State-Aid Bridge News

January 16, 2013

Bridge Asset Management Update

Bridge Data Backlog:
We recognize the consternation the bridge data backlog has caused customers. Getting on top of the backlog has become a top priority in the Bridge Office. Our staff has been putting in a lot of extra time to get where we are today.
At the end of January we will be 85% caught up on the backlog, not including the bridges new to the system in this previous (2012) construction season (historically, these would not be input until we have updated the system with 2012 inspection data).

We will need to stop working on the backlog during the month of February to use that time to update the system with 2012 inspection data. This will allow time in the month of March to check/correct the data that will be submitted to the FHWA for the required annual federal reporting on April 1st. If the data looks to be in good shape, we will be able to resume work on the data backlog.

Since we have a list of new bridges not yet in SIMS that replaced old bridges, we will be looking into the possibility for SIMS to compare the old bridge data to this list prior to automatically generating a message to bridge owners about delinquent inspections. The Bridge Office will be talking with InspectTech (SIMS was developed by InspectTech) about this.

Through staffing, improved/standardized process of handling new bridges, etc., the Bridge Office is committed to making sure all backlogged bridges are in SIMS as soon as possible. The Bridge Office will also be working towards updating data to within 24 hours of notification.

If you have any questions regarding your bridge data backlog please do not hesitate to call or e-mail Lisa Hartfiel (lisa.hartfiel@state.mn.us) at 651-366-4557 or Thomas Martin (thomas.martin@state.mn.us) at 651-366-4556.

Scour Code and Culvert Fill Depths:
On several State Aid Projects (SAP) we have noticed the scour code is missing in the Scour Confirmation Recommendation box on the bridge survey sheet.
The designers are already putting the scour elevation in this box, so please don't forget to add the appropriate scour code as well. Note the scour codes of all bridges in the state must be reported to the FHWA. In creating the report for the FHWA, missing scour codes will report a scour code of F (no evaluation-found) which is unacceptable for a new bridge. Note, SALT Bridge will be looking closer to assure all new bridge plans have a score code.

Also we have noticed some local culvert plans with a lack of information to correctly calculate culvert fill depths. The culvert plan should show enough detailed information for us to calculate the fill depth and report into SIMS. The plan should show or indicate the culvert profile with inlet and outlet invert elevations, and along the culvert alignment the plan should also show or indicate the top of centerline roadway elevation and roadway cross slope information. We appreciate your assistance with this useful information.

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Updating Town Bridge Improvements Costs:
The improvement cost data is used to annually apportion the Town Bridge Account funds to each county. The funds can be used to replace, rehabilitate or remove an eligible township bridge. It is very important that each county review their township bridge improvement cost data annually, any disagreements with the computer generated or manually supplied costs must be updated to assure a fair and proper apportionment is received.

Please submit your cost updates no later than the end of **October** to ensure the Town Bridge Apportionment calculation which is performed in **November** is based on updated bridge replacement costs. **This is the responsibility of each individual agency to complete to ensure your town bridge apportionment accurately represents your replacement costs of deficient town bridges.**

Revise and mark up printed copy of Improvement Cost Worksheet as needed and send to Lisa Hartfiel at 651-366-4557 (lisa.hartfiel@state.mn.us) or Thomas Martin at 651-366-4556 (thomas.martin@state.mn.us) in the Mn/DOT Bridge Office.

NBIS Compliance Headlines

Questions regarding these topics can be directed to David.Hedeen@state.mn.us at 651-366-4528.

All inspection data must be entered and approved no later than February 15, 2013
If you do not meet the February 15 deadline, you will be out of compliance with Minnesota Statute 165.03, Subdivision 3. Note: The State of Minnesota or Mn/DOT is ultimately responsible to assure our local agencies are in compliance with NBIS regulations. If any one of our local agencies is found to be non-compliant with the NBIS and proactive steps are not taken to fulfill NBIS regulations, the FHWA could withhold Federal- aid highway funds from the state. Please contact Lisa.Hartfiel@state.mn.us or Thomas.Martin@state.mn.us if you will not be able to meet the deadline.

Certification of Bridge Safety Inspection Form Still Required
The "Certification of Bridge Safety Inspection to the Commissioner of Transportation" form must be submitted no later than the close of business on Friday, February 15, 2013. This document can be signed, scanned, and sent to Lisa.Hartfiel@state.mn.us or Thomas.Martin@state.mn.us as an e-mail attachment or Fax: 651/366-4497. This form, along with many helpful resources, can be found on MnDOT's website at: http://www.dot.state.mn.us/bridge/docsdown.html.

Grace Period for 24/48 Month Inspection Frequencies
A one month grace period for 24/48 month inspection frequencies is allowed as long as there is a documented unusual circumstance. A list of structures meeting the criteria will be emailed to Program Administrators on a form that needs to be returned to the MnDOT Bridge Office. The form will be emailed after the February 15 submission date and will need to be returned by April 1.

New NBIS Compliance Review Process
The NBIS compliance review process was overhauled in 2012 to match current federal requirements. Agencies will now be assessed annually based on the data submitted by February 15. Agencies will be issued a letter summarizing their compliance percent and rank annually and expect to see an in-depth review every five years. Additional information on this topic will be presented in the 2013 Bridge Inspection Seminars.

Load Posting Requirements
If it is determined that the maximum legal load under state law exceeds the load permitted on the structure under the operating rating stress level assigned, the bridge must be posted. Advanced signing of the load posted bridge should also be considered at the nearest intersection or turnaround point.

Quality Inspections
An important aspect of a quality inspection is the documentation of deficiencies and how they have changed over time. Justification of element conditions shall be recorded in the element inspection comments for all inspection element quantities greater than condition state one (CS1). A quantification of the deficiency shall be made along with the year of the inspection so inspectors can monitor any changes with time. Inspectors shall document that the deficiency was monitored during subsequent inspections and record any change from the initial state. A way to follow this practice is shown by the example below:

[2012-2013] South fascia girder has 15LF of freckling rust starting at west abutment
[2009-2011] South fascia girder has 10LF of freckling rust starting at west abutment**.**

With the implementation of SIMS, inspectors now have the ability to add notes to NBI condition codes. Inspectors should use these fields to track the condition history and justifications for NBI condition codes. Inspectors should date these notes in a similar manner to that of element notes.

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

Critical Deficiencies
A "Critical Deficiency" is defined as any condition discovered during a scheduled bridge inspection that threatens public safety and, if not promptly corrected, could result in collapse or partial collapse of a bridge. MnDOT Technical Memorandum 11-12-B-04 defines and establishes the process to handle a critical finding. This is a reminder that bridge owners must report the critical finding to the MnDOT Bridge Office within 7 days of the finding.

