to MnDOT District, Resident, and Bridge Engineers, and AGC for nominations. The current award categories are for bridges costing less than \$1.5 million, between \$1.5 and \$5.0 million and for bridges costing over \$5.0 million.

Judging criteria includes innovation, complexity, timeliness, general appearance, workmanship, and other items such as safety, cooperation, etc.... The rating panel includes the MnDOT Bridge Office, MnDOT Office of Construction, MnDOT Resident Engineer, and AGC. The program will recognize the lead individuals who were responsible for developing and constructing the project. The awards program will be held during the annual AGC meeting typically held the third week of January.

Note eligible bridges for 2012 include those opened to traffic in 2011 and 2012. Also award submittals will only be accepted for bridge projects completed by AGC member contractors. State Aid Bridge will work with the Bridge Office, SA District Engineers and the MCEA Bridge Committee to amend the AGC bridge construction award nomination memo to include local bridge projects.

## **Bridge Hydraulic News**

### **Local Bridge 101: Planning, Hydraulics, Optimal Type & Size**

In realization that our local bridge needs continue to outpace available funding resources which are likely to remain so or be reduced, the time seemed appropriate to revisit and educate on planning and sizing local bridge structures. After coordinating with State Aid, several DSAE's, the County Engineer's Bridge Committee, and our local bridge consultants we have now developed a class agenda and are preparing materials to conduct classes this year.

The primary purpose of the class will be to provide basic training on bridge type and size selection with an emphasis on bridge hydraulics. The training will also look at how to achieve a reasonable balance between hydraulics, structural limits, costs, permitting agencies, special interests, risks, etc... Regardless, the class participant will go home with some valuable reference materials. Note, input and advisement from our local bridge consultants will continue throughout development of the class.

Class Instructors will include but not limited to the DSAE, Petra DeWall, and State Aid Bridge. Who should attend? The class is designed primarily for County Engineers, Assistant County Engineers, DSAE's and DSAE's. Interested City Engineers and their assistants are also welcomed.

### **Class Locations and Dates (All classes will run from 9 am to 3:30 pm, lunch included):**

- Duluth, March 21<sup>st</sup>, 2012
- Bemidji, April 4<sup>th</sup>, 2012
- St Cloud, April 9<sup>th</sup>, 2012
- Marshall, March 27<sup>th</sup>, 2012
- Owatonna, April 6<sup>th</sup>, 2012
- Detroit Lakes, March 28<sup>th</sup>, 2012

## Scour Critical Bridges

FHWA notified the MnDOT Bridge Office on December 13th, 2011 that the scour critical bridge requirements do not meet the requirements set forth in the National Bridge Inspection Standards (NBIS) regulation, [23 CFR 650.313 \(e\)\(3\)](#). To obtain this finding, FHWA randomly selected 18 scour critical bridges for review. The review concentrated on whether the Plans of Actions (POAs) had been prepared as well as implemented. As the majority of Scour Critical Bridges are on local roads, the 18 bridges were all CSAH Township and Municipal bridges. 10 out of the 18 were found to be either insufficient or lacking required channel cross-sections. The main points of contention were that the plans did not include a “Bridge Closure Plan”, a “Closure Plan Notification” and/or didn’t have recent cross sections.

Please review your existing Plans of Action (POA) for completeness. When updating your POAs, please be sure to note a contact person, even if everyone knows who to call. Also, we will be posting suggested language on the Closure issue on our web site. A detour plan is preferred, but we recognize that it is not practical in all situations. Still, it must be somehow addressed on the POA so people reviewing the plans know it was given consideration. We need these updated documents submitted to MnDOT Bridge Management by December 31st, 2012.

Cross sections need to be taken at Scour Critical Bridges during routine inspections as per the MnDOT [Bridge Inspection Field Manual](#) section 2.2.5.

