State Aid
Bridge News
January 2019

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Bridge Inspection General

In the 2018 Bridge Safety Inspection Refresher Training Seminar, we incorporated a special and all new breakout session for Program Administrators (PA). Those in attendance found the session informative and very useful in helping PA’s understand their roles in providing a successful and safe local bridge program. Based on this response and feedback State Aid Bridge received, we plan to continue the PA breakout session during this year’s Bridge Safety Inspection Refresher Training Seminars.

Last year’s PA sessions focused primarily on bridge inspection report review and response. This year, the PA session will include a review of PA role and responsibilities, a revised PA checklist, a NBI rating calibration exercise, and a prestressed concrete beam inspection example. **If you’re a PA, we highly recommend attending the 2019 seminar to capture this new material.** Don’t be surprised if you see your District State Aid Engineer (DSAE) in the classroom, for they’ve also been invited to learn and better understand the PA’s duties.

Another hot topic in the bridge inspection and load rating world is steel corrugated plate culverts. This topic will be covered in the general session, and will cover: history, basics, inspection, and load rating of steel corrugated plate culverts – with approximately 1,200 steel culverts on the inventory, and with many of them being built between 1950 to 1975, they’re nearing their expected design life and must be more closely monitored and understood. Moises Dimaculangan and Dave Conkel from State Aid Bridge will be presenting on this topic.

Bridge Safety Inspection Refresher Training

Introduction

MnDOT, in cooperation with the FHWA and the University of Minnesota, College of Continuing Education, are pleased to offer seven Minnesota Bridge Safety Inspection Refresher Training seminars to be held at various statewide locations in February and March 2019. To maintain MnDOT certification as a bridge safety inspector, program administrator, or team leader, attendance is required at a minimum of two bridge inspection seminars during each four year recertification period.

Who Should Attend

Individuals who need to maintain MnDOT certifications as Bridge Safety Inspection “Team Leader.” Attendance is required at a minimum of two bridge inspection refresher training seminar.

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- County, city, or consultant engineers who are designated as bridge inspection “program administrators” are required to attend a minimum of two bridge inspection seminars every four years.
- Individuals who assist in bridge inspections are not required to attend, but are welcome and encouraged to do so.

Description

MnDOT conducts Bridge Safety Inspection Refresher Training each year to improve the quality of inspections, introduce new equipment and techniques, and maintain consistency and reliability throughout the statewide network of bridge safety inspection programs. Speakers will discuss a variety of issues that surround key topics, and use visual presentations with handouts to deliver the core of this training.

2019 Topics

- State of Minnesota and FHWA Updates
- Load Rating and Steel Culverts
- Bridge Data Management Update
- BSIPM Chapter D: Recording and Coding Field Guide
- Bridge Inspection Example—Steel Beam
- Overview of 2018 Agency Reviews, Critical Finds, and Map Cracking on Concrete Surfaces
- Program Administrator Breakout Session
- Bridge Inspection Breakout Session

Instructors

- MnDOT and FHWA staff

General Information

- The seminar fee is $125 and includes training materials, lunch and refreshment breaks.
- Registration begins at 7:30 a.m. Seminars are scheduled from 8 a.m. to 4 p.m.
- Class space is limited and early registration is highly recommended.

Registration questions contact: Marie Villano, University of Minnesota, 612-624-4972, ccapsconf2@umn.edu
Curriculum Questions Contact: Pete Wilson, MnDOT, 651-366-4574, pete.wilson@state.mn.us

Dates and Locations

You may register online or print out a registration form (PDF) and mail or fax in

<table>
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Questions regarding this topic can be directed to Jennifer Wells at jennifer.wells@state.mn.us or 651-366-4573 or Peter Wilson at pete.wilson@state.mn or 651-366-4574.
Bridge Maintenance Support

MnDOT’s Bridge Operations Support Unit is available to assist. Please contact Greg Mensen at 651-366-4520 or greg.mensen@state.mn.us or Sarah Sondag at 651-366-4529 or sarah.sondag@state.mn.us if you have any questions or if you would like guidance for your agency’s bridge maintenance program.

SIMS Maintenance Module

The SIMS Maintenance Module is available for local agencies to utilize. Please contact Sarah Sondag at sarah.sondag@state.mn.us if you would like to schedule a demonstration.

Training

Bridge Maintenance Training is also available to local agency participants. Training announcements are posted on the MnDOT Bridge and Structures Training webpage. If interested, please follow the registration process outlined in the training announcement.