Structure Information Management System (SIMS) News

Questions regarding these topics can be directed to Jennifer.Zink@state.mn.us at 651-366-4573.

All SIMS account IDs will expire on February 28, 2013.

Helpful reports available on SIMS 'Manager' side
Local agencies can find helpful reports under the 'Reports' dropdown on the SIMS Manager (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.

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

Approving Reports
With the implementation of SIMS, reports are now electronically signed through the approval process. 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. **Only** inspections reports approved by the Program Administrator 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/videos.html

Update Reports
How do you update an inspection report once the report has been approved? Answer – use the 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.

SIMS Maintenance Module
The SIMS Maintenance Module is currently in development with completion anticipated by early spring 2013. A subcommittee of local agency representatives was formed to review the module and provide feedback regarding how it may be used from a local agency perspective. Training sessions will be provided; however scheduling for local agency training has not yet been determined.

Bridge Inspection General

Questions regarding these topics can be directed to Pete.Wilson@state.mn.us at 651-366-4574.

Safety Inspection of In-Service Bridges (Bridge Safety II Class)
The NHI Safety Inspection of In-Service Bridges Class (formerly Bridge Safety II) is confirmed for the scheduled dates of March 11 – 22, 2013 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.

2013 Bridge Safety Seminars
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.
Registration questions – Norm Plasch, MnDOT Phone (651) 366-3301, Cell (651) 336-1621.
Questions about seminar content – Pete Wilson, MnDOT Phone (651) 366-4574.

Snooper Rental Policy
Snooper use is available for local agency bridge inspections. Access for inspection is a critical component to properly inspect a bridge. Bridge inspections are enhanced when access is achieved. A snooper rental policy has been established by the Bridge Office to provide local agencies with this access. This policy is listed below.

County/Local Snooper Rental Procedures through the MnDOT Bridge Office
1. Snooper schedule must be checked first for availability through Farrell Potter/ Scott Theisen. Priority for snooper time is given to Fracture Critical and MnDOT District inspections first.

2. All information related to the rental must be sent to Scott Theisen/ Farrell Potter for approval. Relative information includes: local agency contact information; dates and times of rental; MnDOT designated snooper operator and driver; reason for snooper usage. The snooper should NOT be used for maintenance that has potential to damage the bucket or the arms.

3. ONLY MnDOT bucket operators are to operate MnDOT snoopers. The respective District in which the County or City resides (or MnDOT Bridge Office if available) will provide an operator based on availability of staff. District or Bridge Office staff will also assist the snooper drivers with lodging, vehicle arrangements, and overnight snooper parking as needed.

4. Traffic control must be provided by the local agency.

5. The snooper driver and operator will charge time, expenses (which includes lodging, meals, etc.), District vehicle usage if applicable, and snooper equipment usage to the County/Local Charge ID. As of 8/18/08, the amount/hour for snooper rental was $118/hour. FY 2012 rate is $5.09/mile. The Bridge Office will still continue to bill at the $118 hourly rate however. The MnDOT Finance Department will ultimately make the determination what to bill based on job numbers that are flagged.

6. 30' SNOOPER Exception: Local agencies will NOT 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.

Snooper Rental Contact Persons:
Farrell Potter (651-366-4471) e-mail: farrell.potter@state.mn.us
Scott Theisen (651-366-4475) e-mail: Scott.A.Theisen@state.mn.us

June 2012 Flood in Duluth and the Northland

City of Duluth
While most of the bridges within the City of Duluth received debris and erosion damage requiring some level of maintenance, 41 structures received more significant damage requiring more extensive remedial repairs and even replacement. Of the 41 more heavily impacted structures, five were damaged to the extent that complete replacement is necessary. Eight structures received damage which will require major rehabilitation work, one site will require extensive retaining wall work and 27 structures received erosion and debris inundation which will require contract forces to restore. Design work for the City of Duluth projects is currently underway with the majority of the projects scheduled for construction in 2013. Projects will be

funded through a combination of City, Federal ER funds, State Bridge Flood Bonding and FEMA funds. Note SEH Inc. has designed two flood damaged bridge replacements that has already been repaired/replaced this past fall and has designed three others and working on two more that will be replaced in 2013.

St Louis County

At least 17 major stream/ river crossings were affected to the extent the bridges required replacement. A number of these structures were entirely washed away due to the event. One of these structures has already been replaced (Jean Duluth Road over Lester River) with a prestressed girder bridge under an expedited schedule due to high traffic volumes and a long detour. One of the structures will likely not be replaced due to acceptable alternate routes and 15 structures are currently in the design phase for replacement. On behalf of St Louis County the project for the design and construction administration for the 15 structures is being led by LHB Inc with assistance from Erickson Engineering and SEH Inc. The replacements will be a combination of 7 bridge structures and 8 single and double precast concrete box culverts. All structure designs are scheduled to be completed by April of this year with the majority to be constructed in 2013. Funding for the bridge replacements includes County, FEMA and largely State Flood Bonding.

In addition St Louis County through a combination of their maintenance forces and contract forces replaced approximately 100 damaged and washed away culverts in a few short months immediately following the flood event. Note SEH Inc. assisted St. Louis County with several riverbank erosion and stability repair projects at bridges. The flood caused erosion that left these bridges and roadway embankments vulnerable to failure. SEH Inc. was involved with field survey, plan development and construction inspection/management to complete these repairs.

Lake County

Two major stream/ river crossings were washed away during the event. One of these structures over the Stewart River has already been replaced with traffic restored. The other structure is in the design phase and will be constructed in 2013.

Carlton County

Carlton County was assisted by SEH Inc. in the assessment, survey and design of 5 bridges replacements that have already been constructed this past fall. These structures were able to be replaced with multi-cell precast concrete box culverts that aided in the rapid replacement of these critical bridges. Eight other bridge replacements are currently being designed for construction in 2013 that will include three new bridges and 5 multi-cell culverts. An additional one is being considered to be replaced with a road-in-lieu.

Local Timber BridgeUpdate

As you recall, last year we summarized the dire need to address our aging local timber bridge inventory. It has become apparent that efforts are being made to remove deteriorating and deficient timber bridges off the inventory. In 2012 our local agencies removed approximately 55 timber bridges.

On another front our state wide SHV load rating contracts continue to expose the vulnerability of timber bridges. In SHV contract 2 we're evaluating 214 timber bridges of which to date 114 have been load rated and 79 of them required load posting. We have initiated SHV contract 3 which will load rate a daunting 420 timber bridges. Note, the saga of load rating evaluation of timber bridges will need to continue well after SHV contract 3 is completed, as there will still be approximately 750 timber bridges on the inventory to re-load rate.