### ***Channel cross-sections are required for the following vehicular bridges...***

1. *Bridges classified as “Scour Critical” (MnDOT scour codes “D”, “R” or “U”).*
2. *Bridges with an NBI Channel Condition Rating (FHWA Item #61) of “3 or lower”.*

*If channel cross-sections are required according to the criteria above, they should be performed at a minimum frequency of 5 years. Channel cross-section measurements shall be documented in the bridge file so that past data can be readily accessed and compared to present measurements. For large bridges, or bridges over large rivers, lakes, or streams – a cross-section diagram (a graphical display of the actual streambed elevation) is recommended. A reference cross-section diagram should be established showing the original (plan) channel cross-section- this should include the substructure foundation elevations. For smaller bridges, or bridges over smaller streams with a relatively stable history- channel cross-section measurements may be documented in a table. Note: to ensure that channel cross-sections are performed at the required (or recommended) frequency, the date of the most recent channel cross-section measurements should be noted in the bridge inspection report (general notes section).*

Forms for cross section measurements are available on our [Bridge Scour](#) web site. Specific questions related to bridge scour can be directed to our State Aid Bridge Hydraulics Engineer, E-mail [Petra.Dewall@state.mn.us](mailto:Petra.Dewall@state.mn.us).

## Scuppers on Bridges

We know scuppers (vertical/horizontal hole through bridge deck or curb for purposes of deck drainage) are sometimes an issue with local bridges. Apparently the DNR is aware of them on local bridges and may start looking at the issue a little more closely. At this time you may be interested in referencing the MnDOT Road Design Manual, Chapter 8 (Drainage Design and Erosion Control) section 8.5.6, for best practices. The manual can be downloaded from <http://www.dot.state.mn.us/design/rdm/metric/8m.pdf> .

## Iowa Local Bridge Scanning Tour

We’re currently planning a local bridge scanning tour of Iowa for May or June of this year. Again, the purpose of the tour will be to seek out bridge designs/details not commonly used in Minnesota with a potential application to local needs. The duration of the tour will be approximately 3 days with County Engineer volunteer costs paid by SALT, and Mn/DOT employee participation covered by the FHWA.

We have assembled the scanning team which includes Tim Stahl-Jackson County, Alan Forsberg-Blue Earth County, John Grindeland-Fillmore County, Romeo Garcia-MN/FHWA, Local Consultants-SEH, EE, WSN, and SRF, Patti Loken-SALT, and Dave Conkel-State Aid Bridge. To date we have identified a few promising Iowa counties to visit which include Buchanan County (homegrown bridge designs) and Black Hawk County (innovative

systems with county forces). Also we have identified a few precast plants to visit which include IPC Inc. in Iowa Falls, and Andrews Prestressed Concrete in Clear Lake Iowa.

## **Local Bridge Replacement Program Update**

In 2011 the Local Bridge Replacement Program funded 238 bridges statewide on the local roadway system. Priority is given to STIP projects, waiting list projects, fracture critical, road in lieu, load posted and emergency/disaster replacement bridges. The local bridge replacement program funded 95 township bridges with \$14.6 million of town bridge funds and 133 bridges utilizing \$51.6 million of bridge bond funds. These township and state bond funds leveraged approximately \$183.8 million of State Aid, Federal Aid, and local funds. The 441 unfunded 2011 projects will be moved to 2012 increasing the total 2012 planned bridges on the master priority bridge list to 820 projects.

The legislature approved \$33 million of state transportation bond funds for the Local Bridge Replacement Program this past summer in the 2011 special session. There are currently no projects waiting for funding. Cities and Counties are encouraged to develop and move projects through design and plan approval. Projects will be funded on a first come first serve basis until such a time the funding is spent down and reserves will need to be set aside for the high priority projects in the STIP. Counties and cities should update their 5-year master bridge list and send in resolutions to the State Aid Office. The master bridge list is used to demonstrate to the legislature the need to continue funding the local bridge replacement program in the upcoming 2012 legislative session.

## **Mn/DOT Bridge Standards Unit Update**

As you recall last year we introduced the new precast concrete box culvert standards in the Load Resistance and Factor Design (LRFD) format as required by the FHWA. A technical memorandum was issued stating that all local culvert projects under preliminary design after December 1, 2010 should implement the new precast concrete box culvert standards into the final construction plans. Our precast concrete fabricators have all made the switch to the new LRFD culvert standards.

At this time all local culvert projects (including old plans on the shelf or waiting list) must incorporate the new culvert standards at <http://www.dot.state.mn.us/bridge/cadd/culverts.html>. Upon request the new culvert standards can be provided in AutoCAD format, and for special designs up to 20 foot spans, please contact Joe Nietfeld, Mn/DOT Bridge Standards, phone 651-366-4477.