A brief description of each class is presented below.

Bridge Maintenance Academy I (eLearning Modules)

MnDOT is converting Bridge Maintenance Academy I into eLearning modules. It is anticipated that a pilot course will be available in January to participants of Bridge Maintenance Academy II.

Bridge Maintenance Academy II (February 4-8, 2019 at the MnDOT Plymouth Truck Station)

In Bridge Maintenance Academy II, participants will receive an introduction to the fundamentals required to perform bridge maintenance effectively including strategies for structural steel, timber bridge maintenance and formwork. Participants will also be given the opportunity to observe experts and perform hands-on bridge maintenance tasks, such as concrete formwork, rebar placement, concrete placement, finishing and curing, chain dragging, concrete removal, concrete patching and structural steel repair.

Please note that each agency is responsible for providing the appropriate safety, tool and equipment training, PPE and basic tools that are needed for participating in this hands-on academy.

The cost to attend Bridge Maintenance Academy II is $100.

Registration is available on the MnDOT Bridge and Structures Training webpage until January 3.

Bridge Maintenance Academy III (will not be offered in 2019)

In Bridge Maintenance Academy III, participants will be given the opportunity to construct a small single span bridge in order to facilitate bridge jacking training. As part of this exercise, participants will be able to observe experts and perform hands-on bridge maintenance tasks, such as setting elastomeric bearings, setting steel beams, fastening steel diaphragms, constructing bridge deck formwork, placing rebar, placing, finishing and curing bridge deck concrete, installing a strip seal joint and performing full depth deck patching. Following construction of the bridge, participants will receive an introduction to basic bridge jacking and bearing and joint maintenance fundamentals as well as perform a bridge jacking exercise.

Please note that each agency is responsible for providing the appropriate safety, tool and equipment training, PPE and basic tools that are needed for participating in this hands-on academy.

The cost to attend Bridge Maintenance Academy III is $100.

Bridge Maintenance Academy III will not be offered in 2019. It is anticipated that a class will be offered in 2020.

Bridge Preventive Maintenance eLearning Modules

Bridge preventive maintenance eLearning modules developed by MnDOT are available to agency participants. Modules include:

- Crack sealing
- Strip Seal Gland Repair
- Poured Joint Sealing

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...continued, Bridge Maintenance

The eLearning modules focus on planning, equipment, materials and best practices for these bridge preventive maintenance activities. These modules are available on the MnDOT Bridge and Structures Training webpage. There is no cost to access the bridge preventive maintenance eLearning modules.

Please contact Sarah Sondag at 651-366-4529 or sarah.sondag@state.mn.us if you have any questions regarding bridge maintenance training.

Bridge Maintenance Manual

Updates for the MnDOT Bridge Maintenance Manual were delayed due to staffing changes and accessibility requirements. It is anticipated that the manual will be posted in 2019.

Midwest Bridge Preservation Partnership

The Midwest Bridge Preservation Partnership (MWBPP) is comprised of representatives from regional state and local highway agencies, provincial transport agencies, industry, suppliers, consultants, and academia. The mission of the partnership is to provide a platform for the MWBPP member agencies and organizations to exchange, promote, and advance best practices, new technologies, and innovation in the areas of highway bridge management, inspections, preservation and maintenance.

One of the goals of the MWBPP is to promote outreach to local agencies. The partnership has monthly teleconference calls, working groups and regional meetings in order to conduct partnership business and exchange bridge preservation knowledge. The 2019 Midwest Bridge Preservation Partnership Regional Meeting will be held in Bismarck, ND October 15-17.

If you would like more information about the partnership, please contact Sarah Sondag at sarah.sondag@state.mn.us.

Bridge Hydraulic News

Longtime State Aid Bridge Hydraulics Engineer, Peta DeWall has retired from MnDOT. Petra joins her retired husband, Craig DeWall, who also worked for MnDOT in the Office of Land Management.

Petra worked in State Aid Bridge for a few years back in 2000-2002 where she really elevated our approach to bridge hydraulic reviews and the various hydraulic training we provided over the years. After her time in State Aid Bridge, she reverted back to her love of water, bridge hydraulics, and finished her successful career in the Bridge Hydraulics Unit of the Bridge Office. Throughout her time at MnDOT, she explored several mobility and temporary assignment opportunities – she spent time in the State Aid Office learning about the federal aid process, in Government Affairs as a legislative liaison, and served as the State Bridge Planning Engineer for several months in the Bridge Office.