Along with replacing and reload rating timber bridges state wide, last year the LRRB sought to research on advanced timber bridge inspection procedures for NBIS, and to develop cost effective repair techniques for Minnesota's local timber bridges. We're pleased to say that the advanced inspection procedures project has started and the timber repair project will start in early January this year. Under the section titled "Local Bridge Research Update" in this Newsletter, you can read about the progress being made on the timber bridge inspection procedures project.

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, load rated 581 local bridges for SHVs (legal 4-7 axle single unit truck with up to 78,000 lbs gross vehicle weight). Of the 581 bridges that were evaluated, 66 percent required load posting. We attribute the relatively large percentage of load postings to the high number of short span bridges susceptible to SHV trucks. Also, many of the bridges that were evaluated had not been load rated for 30 years.

The second SHV load rating contract is currently underway. Five different local bridge consultants were selected to perform the load rating and posting analysis. The team of consultants includes Stantec, LHB, WSN, Erickson Engineering and TKDA. They will load rate approximately 710 local bridges, which will include 13 different bridge types. More than half of the bridges are short span timber and steel bridges. This extensive work covers 78 counties, with the heaviest concentration of work in the Metro, District 6, and District 7. To date, 363 of the 710 local bridges have been load rated, and 202 (56 percent) required load posting. Once again, the short span timber and steel beam bridges were most affected by SHV trucks.

To date, the contract has looked at approximately 114 timber bridges and 141 steel beam bridges. Sixty-three percent of the timber bridges and 59 percent of the steel bridges required load posting. This recent number further validates the vulnerability of timber bridges to SHV trucks and the growing need to remove, repair, rehabilitate or replace these bridges. The load rating for this contract will be completed by March 2013.

Lastly, work has also begun on our third SHV load rating contract. This contract calls for another five local bridge consultants to load rate approximately 770 local bridges. There were 10 very qualified local and national firms that applied for this work. LHB, WSB, SRF, TKDA and HDR were the top five selected for the job. The load rating for this contract will be completed by March 2014.

As part of the contract agreement, all bridges will be load rated using Virtis software. This software will allow MnDOT Bridge Office to store detailed descriptions of each bridge sufficient for structural analysis. The concept of storing generic bridge description in a database will give MnDOT and Local Agencies the tool necessary to quickly obtain load ratings and the ability to analyze legal and permit loads.

Before the first SHV contract was developed, the MnDOT Bridge Office examined approximately 5,200 local bridges susceptible to SHV out of a total of 14,735 local bridges in the inventory. This list of 5,200 did not include bridge types that were incompatible with Virtis (e.g., box culverts, truss bridges, steel arch, suspension and post tensioned bridges). The 5,200 bridges were further refined and prioritized using a bridge selection process. This method of prioritizing included operating rating values, load rating dates, superstructure and substructure NBI conditions, structure type and replacement schedule (IE. bridges scheduled for replacement within the next two years).

As stated in our previous State Aid Bridge Newsletters, we identified the top 1,000 local bridges with highest priority and most susceptible to SHVs. These bridges were addressed in SHV contract 1 and 2. After the third SHV load rating contract is complete, we will have evaluated approximately 2,061 bridges for SHVs. Moises Dimaculangan, Local Bridge Load Rating Engineer, will continue to refine the 3,139 remaining bridges using the same bridge selection process. He will also work to develop the next two sets of consultant contracts for 2014-2016, which will include additional bridges susceptible to SHVs, as well as approximately 600 timber bridges that were load rated in 2005 as part of the statewide Timber Hauler's Bill load rating contract. Note at the time of the Timber Hauler's Bill load rating contract, SHV's were not required as part of the load rating/posting evaluation. We anticipate SHV contracts four and five will include approximately 1,400 bridges.

These five SHV contracts are intended to capture high-priority bridges (high ADT, low NBI condition ratings, etc…) which are susceptible to SHVs. However, there is still more work to be done. Many bridges in our local system are still not compliant with the FHWA NBIS load rating/posting requirements. These include, posted bridges with very old load ratings, recently constructed bridges without load ratings (bridges which are 5-10 years old), concrete and steel box culverts and other bridge types with complex superstructures (e.g., low/high steel truss, steel arch, prestress pipe arch and post tensioned bridges). These efforts can be accomplished through additional statewide load rating contracts through MnDOT and continued bridge owner load rating contracts.

County Engineers Bridge Committee Update

Posting Township Bridges

It has been brought to our attention by the MnDOT Bridge Office that some townships are non- compliant with federal regulations because they have failed to load post a township bridge that requires load restrictions. This becomes a dilemma for counties who are responsible for the township bridge inspection/inventory report.

There are several references in statute language that make it unclear as to what authority the counties have if a township does not implement county bridge inspection recommendations to load post. To clarify this ambiguous situation, the MCEA Board of Directors has directed the bridge committee to meet with state township organization officials to discuss the problem and solutions.

In early December 2012 a few bridge committee members, bridge office staff, and state aid conducted a conference call with Kent Sulem (Minnesota Association of Townships (MAT) attorney) and Rob Vanasek, MAT lobbyist. Items discussed in the meeting included guidance as to roles and responsibilities of both the township, county, and state for township bridge load posting, current notification process counties provide the townships when their bridge requires load posting, a process for follow up between townships and counties to ensure the bridge is load posted in a timely manner, funding sources for costs associated with bridge load posting, and opportunity for education of both MAT and MCEA on this topic.

Also Kent Sulem offered to draft some proposed changes to the statute language 165.12 for consideration and discussion at the Bridge Committee meeting at the 2013 MCEA Winter Conference. This meeting will be dedicated entirely to Posting Township Bridges. Kent and Rob also asked the Bridge Office to review and clarify the rules for timelines associated with load posting with regard to federal and state rules.

Bridge Replacement and Improvement Management (BRIM)

The Bridge Committee met in October 2012 to hear about HDR Inc. and their work for Freeborn County. HDR Inc. assisted Freeborn County with prioritizing their timber bridges. Also at the meeting, the Bridge Office introduced their BRIM (bridge replacement and improvement management) process and tool to the Bridge Committee. The Bridge Committee is interested in pursuing a similar BRIM tool for local bridges.

The BRIM tool uses NBIS inspection and inventory data and input from industry experts to predict the replacement or improvement needs for each bridge on a statewide basis, and based on expected deterioration for each bridge. It also uses a risk assessment method which considers the probability of a service interruption, and the consequences of the service interruption (length of detour and potential time to mitigate the service interruption, etc…). The BRIM assigns a score to each bridge to represent its relative priority for replacement or improvement. This system may allow Local Agencies to make the best planning decisions regarding individual bridge improvement and replacement projects along with identifying funding needs for both short term and long range planning activities.