Remember all new local bridge culverts require a load capacity rating. Use MnDOT Culvert Rating Form 90 <http://www.dot.state.mn.us/bridge/docsdown.html#ratings>. For the new standard LRFD precast concrete box culverts, the inventory rating will be RF=1.0 and the operating rating will be RF= 1.3. Note, the Inventory and Operating Rating RF will have to be calculated (by MnDOT bridge office or local bridge consultant ) for all box culverts with spans exceeding 16' or fill heights greater than noted in the precast concrete box culvert tables, MnDOT Fig. 5-395.100 (B) thru (E).

Please submit the completed load rating forms to the MnDOT Bridge Management Unit, attention Lisa Hartfiel, phone 651/366-4557.

## **Brian Homan Returns from TH169/I494 Mobility**

Brian Homan has returned to the State Aid Bridge Unit from his year-long mobility to the TH169/I494 project. In this mobility, Brian served as the Design Engineer lead on the Mn/DOT Oversight Team responsible for the review and acceptance of preliminary and final design plans, prepared by the Contractor's consultant, for all bridges and miscellaneous structures on the project.

The TH169/I494 project is a \$125 million design build project that was let on September 30, 2010 with the "Best Value" bid going to the joint venture contractor C.S. McCrossan/Kraemer. The project consists of 9 new bridges, 3 bridge widenings, over 2 dozen miscellaneous retaining walls and several noise walls and visual barriers. Although there have been several bumps along the way so far, including the government shutdown, the schedule still calls for

substantial completion by the end of 2012. Information on the project can be found at the following website, <http://www.dot.state.mn.us/metro/projects/169/>.

With all the design work on the 169/494 project pretty much wrapped up, Brian is now back in the State Aid Bridge Unit excited to reconvene his previous duties serving the state's cities and counties. He will be working part time throughout the end of the project as needed, however, reviewing shop drawings for the remaining steel bridges and answering any structures related questions that may come up. He hopes to be able to put his new knowledge and experience in Design Build projects to use for the counties and cities looking to use this delivery method for future projects.

Welcome back Brian.

## **New Tech Memo for Pre-fabricated Pedestrian/Bicycle Bridge Superstructures**

The Technical Memorandum No. 11-03-B-01 "Use of Performance Specifications for Pre-fabricated Pedestrian/Bicycle Bridge Superstructures" was approved and issued on 6/28/2011. This Tech Memo can be found at the following link.

<http://techmemos.dot.state.mn.us/TechMemo.aspx>

This new Technical Memorandum replaces the previous Tech Memo entitled "Design-Build Pedestrian/Bicycle Bridges", No. 99-20-B-03, which had expired and was in need of updating. The goal of the update was to clarify and simplify the whole approval process, turning more review responsibility of the Pre-fabricated bridge superstructure plans and calculations over to the owner's consultant. We have added the following informational documents to the State Aid Bridge web site to help explain the submittal and review process and clarify the responsibilities of all parties involved.

<http://www.dot.state.mn.us/bridge/stateaid/prefabricatedpedestrianbicyclebridgesindex.html>

- Special Provision boiler plate for Pre-Fabricated Pedestrian/Bicycle Bridge Superstructure
- Submittal and Approval Process for Pre-Fabricated Pedestrian/Bicycle bridge Projects
- Guidelines for Superstructure Plan Review for Pre-Fabricated Pedestrian/Bicycle Bridges
- Pre-Fabricated Pedestrian/Bicycle Bridge Project Submittal and Review Requirements

This is a new process that will take some getting used to, but in the end, should speed up the overall process and move the bridges through to construction faster.

## **Bridge Costs Update**

Calendar year 2011 saw a moderate increase in unit costs for PCB (Prestressed Concrete Beam) and C-SLAB (Concrete Slab Span) type structures which account for the majority of local bridges.

There was a pronounced increase in the number of PCB bridges compared to CY 2010 (41 let in CY 2011 vs. 24 let in CY 2010). There was also a pronounced decrease in the number of C-SLAB bridges compared to CY 2010 (13 let in CY 2011 vs. 25 let in CY 2010). The percentage increases/decreases are shown below.

The unexpected bridge bonding windfall led to another busy year for the SALT Bridge Office. In CY 2011 we processed approximately 69 local bridges totaling \$64M.

***PCB structure costs were up 22%*** (\$97.08/sf in CY 2010 vs. \$118.83/sf in CY 2011)

***C-SLAB structure costs were up 19%*** (\$92.06/sf in CY 2010 vs. \$109.17/sf in CY 2011)

***TRUSS pedestrian structure costs were up 14%*** (\$168.81/sf in CY 2010 vs. \$191.93/sf in CY 2011)

## State Aid Bridge Contacts

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