Petra served as State Aid Bridge Hydraulic Engineer for over 18 years. Her experience and advanced knowledge of bridge hydraulics enabled her to assist our local bridge owners and their consultants with the more complex and difficult hydraulic issues. She was instrumental in reviewing and assisting with hydraulics for any local bridge over a major river, FHWA local bridge scour compliance requirements, culvert hydraulics, etc. She will be missed by her peers, and the many local agencies she helped serve over the years. We wish Petra well in her retirement and thank her for all her years of service.

Her temporary replacement will be Solomon Woldeamlak. Solomon has worked in the Bridge Hydraulics Unit under Petra’s supervision for 10 years. Solomon has familiarity with local bridge hydraulics, and hydraulic issues, and will help provide the necessary hydraulic assistance and reviews until Petra’s position is permanently backfilled. Solomon may be reached at solomon.woldeamlak@state.mn.us or 651-366-4548.
Local Bridge Replacement Program Update

The 2018 Legislative session ended with the passage of a capital improvement bill and an appropriation of $5 million for the State Transportation Funds (GO Bonds) for the Local Bridge Replacement Program (LBRP). Combined with the 2017 Legislation, the LBRP has funded, or will fund, approximately 145 bridges over the FY 17/18 biennium.

This includes the $31,875,000 for the City of Minneapolis rehabilitation and restoration of the historic Tenth Avenue Bridge on track to be awarded in 2019. This bridge is a concrete open spandrel arch structure over the Mississippi River in downtown Minneapolis. The $16,537,000 of undesignated bond funds appropriated in 2017 will fund 80 local bridges statewide.

The Legislature also added new funding in the 2017 Transportation Appropriations Bill (Chapter 3-HF No. 3) by dedicating 13 percent of the motor vehicle lease sales tax revenue for the LBRP state transportation fund. The available funding from this account is $12,576,303 and will be used to replace approximately 32 bridges statewide.

Lastly, the 2018 bond appropriation of $5 million will fund 21 bridges. To date, all the available local bridge funding is allocated (spent) or on reserve for the 2019 federal bridge off system (BROS) projects expected to be awarded in the spring of 2019.

In addition to the state transportation funding, counties and townships replaced approximately 43 bridges in 2018 spending approximately $12.2 million in town bridge funds. The town bridge funding will be replenished again in January with another distribution from the Highway User Tax Distribution Fund. This consistent dedicated funding source for township bridges has been crucial for replacing the hundreds of deficient town bridges throughout the state. Counties are encouraged to make sure the bridge improvement cost estimates for your township bridge projects are updated to reflect accurate replacement costs. Instructions can be found on the SALT LBRP webpage.

What is the future outlook for the LBRP? Currently there is a waiting list of bridge projects with plans approved and waiting for additional funding from the legislature. The waiting list changes constantly as projects are approved by the district state aid folks and the State Aid Bridge Office. The current waiting list has approximately 44 bridges with plans ready to go, and approximately 36 projects in various stages of design anticipating funding for 2019. The total request for bond funds for the 80 bridges is approximately $36 million with a total replacement cost of $92 million. The bridge program can anticipate approximately $12-$13 million from the 13 percent of dedicated motor vehicle sales tax in late July of 2019.

We encourage you to visit the SALT LBRP webpage for the history, details, and information on the LBRP. There are also links to tools on various resolutions, such as how to advance county regular/county municipal funds to supplement the Town Bridge Account. Tools on how to create a prioritized bridge replacement list, and to amend a prioritized bridge replacement list is also provided. For more information contact Patti Loken, State Aid Programs Engineer at patti.loken@state.mn.us or 651-366-3803.

Local Historical Bridge Preservation Update

Along with our steady diet of processing standard type local bridges, State Aid Bridge has seen an influx of local historic bridge projects, not including the Historic Tenth Avenue Bridge over the Mississippi River for the City of Minneapolis. The influx of local historic bridges is primarily due to an earlier effort in which multiple grant applications were pursued to receive legacy grant funds to prepare rehabilitation plans and specifications. The local historic bridges selected for these legacy grant applications were primarily derived at the historic bridge owner’s request, and they only included historic bridges listed on the National Register.

The following historic bridges have recently made their way through the State Aid Bridge Office for some form of bridge plan review and coordination.