Local Historic Bridge Preservation Update

Local Historic Bridge Study Phase I

This Minnesota Local Historic Bridge Study was completed in October 2012, the consultant team included Mead & Hunt (project historian) and Olson & Nesvold Engineers, and was sponsored by the Minnesota Department of Transportation (MnDOT) State Aid Office, in cooperation with the MnDOT Cultural Resources Unit (CRU) and the MnDOT Bridge Office.

The study focused on Minnesota's locally owned historic bridges. Of the nearly 200 historic bridges in the state, 120 are owned by local units of government. The goal of this study included gathering basic information on the current condition of the bridges, sharing information regarding bridge owners' roles and responsibilities regarding federal and state regulations, and to summarize available historical and engineering data. This study was undertaken as the first step in developing a statewide historic bridge program, and is known as Phase I.

The study made progress toward improved communication regarding locally owned historic bridges. Many bridge owners now have a better understanding of the historic bridges they own and why they are significant. However, four areas of need emerged.

First, owners indicated an incomplete understanding of the Section 106 process. Second, improved communication between agencies is a continuing and ongoing need. Third, a range of educational needs was expressed. Fourth, owners emphasized the need to address funding shortfalls and other limitations to preserving historic bridges.

Local Historic Bridge Study Phase II

The purpose of phase II study is to work towards completing a statewide program for local historic bridges. This study will build upon the findings and results of the phase I study which began the important process of engaging local bridge owners, and laid the groundwork for the successful completion of Phase II. An objective of this study is to inform interested owners concerning processes and available opportunities for their historic bridges, while gaining a better understanding of their issues and concerns. The MnDOT State Aid Office will serve as project lead and will jointly administer this project with the MnDOT Cultural Resources Unit (CRU) and MnDOT Bridge Office.

Important study tasks include, complete historical research, complete engineering information and data gathering, performing field investigations, produce individual bridge reports (report information will include recommendations on stabilization, preservation, maintenance, schedule, and estimated costs), prepare National Register nominations, update the General Historic Bridge Management Plan, record historic bridges into the state's GIS system, and to identify best practices in the management and funding of historic bridge programs from other states. The project is currently under contract development. We anticipate a February 2013 start date, and a project completion date in June 2014.

Local Bridge Research Update

Advanced Timber Bridge Inspection Procedures

The University of Minnesota Duluth, in cooperation with Iowa State University, USDA Forest Products Laboratory and HDR Engineering, has started activities for the project, Development and Integration of Advanced Timber Bridge Inspection Procedures for NBIS. The project is focused on improving inspections of timber bridges in Minnesota and Iowa. Traditionally, inspections for timber bridges have been mostly limited to visual inspection, hammer sounding and probing. These techniques have proven appropriate for advanced decay detection, but are inadequate for early stage or internal deterioration. It is critical that efforts be conducted to develop and implement advanced timber inspection techniques into routine bridge inspections in accordance with National Bridge Inspection Standards (NBIS) requirements.

This project will result in improved assessment information that can be used to improve the safety and reliability of Minnesota's timber bridges. The research team will identify and help implement an inspection protocol for timber bridges (with an emphasis on timber substructures) that can accurately assess structural condition and support the load rating process. Key milestones include the development of standard inspection protocols, integration of the results into bridge data management software, development of a customized inspection manual, outreach training for local agencies/MnDOT District -State Aid, recommendation of equipment purchases, and completion of an economic assessment on the use of advanced inspection techniques.

To date, a worldwide review of commercial nondestructive inspection technologies for timber bridges was completed and used to generate a list of equipment that could be effectively used in Minnesota. Information was collected on equipment costs and applications. The preferred inspection equipment includes traditional inspection equipment like pick hammers, awls, increment corers and more advanced equipment like moisture meters, stress wave timers, resistance micro-drills, and acoustic tomography.

A comprehensive list of other timber bridge inspection supplies and equipment has also been developed. During the next stage of the project, timber bridge inspection protocols for the most promising equipment will be developed. These protocols will be developed for all timber members including piling, pile caps, girders, decks, abutments and wing walls, and other members with a special emphasis on techniques near or below the water line. The focus of the effort will be to create user-friendly, easily understood and time-efficient inspection protocols specific to timber bridge components.

Project updates will be located on a special website that is being developed for the project and hosted at the University of Minnesota Duluth. For more information or to become involved in the project, contact Brian Brashaw of the University of Minnesota Duluth (218-720-4248, bbrashaw@nrri.umn.edu).

Pooled Fund Study of the Impacts of Implements of Husbandry on Bridges

The objective of this project is to determine, through **physical testing** and **analytical modeling**, how the implements of husbandry distribute their loads within a bridge structure system. The goal is to provide recommendations for bridge rating tools that will include a generic rating vehicle, codified-type parameters, and recommendations for posting signage.

For the past two years, the Iowa DOT research team has load tested 19 bridges as part of the physical testing. These groups of bridges consist of 3- timber deck on timber-stringer, 11- timber deck on steel-girder and 5- concrete deck on steel-girder bridges. Four different agricultural vehicles with grain wagon/carts and a five axle semi-truck with grain were used during this test. Strain sensors were installed on the bridges to collect data and measure the forces that each vehicle imposed on the bridge. Distribution factors (DF's) will then be calculated and compared with the calculated DF's from the AASHTO equations. This month, the research team will also load test three timber slab span bridges in Minnesota. The load tests will be completed using the same or similar equipment that was used in previous rounds of testing. Results from this test will be available next month.

As part of the analytical modeling, the team ran a computer analysis on the same 19 bridges using 121 different types of agricultural vehicles based on the information that they've collected from many different manufacturers (John Deere, New Holland, Versatile etc…). These vehicles had an average weight of 100,000 pounds and an average length of 40 feet. Again, distribution factors will then be calculated and compared with the calculated DF's factors from AASHTO equations.

Data shows that the DF's on a **timber girder bridge w/ timber deck** of the Statistical Control Limit of the 121 vehicles exceeded the calculated DF's of the AASHTO equations. It also shows the DF's envelop from field testing and of the semi-truck vehicle exceeds the DF's of the AASHTO equations on a number of stringers. In this case, and for this particular bridge, the team suggested that the AASHTO equations are not conservative enough.

Future work will continue on the parametric study, statistical evaluation of the collective results, develop the DF's for implements of husbandry, develop the generic implement of design vehicles, and develop the generic posting signage.

Evaluation and Analysis of Decked Bulb T-Beam Bridge:

The purpose of the study is to investigate an innovative way to build bridges with alternative materials and a new beam design. Researchers predict a decked bulb T-beam bridge will last twice as long as current bridges and require far less maintenance, leading to significant cost-savings for taxpayers. As a prefabricated bridge system, it will also have the potential for accelerated bridge construction, resulting in minimal traffic disruption.