- Bridge L3275, Dakota County, Waterford Township, a 1909, 140-foot-long Camelback Steel through Truss
- Bridge L4646, Rock County, City of Beaver Creek, a 1911, 32 foot single span reinforced concrete, filled-spandrel, barrel-vaulted, arch bridge
- Bridge 5744, Pipestone County, a 1938, 50 foot single span Masonry-Arch Highway Bridge
- Bridge 3219, Wabasha County, a 1937, two 24-foot multi plate steel arch spans on stone masonry abutments
- Bridge 6527, Watonwan County, a 1908, 96 foot single span Warren through Truss

Some notable consultants involved in these important historic bridge rehabilitation projects include: ONE, SRF Consulting Group, Inc., LHB, WSN, WSB, Bolton & Menk, Stonebrooke Engineering, and SEH. The next big challenge is to pursue funds to construct these projects. Possible funding sources include additional legacy funds, federal funds, and local funds.
2018 Featured Local Bridge Construction Projects

Bridge 16525

Bridge 16525 was recently nominated and awarded the 2018 AGC bridge award in the category for bridges costing less than $1.5 million. All AGC bridge awards were announced in late December. What made this bridge a great candidate for the award, was because of the project timeliness, general appearance and workmanship, complexity of the project, innovation, quality, and safety. Bridge 16525 is located at Lutsen Ski Resort and receives heavy tourism during both winter and summer. In addition, a ski run and mountain bike trail cross under the bridge. Minimizing disruptions to resort activities was a critical aspect of this construction project. Several buried utilities were located under the bridge, including: water, sanitary, and storm sewer. Locating these utility lines was critical to avoiding conflicts during pile driving and also during grading of the ski run/bike trail to the proper elevation. The resort owner requested the trail elevation be lowered to improve vertical clearance under the bridge.

The project was in the heart of the Lutsen Mountain Ski Resort and, as such, extra space was a luxury that the contractor rarely had – couple this with the constant tourism this area receives, and you have lots of confused pedestrians and motorists. The contractor did well with their space management and kept the traffic and pedestrian signage easily comprehensible. Providing a safe environment for the laborers, tourists, resort staff, and suppliers was critical to this project and was accomplished by the contractor. S&R Reinforcing, Erickson Engineering, Cook County, and Lutsen Resort worked closely together in a public-private partnership to achieve a successful project and a very desirable end product.

Construction commenced on May 16, 2018. All piling installation was to be completed by June 22, 2018 to allow for a mountain bike race that included the trail under the bridge as part of the route. The bike race was attended by several thousand participants and spectators. Construction for the entire project was to be completed by August 10, 2018. The contractor met the intermediate completion date in June for the bike race and also the final completion date in August. The bridge opened to the public on August 8, 2018. Along with these many challenges, the contractor workmanship and appearance was very pleasing. The rail alignment and the coping on the railing and wing walls was straight. The concrete special surface finish and paint finish on the structural tube railing and light poles was very uniform.

Tenth Avenue Bridge (Bridge 2796)

The City of Minneapolis owns this bridge. Completed in 1929, Bridge 2796 is listed in the National Register. In April of 2014 SRF Consulting Group, Inc., Olson and Nesvold Engineers, and Hess Roise Historical Consultants completed the Tenth Avenue SE River Bridge Rehabilltations Strategies Study for the City of Minneapolis Public Works Department. The alternatives include: various levels of deck replacement, concrete repair along the cap beams, spandrel columns, piers, pier caps, and arches; railing and lighting replacement; drainage system repair or replacement; and the addition of a cathodic protective surface coating. The north and south approaches to the bridge will be repaired and rehabilitated.

Since the rehabilitation study back in 2014, a lot has transpired and progressed in the way of bridge funding and project design to position the city for a winter 2019 letting. The bridge design team, which is headed up by SEH, includes ONE and Genesis Structures, with a detailed peer review performed by HDR. Mark Maves with SEH, and Steve Olson with ONE, have lead the final design project from the beginning for Jack Yuzna, City of Minneapolis Bridge Engineer. The desire would be to get the bridge re-opened prior to the 2020-2021 winter season.
Minnesota’s New Prestressed Concrete Beam MH Shapes

Currently, prestressed concrete beams make up 70 to 80 percent of the state’s new bridges. MnDOT has worked with local fabricators to continue improving the quality and efficiency of beams. An analysis of MnDOT owned bridges designed since 2001 and state funded local highway bridges designed between 2009 and 2016 showed a significant portion of bridges spanning 75-105 feet with beam depths between 27 and 45 inches. While typically the desire has been to develop deeper beams that can be used for longer spans, MnDOT identified efficiency gaps in the shorter spans which led to the new 30, 35, and 40 inch deep "MH" shapes. MnDOT’s new MH series beams should prove to be an efficient beam type for use in the 75 to 105 foot span range.

On December 20, 2018, the MnDOT Bridge Office issued a Memo to Designers notifying them of the ability to use the new 30MH and 35MH for projects with a letting date on or after July 1, 2019. To allow fabricators adequate time to procure forms, the 40MH beams will be permitted for projects letting on or after November 1, 2019. These shapes will be utilized for upcoming MnDOT projects and on the local highway system. Beam costs, fabricator concerns, and contractor comments will be analyzed to determine if additional changes are needed.

Success developing the beams would not have been possible without collaboration between several functional work areas in the MnDOT Bridge Office, including the State Aid Bridge Office and their many local bridge consultants for expert input, and our local fabricators. Kevin Western, State Bridge Engineer, was instrumental in steering this overall effort with Robbie Hass, a Senior Design Engineer in the Bridge Office who performed the detailed analysis and design work. Robbie is currently developing a letter to be published in the Aspire Concrete Bridge Magazine very soon.

2018 FHWA Competitive Highway Bridge Program Grant “Bridge Bundling”

On September 5, the FHWA published a Notice of Funding Opportunity (NOFO) in the Federal Register for rural states to compete for $225 million in Competitive Highway Bridge Program (CHBP) grants. The funds were restricted to states with a population density of less than 100 people per square mile. 25 states qualified, including Minnesota. The purpose of this program was to demonstrate the efficiencies associated with "bundling" of highway bridge replacement and/or rehabilitation projects into a single contract. News of this program spread across the state and was communicated at several district state aid meetings by Tim Anderson, Mn/FHWA Bridge Engineer and Dave Conkel, State Aid Bridge Engineer.

Before the official NOFO was published for this program, the FHWA was advertising the program for local rural bridges only. However, upon reading the published NOFO closely, we realized the program was not restricted to just local rural bridges, and it included both state and local rural and urban bridges. With this realization the program was open for MnDOT or state owned bridges to pursue as well. It became apparent a subcommittee of MnDOT, MnDOT State Aid, interested local bridge owners, and representatives from the Minnesota County Engineers Bridge Committee needed to be quickly formed to formulate good application candidates that considered both local and state bridge interests.

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...continued, 2018 FHWA Competitive Highway Bridge Program Grant “Bridge Bundling”

In October, the subcommittee met multiple times to hone in on the best project candidates to move forward with. These candidates were brought forward to the Transportation Program Investment Committee (TPIC) for further review which eventually resulted in the following projects to pursue.

- MnDOT District 1/St. Louis County Bundled Bridges Project. A project seeking $14.1 million program funds to address the deteriorating structural conditions of 21 bridges in northeastern Minnesota that pose a serious threat to safety, regional mobility, and economic development.
- Interstate Red River Fracture Critical Bridge Replacement/ Rehabilitation Project. A project seeking $13.2 million program funds to address the critical condition of three bridges carrying County State Aid Highways (CSAH) over the Red River of the North between Minnesota and North Dakota.
- MnDOT I-90 and Mower County Bridge Bundling Project. A project seeking $9.2 million program funds to addresses the critical condition of seven bridges in the rural southeastern Minnesota counties of Mower and Freeborn.

In order to meet the tight time frame, and to submit the applications with the highest of quality, MnDOT and MnDOT State Aid decided to hire Michael Baker International to create and submit the applications by December 4, 2018. Note, each eligible state was allowed to submit up to 3 separate applications. Just a few other tidbits about this federal program, the funds provided for this program under the FY 2018 Appropriations Act are available for obligation through September 30, 2021, and expire after September 30, 2026. The standard non-federal share is not less than 20 percent of the cost of the project. Selection criteria under this program includes innovative technologies, innovative project delivery, economic vitality, life-cycle costs, and project readiness. Award announcements are anticipated in early 2019.

Special recognition goes out to: Rich Sanders with Polk County, Mike Hanson with Mower County, and Rachel Gregg with St. Louis County for their time and effort to assist Michael Baker with the pertinent application information. Also we can thank other associated county staff and their local bridge consultants who helped assist in the application process. Lastly, thanks to Patti Loken, Kristine Elwood, and Dave Conkel with MnDOT State Aid, Tim Anderson with Mn/FHWA, and Dustin Thomas with the MnDOT Bridge Office, who helped assure the overall application effort was funded, coordinated, and successful.