This Transportation Pooled Fund Program study lead by Michigan, involves four partner states—Iowa, Minnesota, Oregon and Wisconsin. Researchers are evaluating the use of prestressed decked bulb T-beams, which have a wider upper flange than I-beams, giving them a T-shaped cross-section. These upper flanges form the deck of the bridge, which allows for faster construction with less traffic disruption.

Researchers are evaluating the use of ultra-high-performance concrete to fill the longitudinal joints between beams, instead of traditional grouting; and replacing traditional steel prestressing and post-tensioning strands and other reinforcement with corrosion-resistant carbon-fiber-reinforced polymer composite cables, or CFCCs. Also transverse post-tensioning will be applied at intermediate internal diaphragms that are integrated into the beams at regular intervals to further compress the cross-section and prevent cracking.

The research plan involves conducting a three-dimensional finite element computer simulation of the proposed bridge system, and a laboratory investigation that consists of designing, constructing, instrumenting and testing one-half scale models of several beams and a bridge superstructure. The laboratory experiment includes constructing seven decked bulb T-beams with CFCC reinforcement and one with steel reinforcement. Of the CFCC beams, five will be used in the construction of the bridge model. Before the model is constructed, one CFCC beam will be tested as a control for flexure and the other for shear strength, while the beam with steel reinforcement will be tested for flexure only. The bridge model will be tested with varying amounts of post-tensioning.

In 2012, a literature review on the current state of practice and available techniques for design and construction of decked bulb T bridges was completed. Currently the research is approximately 50 percent complete for both the finite element modeling and the laboratory experiment, and construction of the half-scale beams and bridge model is 100 percent complete. Testing will begin in 2013 once completed in 2014, the investigation will offer recommendations for designing and constructing a prefabricated decked bulb T-beam bridge, including beam design guidelines, optimum transverse post-tensioning levels, and the

optimum number of post-tensioned diaphragms.

Passive Force-Displacement Relationships for Skewed Abutments

This Transportation Pooled Fund Program study lead by Utah, involves four partner states MN, MT, NY, OR and the FHWA. Passive force-displacement relationships have been developed based on lateral load tests on pile caps/abutments aligned perpendicular to the soil backfill. However, many bridge abutments are constructed at a skew relative to the backfill. The orientation of the skew appears to cause the abutment to slide past the backfill and leads to torsion on the bent. This becomes an important consideration for integral abutments subject to thermal expansion.
No large scale tests have been performed on skewed abutments to this point to help designers better analyze this behavior, but limited small scale tests and computer analyses indicate that the ultimate passive force may decrease as skew angle increases. No design procedures are currently available to define how the passive resistance would change for variations in skew angle. This research study is conducting large scale field tests to evaluate the effect of abutment skew on passive force.

Tasks for this study include a literature review to collect available data and analysis regarding skewed abutment performance, perform passive force-deflection tests on 2 ft high wall in lab with skew angles of 0º, 15º, 30º and 45º, perform passive force-deflection tests on 3.5 and 5.5 ft high walls in field with skew angles of 0º, 15º, and 30º, calibrate computer model to results of physical model tests and conduct parametric studies., develop a simplified design procedure for predicting passive resistance-displacement considering skew angle and to submit a final report that documents the entire research effort. To date the larger scale field tests have been conducted, the next technical advisor committee meeting is scheduled for early February. Feel free to Reference, TPF-5(264) Passive Force-Displacement Relationships for Skewed Abutments at http://www.pooledfund.org/Details/Study/493 for additional study details.

Innovative Local Bridge Construction Update

LRRB Synthesis Report- Innovative Bridge Construction for Minnesota Local Roads:
Minnesota counties have been implementing new design and construction techniques for multiple projects in recent years. Several of these new designs were discovered through past scanning tours of other states. Credit goes to representatives from the Minnesota County Engineers Association to pursue implementation of these innovative technologies to realize the benefits and potential savings in construction cost and/or construction schedule.

To capture these innovative technologies, the LRRB approved a synthesis report in 2011 to document them. They retained HDR Engineering who did an excellent job in preparing the report by interviewing County Engineers and staff, SALT Bridge, FHWA, and consulting engineers involved in the projects. The full report was completed in July 2012 and can be viewed on LRRB website at http://www.lrrb.org/media/reports/TRS1203.pdf

The six technologies addressed in the synthesis include; Geosynthetic-Reinforced Soil (GRS) Abutments – Rock County, Precast Inverted Tee Slab Span Bridges – Scott and Chisago County, Precast Box Beams and Sheet Pile Abutments – Blue Earth County, MSE Wall with Single Line Pile Abutment – Steele County, Crash Tested Open Metal Railing – Polk County, and Large Precast Box Culverts – Aitkin County, and Three-Sided Structures – Multiple Locations.

Rock County Geo-Synthetic Reinforced Soil Abutment Bridge:
The first ever geo-synthetic reinforced (GRS) earth abutment bridge will be constructed in Rock County this spring of 2013. The bridge was designed by Erickson Engineering Comapany and will be built by the Minnowa Construction Inc. The GRS abutments will be monitored by FHWA and the MnDOT Foundations Unit.

The bridge carries Rock County Road 55 over a regional railroad. The GRS abutment system will be 22 feet tall and is composed of alternating layers of geo-synthetic fabric with backfill in 4- to 8-inch layers. The GRS mass is stabilized internally by the interaction of the reinforcing fabric and backfill. The front facing of the abutment is gravity stacked 8-inch concrete masonry blocks on a 2 degree wall batter. In addition to the GRS abutment system, this bridge also includes the use of a 78 foot span adjacent box beam superstructure on 6% grade. The deck will be transversely post-tensioned, will have a bituminous overlay, and the traffic railing will be concrete F-barrier.

The Rock County Engineer noted from his previous experience with GRS Abutments, as long as construction begins at the correct location and elevation, it is fairly simple and he does not anticipate constructability issues. Following successful completion of this project, the County Engineer noted that he will be trying the GRS technology under the approaches of the bridges they construct using conventional methods to take advantage of the benefit that the GRS can eliminate the settlement

that causes a bump at the ends of the bridge. We will share the results of this GRS demonstration project at future County Engineers and State Aid District meetings.

Chisago and Scott County Inverted Tee Beam Bridge:
In the 2012 construction season we had two local bridge replacement projects use the inverted tee beam technology. Chisago County used a 45 foot single span on County Road 57 over Goose Creek- Bridge No. 13521, and Scott County used a 35 foot single span on CSAH 6 over a stream west of Belle Plaine-Bridge No. 70548. The designer for Bridge No. 13521 was SRF Consulting Group, Inc. and TKDA designed Bridge No. 70548.