From Jim Foldesi, St. Louis County, “Thanks everybody and good luck!”

Reference Documents:
- Transportation’s Competitive Highway Bridge Program for FY 2018
- Every Day Counts / EDC-5: Project Bundling

Local BRIM Update

To start the Local BRIM update article, it wouldn’t hurt for us to review some past SA Bridge News articles and available resources on Local BRIM for a quick refresher. We would refer you to the following locations:

- 2017 State Aid Bridge News, pages 13-14 (PDF)
- 2018 State Aid Bridge News, pages 9-10 (PDF)
- State Aid Bridge – Local BRIM webpage
  ⇒ Local BRIM tool overview
  ⇒ BRIM report for locals
  ⇒ BRIM Calculator examples

In 2018, starting at the MCEA summer conference, Dave Conkel, State Aid Bridge Engineer and Barritt Lovelace with Collins Engineering, and David Hedeen from the MnDOT Bridge Information Management Unit presented on the Local BRIM tool. From there, Dave Conkel and Barritt Lovelace traveled about the state attending State Aid District meetings to present on the various Local BRIM tools available to our local bridge owners and to further encourage using the Local BRIM. As we continue to receive positive feedback on the Local BRIM, we anticipate it will evolve over-time, especially as more and more local bridge owner program administrators use the tool and discover enhancement ideas, and other feedback items.

As you may know, the State Aid Bridge Office and the MCEA County Engineers Bridge Committee typically meet every year to discuss everything (continue on page 9)
...continued, Local BRIM Update

local bridge for a full day. A big topic on the agenda was the Local BRIM and taking those next steps to use it as the first cut or screening tool for bridge funding eligibility. In the spirit to meet FHWA’s MAP-21 Act Requirements, which requires bridge owners to apply a risk based approach to maintaining assets, we are over due to move in this direction. In the County Engineers Bridge Committee meeting, Tim Anderson, Mn/FHWA Bridge Engineer, gently reminded us that the FHWA no longer recognizes terms such as Structurally Deficient (SD), Functionally Obsolete (FO), Sufficiency Rating (SR), and the associated age old funding eligibility criteria we have used for decades. This old criteria can best be explained by overviewing the State Aid Manual, Chapter 4 Funding Local Programs, A. Federal Highway Bridge Replacement and Rehabilitation Program.

At this time, the FHWA understands there will be a phase in period to move from the old funding eligibility criteria using SD or FO with SR to the new criteria using Local BRIM and the Local Planning Index (LPI) numbers. However, the County Engineers Bridge Committee (CEBC) agreed it was time to explore the Local BRIM in a new bridge funding criteria using the LPI. We concluded this meeting agenda item by the CEBC requesting SA Bridge and David Hedeen to set or calibrate an LPI score threshold and criteria to best envelope the local bridges already established on the latest Master Local Bridge Priority List, and the local bridge inventory. Along with this result or outcome, we are to propose a revised funding criteria for the State Aid Manual to be further discussed at the next CEBC meeting in January 2019. We understand it will be a process to establish this new criteria, which will hopefully culminate in approvals from our District State Aid Engineers, Patti Loken - SALT Local Bridge Programs Engineer, the CEBC, and finally the MCEA Board of Directors.

Since our last CEBC meeting, Dave Conkel, David Hedeen, and Barritt Lovelace met a few times to hone in on a recommended LPI score, and some suggested language for the State Aid Manual. We looked at the entire local bridge inventory comparing the old criteria versus a new criteria, and will now be focusing on the Master Local Bridge Priority List next. We obviously will never find the exact LPI score that will sync with the old federal criteria, but we do see this effort worthwhile to start the new Local BRIM funding eligibility criteria phase in period.

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Showing a small excerpt from a Local BRIM report showing a few local planning index numbers to assist local bridge owners with their bridge rehabilitation and replacement decisions.

Bridge Standards Update

It’s been another busy year for the MnDOT Bridge Office Standards Unit headed up by Paul Rowekamp. The following is an abbreviated list of items significant to local bridges.

- Developed standards for new prestressed concrete beam shapes, PCB 30 MH, PCB 35 MH, & PCB 40 MH

- MASH crash testing of Structural Tube Railing Design T-1 on Concrete Parapet P-2 vehicular railing system has been sent to the Midwest Roadside Safety Facility (MwRSF) and they have sent MnDOT a proposal to crash test it to MASH standards. The funding is available and it is expected that the testing can be completed before the end of 2019. This should make St. Louis County excited as they often specify this railing which has a lower profile to accommodate the picturesque panoramas of Duluth and the surrounding areas.

- MnDOT’s precast concrete box culvert standards have evolved over the years by slowly increasing the culvert span widths. The maximum span widths increased from 12’ maximum to 16’ maximum over the past few decades. If you search back in our State Aid Bridge Newsletter in 2007 and 2009, you’ll see articles on the ever increasing culvert span widths. Currently anything outside our culvert standards span and cover limits can be considered a special design. Over the past approximately 10 years we have continued to see bridge owners design and build culverts beyond our standard 16’ maximum span limit. Recognizing this fact and with further discussions with our local precasters, the Bridge Office Standards Unit will be

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...continued, Bridge Standards Update

developing new culvert standards to accommodate both 18’ and 20’ span widths. They’re hopeful these new standards will be available for the 2020 construction season. Please stay tuned, and continue to consider precast concrete box culverts whenever possible. They’re typically known for lowest initial cost for one and two barrel arrangements, fast construction, lowest life cycle cost with a 75+ year life span, and MnDOT culvert standards typically make bridge plan development cheaper and quicker.

We look forward to these new and improved bridge standards in the upcoming years. State Aid Bridge will continue to be a strong advocate for all local bridge owners as they continue to serve on the associated MnDOT Bridge Office Committees that effect positive change and improvement.

Iowa Local Agency Bridge Innovation Days

In last year’s State Aid Bridge Newsletter, we mentioned the opportunity to attend a FHWA sponsored technology transfer scan to Buchanan County, Iowa to learn more about their innovative sheet pile faced Geosynthetic-Reinforced Soil (GRS) abutment bridge. With good intentions, we started planning our bridge scan to Iowa to focus on these innovative structures and their possibilities for Minnesota. What eventually resulted is our participation in their Local Agency Bridge Innovation Independence Days and Demos. This event was orchestrated by the Iowa LTAP. The program included presentations from Dave Conkel, State Aid Bridge Engineer, on Minnesota’s experience with GRS abutment design and construction, and Ultra-High Performance Concrete (UHPC) as used on the Franklin Avenue Bridge historic rehabilitation project. The event also afforded us the opportunity to hear from other speakers on GRS abutments and UHPC from a national perspective and Iowa’s experience and lessons learned. We also received a nice scanning tour of Buchanan County’s innovative bridge projects, which included the sheet pile faced GRS abutment bridge.

The Minnesota local bridge consultants and local agencies that attended this event with Dave Conkel included: Tim Anderson with Mn/FHWA Bridge Engineer, Ron Gregg with Fillmore County, Matt Hemmila and Rachel Gregg with St. Louis County, David Overbo with Clay County, Kent Rohr with WSN, Jon Sister with LHB, Jeff Johnson with SEH, John Sowada with Erickson Engineers, and Moises Dimaculangan, State Aid Bridge Load Rating Engineer. A special thanks goes out to Tim Anderson and the SALT Office who helped fund this opportunity for our county engineers and state aid representatives. Also a big thanks to those dedicated local bridge consultants who attended and look forward to implementing more GRS abutments in the future.

Note, to refresh your knowledge on GRS abutments, please visit our 2014 and 2017 State Aid Bridge newsletters on page 7 and page 10 respectively. On a side note, Dave Conkel is heading up a MnDOT Bridge and Foundation Office Committee to develop an official Technical Memorandum for using GRS abutments. The memorandum will receive input and vetting from select local bridge consultants, local agencies, and will have generous input from the FHWA who developed and implemented the technology nationwide.

UAS/Drone Peer Exchange

As promised in last year’s newsletter, in late August of 2018, the FHWA held an Aviation Unmanned Aircraft Systems (UAS)/Drone Peer Exchange with multiple states in Shoreview, Minnesota. The intent of this peer exchange was to: share what our Minnesota counties have been doing with UAS, to discuss and document any lessons learned, compose ideas for best practices, determine remaining barriers, and to figure out if there is a county perspective focus for the future. This peer exchange was championed by Joe Campbell with the Mn/FHWA, who in 2017 presented and demonstrated on drone use at several state aid district meetings.