Note, the precast inverted tee was developed for shorter span bridges as an alternative to CIP slab span bridges. The inverted tee provides the same shallow depth of structure and reliable service as a slab span. The benefits of an inverted tee include: no false-work required, rapid construction, shallow depth of structure, and improved traffic and worker safety. Again we will share the results of construction and performance of these inverted tee beam bridges at future County Engineers and State Aid District meetings.

Sunrise Township, Chisago County- Three Sided Bridge Structure:
Minnesota's longest span 3-sided bridge structure was constructed this year. The bridge type was a Conspan (modular precast concrete arch units) bridge system by Contech Engineered Solutions. The project designer was Thatcher Engineers, and the contractor was Meyer Contracting. This innovative bridge structure replaced the existing 1925 low steel truss bridge on Kost Dam Road over the Sunrise River in Sunrise Township-Chisago County.

The Conspan bridge spans 60 feet and is supported on a steel pile foundation. The bridge system includes precast concrete headwalls and wing walls. The 3-sided precast arch bridge is considered a buried structure which can reduce maintenance costs and lower life cycle costs. The modular arch system allows for rapid installation which can also result in reduced overall project costs, delays and detours.

Iowa Local Bridge Scanning Tour Update

In June of 2012, we embarked on a 3 day local bridge scanning tour of Iowa. The scanning team assembled included Willy Rabenberg-Redwood County, David Overbo-Clay County, John Grindeland-Fillmore County, Romeo Garcia-MN/FHWA, Local Consultants-SEH, EE, WSN, and WSB, Patti Loken-SALT, and Dave Conkel-State Aid Bridge. Again the purpose of the tour was to seek out innovative and cost effective local bridge designs/details not commonly used in Minnesota with a potential application for local needs.

The tour included a visit to Andrews Prestressed Concrete in Clear Lake, Iowa and the IPC-Innovative Precast Solutions in Iowa Falls, Iowa. At Andrews we learned they supplied the precast components for the 640th Street Bridge for Buena Vista County Iowa. The bridge was rated best special structure constructed on a local road in Iowa in 2008-2010. This Innovative Bridge Research and Construction Project consisted of precast abutment footings, precast abutment backwalls, pretensioned precast 48"x21" deck beams, and metal traffic railing. The bridge has a 50' span and 28' roadway width, and the abutment footings are supported on H-piling. The bridge was constructed in only 10 days!

Along with observing their plant operations, and understanding their capabilities to produce precast bridge elements and systems for rapid construction, we learned about other miscellaneous structural products they produce. For instance, at IPC they also fabricate the recon retaining wall system, which consists of 3,000 pound precast concrete blocks that permits wall heights up to 17 feet without reinforcing geogrid. After our insightful visits of the precast plants, we proceeded to Buchanan County for a day long bridge scan.

We met up Mr. Brian Keierleber- Buchanan County Engineer who afforded us a nice presentation on his bridge program. Brian discussed many of their unique, innovative and cost effective bridge types. Bridge types discussed included a low ADT railcar bridge supported on geosynthetic reinforced soil (GRS) abutments, an ultra- high performance concrete pi- girder (substantial double tee section) bridge, locally funded flatbed railcar bridge, an Oden Enterprise precast concrete deck slab on all steel abutments, etc…. The remaining time spent with Brian included site visits and gathering further information on these interesting bridge types. Our tour concluded with a debriefing at the Buchanan County Department of Engineering and Secondary Roads.

After our full and enjoyable bridge tour of Buchanan County, we concluded our Iowa scan by visiting Black Hawk County. Our team met with Cathy Nicholas-Black Hawk County Engineer who put together an excellent presentation and half day tour of several notable bridges. We were impressed with their Precast Modified Beam-in-Slab Bridge (PMBISB) which they fabricate, erect and construct with their own bridge crew. The PMBISB typically consists of four adjacent precast panels; each panel uses longitudinal rolled steel girders as the main structural element with transverse arched concrete deck spanning between the girders. The panels are set on the abutments and connected together with an in-field cast-in-place concrete closure pour. The PMBISB design is limited to span 40 feet to accommodate the county's transportation and lifting equipment. Note the PMBISB has been studied and load tested by Iowa State University.

In summary of the Iowa scanning tour, it was enlightening to see the capabilities of the Iowa precasters and their experience with innovative precast bridge elements, and the Iowa counties ingenuity to provide safe, innovative and low cost bridge systems with their available resources. We look forward to possibly implementing a few of these low cost bridge systems for Minnesota local roads in the future.

Local Bridge Replacement Program Update

In 2012 the Local Bridge Replacement Program funded 262 local bridges statewide totaling $96.7 million. Bond funds accounted for $44.7 M of the total replacement cost leveraging $6.5 M of federal, $24.8 M of state aid, $14.8 M of Town Bridge, and $5.9 M of local funds. Note funding priority is given to STIP projects, waiting list projects, fracture critical, road in lieu, load posted and emergency/disaster replacement bridges.

At this time, the number of local bridges identified for replacement on the master bridge replacement priority list utilizing all funding sources for 2013 totals 557 bridges with an estimated total replacement cost of $206 M. The total number of bridges identified for 2014 is an additional 149 bridges with an estimated replacement cost of an additional $74 M. The total bond funds identified for these bridge replacement projects totals $102 M. There is currently $33 M of bridge bond funds available to offset the $102 M identified for 2013 and 2014.

Bridge Costs Update

Calendar year 2012 saw small unit cost increases for PCB (Prestressed Concrete Beam) and C-SLAB (Concrete Slab Span) type structures which account for the majority of local bridges.

We let two INV-T (Inverted T-Beam) bridges in CY 2012. This bridge type has span arrangements and deck thicknesses similar to a C-SLAB bridge but doesn't need deck forms (the T-Beams act as the form for the topping concrete). The MnDOT Trunk Highway system uses this bridge type for ABC (Accelerated Bridge Construction) projects. MnDOT has also used pre-cast substructure units to further accelerate construction. These two bridges had an average unit cost of $213/sf.

Another ABC bridge type worth noting was the GRS (Geosynthetic Reinforced Soil) bridge. The FHWA had some funding for ABC bridge research and they provided some design/construction guidelines for the new abutment type. Side by side box beams were used (similar span arrangements to our 27 and 36 inch PCB's) with the modular block abutment type and the bridge unit cost was $229/sf. This bridge type offers fast construction (no abutment concrete pours and little deck forming) and is a good choice for very low velocity water crossings and non-water crossings.

We also let a very long span 3-sided arch structure (supplied by CONSPAN). The span was 60' and it came in at about $367/sf. The 60' span length was the longest we've done in Minnesota.

There was a pronounced increase in the number of C-SLAB bridges compared to CY 2011 (24 let in CY 2012 vs. 13 let in CY 2011). There was also a pronounced decrease in the number of PCB bridges compared to CY 2011 (28 let in CY 2012 vs. 41 let in CY 2011). The unit cost percentage increases/decreases are shown below.

PCB structure costs were up 5% ($118.83/sf in CY 2011 vs. $125.39/sf in CY 2012)
C-SLAB structure costs were up 3% ($109.17/sf in CY 2011 vs. $112.60/sf in CY 2012)
TRUSS pedestrian structure costs were down 28% ($191.93/sf in CY 2011 vs. $149.83/sf in CY 2012)

MnDOT Bridge Standards Unit Update

The MnDOT Bridge Standards Unit has developed a new draft special provision for the design and construction of Prefabricated Modular Block Walls "Wetcast Big Block" (PMBW) with or without earth reinforcement. The final version will be published shortly. They have also updated their list of approved PMBW suppliers. Contact Khalid Obeidat at 651-366-4485 or Khalid.obeidat@state.mn.us for further information.

Also, when planning for a project that involves a 3-sided structure, PMBW, other types of mechanically stabilized earth walls, please include adequate lead time for shop drawing review and structure fabrication in your project schedule. This should help improve the quality and timeliness of these projects.

Bridge Hydraulic News

Improved Hydraulic Software

HY8 version 7.3 has been released. The program expands the capabilities to analyze special hydraulic situations and culvert shapes and includes improvements to make the program run more smoothly and efficiently. New features:

- Analysis of hydraulic jumps that form within the culvert barrel
- Broken back culvert profiles for all HY-8 barrel shapes
- User selection of individual analysis discharge values
- Horizontal and adversely sloped barrels
- Special shapes like concrete open-bottomed arches and circular embedded culverts
- Entrance losses due to mitered concrete pipe and combinations of concrete prefabricated box barrel dimensions, fillets and inlets (i.e. the South Dakota Prefabricated RCB culvert)
- HY-8 7.31 comes with a user's manual (accessible through the HY-8 Help Menu) and a Quick Start Guide, which provide users with an overview of basic software operations and features. The technical methods applied in HY-8 are based on the most recent third editions of FHWA publications: "Hydraulic Design Series 5: Hydraulic Design of Highway Culverts" (HDS-5), and "Hydraulic Engineering Circular 14: Hydraulic Design of Energy Dissipators for Culverts and Channels" (HEC-14).

The program can be downloaded for free from:
http://www.fhwa.dot.gov/engineering/hydraulics/software/hy8/

Foundation Boring Locations, Depths, and Analysis Revisited

There have been an increasing number of local bridge projects that have had pile length issues due to inconclusive soils borings/geotechnical reports. We see many soils reports that have borings that are too shallow to conclude accurate test and foundation pile lengths. The resulting pile cost overruns can be quite costly (sometimes in excess of $50K). We remind you that if the local bridge project is funded with State Bridge Bond Funds, and/or Federal Funds that are capped, project cost over-runs become the responsibility of the governing local agency.

SALT Bridge has been working with the MnDOT Foundations Unit to develop a template contract for the local agencies to use when hiring geotechnical firms for soils borings. The template contract is based on the MnDOT Trunk Highway contract but with a few modifications. The template contract should be used on every local bridge replacement project. SALT Bridge will work with the County Engineers Bridge Committee to vet the contract language for approval and use for local bridges.

Currently the new MnDOT Trunk Highway contract requires each boring to meet a total blow count of 2500. This is calculated by adding up the blows per foot (bpf) as the boring goes through the various soil layers. Only blows counts of 15 or more add to the total count…10 feet of 20 bpf would add 200 to the total count, and so on. MnDOT also requires the drilling crew to core rock layers for 10 feet.

For local bridges, SALT Bridge is proposing to adjust it so the local contract would reflect a 2000 blow count total per boring and only core rock for 5 feet. The limits of the distance between borings would also be adjusted. These modifications to the MnDOT method would cost less than a MnDOT project but would give the local agency and their design consultant some definitive soil borings to work with.

The new soils exploration contract would cost the local agencies more on the front end, but we feel that the cost of the new method would still save tax payer money by reducing the likely (and costly) pile overruns that we currently are dealing with. One costly pile overrun could pay for a few bridge soil reports. It is important for the local bridge designer to have a definitive soils report to more accurately determine pile lengths. This should reduce the risk for both local agencies and their consultants.

Currently, local agencies are paying relatively very little for a soil boring compared to MnDOT's typical estimate of $9K per boring. As a result, the local agency and their consultant do not always get a complete picture of the subsurface soil properties. The solicitation for geotechnical work with minimum boring requirements per above will lead to a conclusive soils investigation.

The geotechnical firms we have talked to will welcome a more standardized contract scope to competitively bid on. The goal is to make sure our local agencies and consultants get better soils information to more accurately estimate pile type, size, and depth. In summary, we continue to encounter bridge projects that under estimate the foundation requirements sometimes resulting in costly project over- runs. The under estimate in foundation requirements is almost always directly related to an inadequate subsurface investigation. It's either the soil boring locations were too sparse and/or the soil borings did not extend deep enough.

New Minnesota Pile Driving Formula (MPF12)

Based on the results of a recent MnDOT research project, MnDOT will discontinue the use of the current MnDOT Nominal Resistance Pile Driving Formula (known as the LRFD formula) for construction control and replace it with a new pile driving formula designated the MnDOT Pile Formula 2012 (MPF12). The MPF12, which was calibrated for site conditions typically encountered in Minnesota, more reliably predicts the nominal resistance of driven piles.

This change in formula will not affect the design of bridges, but will require a change in the standard plan notes for CIP piles and H piles. Our local bridge consultants were informed of this change in early November 2012 with instructions to prepare plans with the new formula for state aid projects with letting dates after February 28, 2013. The new specification for 2452 "Piling" that includes MPF12 and other significant changes was recently made available. In order to educate state, local, and consultant field personnel, the MnDOT Bridge Construction Unit organized a number of informational-training sessions statewide to provide information regarding the transition to the MPF12. The training sessions will be conducted in the month of January 2013.

2013 LTAP Local Bridge Maintenance Workshop

In January of this year **Bob Kleinschmidt and Kenneth Johnson (Workshop Speakers) met with** the Bridge Office, SALT, SALT Bridge, and a few members of the County Engineers Bridge Committee to discuss the agenda and to seek additional input and advice to meet the overall goals of the workshop. As you may know, Bob is a retired senior engineering specialist with 37 years of experience with the Bemidji MnDOT Construction Inspection unit, and Ken is a retired engineer with experience working for the Aitkin County Highway Department, Wheeler Lumber, and since 2006 has worked to develop training programs for bridge construction and safety inspections. The one day workshop is scheduled for March 26-Rochester, March 27-Blaine, and March 28-Brainerd. For registration and further details on the workshop, please visit MN-LTAP website at http://www.mnltap.umn.edu/training/topic/maintenance/bridge/index.html

It was ideal for Bob and Ken to hear from the Bridge Office as the Bridge Office has made tremendous progress since the 2008 legislative audit which recommended MnDOT establish standard procedures for documenting, communicating, and following up on bridge inspectors' maintenance recommendations. The Bridge Office now has a Bridge Operations Support Unit which provides statewide bridge preservation guidance. The Unit is headed up by Sarah Sondag-Operations Engineer and Larry Cooper-Operation Senior Specialist. The Operations Unit has been instrumental in developing and implementing the Structure Information Management System (SIMS) maintenance module. The Maintenance Module was designed to meet Minnesota's need to enter, track, and make decisions on bridge repairs and other maintenance tasks. Bob and Ken are working with Sarah and Cooper to incorporate SIMS maintenance module materials, screen shots, sample maintenance work photos, and other valuable MnDOT bridge operation information into their workshop presentation. The hope is that this information can be used, adapted and applied to effectively maintain a local bridge network.

The workshop is designed for local agency personnel, and topics will cover the development of a bridge asset management program, how to prioritizing both proactive and reactive maintenance, relationship between structure age and maintenance needs, Integration of condition assessments into operational planning, typical maintenance procedures, and strategic planning for bridge emergencies.

2012 AGC Local Bridge Construction Awards

We would like to congratulate State Aid-Bemidji, Dan Sauve, Clearwater County Engineer and the DNR for being selected as a winner for bridges in the cost category below $1.5 million. The winning Bridge Number was 15513 which carries park traffic over the Mississippi River in Lake Itasca State Park.

The bridge is a 53 foot glued laminated beam span, with nail-laminated deck and bituminous wearing surface, 32'-6" clear roadway width, and crash tested timber vehicular bridge railing. The bridge foundation consists of pile supported concrete abutments and wing walls. The abutments and wing walls are painted and include a stone veneer facing to enhance the aesthetic character of the bridge. The bridge was designed by Ron Benson of Stantec and constructed by Redstone Construction Inc.

Note, Award winners will be honored at the 2013 AGC Spring Membership & Quarterly Meeting. Plaques and project photos will be presented to each member of the winning teams and group photographs will be taken.

Complex Local Bridge Construction and Repair

Lowry Bridge (Owner Hennepin County**):**
Opening on October 27th, 2012, this bridge is a basket-handle steel arch design that spans more than 400 feet across the navigational channel of the Mississippi River. The bridge has expanded sidewalks with unobstructed views of the Mississippi River, a high efficiency LED lighting system for the steel arch that is color adjustable, and an anti-icing system. Feel free to visit the following websites for additional information on this "Iconic" Local Minnesota Bridge Structure.

History, Design, and Construction information: http://www.lowryavenuebridge.com/
Lowry Bridge grand opening video: http://www.tcdailyplanet.net/blog/mn-videos/mn-videos-lowry-bridge-grand-opening-video
Lowry Bridge Light Show: http://www.youtube.com/watch?v=fZQJqcYZpbA

Martin Sabo Pedestrian Bridge (Owner City of Minneapolis**):**
The bridge has a total length of 2,200 feet. Its main span is 220 feet over Hiawatha Avenue, with a cable-stay steel pylon rising 100 feet above the concrete bridge-deck level. This bridge is the first true cable-stayed suspension bridge in the State of Minnesota. The bridge opened in November of 2007 and is used by an average of 2,500 riders a day, peak use can hit 5,000 to 6,000 per day.

In February 2012, a few steel diaphragm plates that anchor the ends of the cables to the steel tower failed. The cables were found detached and lying across the bridge deck. The bridge was closed shortly thereafter to all traffic. After emergency supports were placed underneath the bridge, a second pair of cables were removed due to cracks in the steel diaphragm plates. An engineering firm was hired to investigate how the diaphragm plates failed. In June 2012, a summary report of the investigation attributed the cable diaphragm plate failure to wind-induced cable vibrations. The bridge re-opened for bicycle and pedestrian traffic in June 2012 with temporary support structures in place.

Structural repair work to the bridge included installing and retrofitting new steel diaphragm plates to the steel pylon. The retrofitted and replaced plates were designed with a bolted connection to withstand fatigue from wind-induced cable vibrations. They also installed monitoring equipment to make sure the repairs are all working properly. The necessary structural work was completed in November 2012, and the bridge was reopened to traffic. Temporary closures may be necessary in 2013, to fix the lighting, reinstall pylon- diaphragm plate bird screens, and some touch up painting.

Plymouth Bridge (Owner City of Minneapolis**):**
The Plymouth Avenue Bridge opened in 1983. The bridge is Minnesota's first segmental post-tensioned concrete box girder bridge. The bridge spans the Mississippi with an overall bridge length of 944 feet. The bridge has a twin concrete box-girder cross section which accommodates a total of 4 lanes of traffic and carries an ADT of up to 14,000.

In 2010, the bridge was closed as a safety precaution after discovery of internal corroded bridge tendons. The corrosion was a result of leaking internal deck drains. A specialized consultant was hired to evaluate the problem. In July 2012 bridge repairs began to fix the main bridge spans. The repair work involved removal and replacement of corrosion damaged concrete and post-tensioning tendons within the bottom slab of the box girders. The bridge was reopened to traffic in October, 2012, but repairs to the side spans will continue through the fall of 2013.

Girma Feyissa and Laura Carlson

Girma Feyissa who has been in SALT Bridge since September 2010 will be returning to a design unit in the Bridge Office in mid-January 2013. As you recall Girma served as a senior engineer reviewing local bridge plans for us during Brian Homan's hiatus to serve on the TH169/I494 bridge project. Girma did an excellent job for us in plan processing of over $160 M in local bridge construction. He will leave us to participate on an exciting accelerated bridge construction project using both superstructure and substructure prefabricated bridge elements.

In February 2013 Laura Carlson will join SALT Bridge for a 6 month rotation as a graduate engineer. Laura comes from MnDOT District 2 of Bemidji. Her new work in SALT Bridge will include reviewing preliminary and final local bridge plans and miscellaneous structural projects. Plan review activities typically include checking bridge geometrics, bridge hydraulics, foundations, and slab span or prestressed concrete beam designs. Laura's overall review work will ensure that the bridge plan satisfies state statutes, rules, state aid policies, MnDOT LRFD Bridge Manual and AASHTO LRFD Bridge Design Specifications**.**

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▪ *Duties full time* ▫ *Duties part time* ◦ *Duties temporary*