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...continued, UAS/Drone Peer Exchange

Brian Pogodzinski, Houston County Engineer and County Engineers Bridge Committee Chair, indicated the peer exchange was very good, and that his county purchased a drone. His county board didn’t have any particular concerns owning a drone. To date, approximately six Minnesota counties have drones. The Mn/FHWA is looking to move to next steps regarding drone implementation and usage for Minnesota.

Joe Campbell suggested tapping into the FHWA Aid Demo Program to potentially capture federal funding to put together documentation to help and train Minnesota local agencies on drone usage. The materials would help county staff: understand how to purchase a cost effective drone, license and fly a drone, and how to document inspection information for all county related work including bridges, ditches, roadway, construction activities, material stock pile quantities, etc.

Joe would like to take his work and knowledge on UAS/drones for local agencies to the National Association of County Engineers (NACE) and is discussing this possibility with Rich Sanders, Polk County Engineer and NACE President.

For all you drone fanatics, Joe wanted to share with you that the recreational drone that he has been discussing in his presentations and demonstrations has now been released in a commercial version that has improved flight capabilities, increased usable zoom, dual camera (optical and infrared). This commercial version has all the same features and is still in a reasonable price range of under $4,000. Joe will be receiving one of the new dual camera versions, reference the Mavic 2 Enterprise Dual with thermal Imaging, and will be doing testing in January.

On an important related note, the Bridge Office has created a Drone Inspection Sub-Committee (DISC) to oversee all drone-related activities involved in the inspection of structures. There are many federal and state rules that come into play when using a drone for business purposes. So BEFOE you “drone,” or if you have interest in being part of the DISC, please contact Jennifer Wells at the Bridge Office at 651-366-4573 or jennifer.wells@state.mn.us. All meeting notes from the DISC will be distributed to all program administrators and team leaders in the state.

Falsework and Forms and Bridge and Slab Placement

We’re not writing to report on the cause of this incident, other than we understand it was a DOT designed bridge with a contractor designed false work system. Apparently, the false work failed during the slab pour. We haven’t specifically heard or confirmed of the underlining cause to date, but we’re taking a little more interest in this incident, because we build approximately 20 new local concrete slab spans every year in Minnesota.

It seemed appropriate to remind our local bridge owners and their bridge consultants to make sure the MnDOT Bridge Office special provision boiler plate SB2018-2401.3 B 1, titled Falsework and Forms and Bridge Slab Placement is included with every new concrete slab span project. This special provision requires the falsework plans and specifications to be prepared by an engineer, thoroughly checked by a second engineer for completeness and accuracy, and certified by one of the aforementioned professional engineers licensed in the state of Minnesota.

It also requires the professional engineer who has certified the plans and specifications for the falsework and forms to thoroughly inspect the falsework after erection. The professional engineer inspecting the as-constructed falsework must certify in writing that all details are approved before any concrete slab placement.

MCEA County Engineers Bridge Committee

We wanted to share with the local bridge world a little about the MCEA County Engineer Bridge Committee (CEBC). For starters, you should always check the MCEA Committee’s webpage for the current listing of members and the chairperson. Every year the CEBC updates their current goals and identifies new goals to help local bridge owners and users with their bridge needs.

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...continued, MCEA County Engineers Bridge Committee

A lot of local bridge articles placed in the State Aid Bridge newsletters, State Aid E-Scene, and other related information placed on the various State Aid websites typically are generated from important discussions in a CEBC meeting. With that said, a few of the CEBC’s 2019 goals are to implement BRIM for local bridge owners, and to formulate new bridge eligibility funding criteria using BRIM output. The CEBC is exploring incentives to permanently remove deficient local bridges off the inventory, and other incentives for good local bridge stewardship, which includes performing timely bridge maintenance and repair work.

The CEBC is still leading the charge on local bridge oversize/overweight permitting and implementing a statewide local bridge permitting process/program to adapt to the current MnDOT permitting processes which will allow seamless permitting between state and local routes. This work overlaps a bit with the MCEA Oversize/Overweight Permitting Committee, but the CEBC stays involved to support the bridge related items. A few other hot local bridge topics on the CEBC plate include: the SHV Load Rating Contract VI and load rating/posting steel corrugated culverts, developing cost effective standard superstructure plans for inverted tee beams, and staying involved in the local bridge safety inspection program to assist program administrators and team leaders.

New Minnesota Truck Weight Calculator Update

In last year’s State Aid Bridge newsletter, we were planning to develop a Truck Weight Calculator Tool/Application for Minnesota. Please reference last year’s related article in the 2018 newsletter (PDF) for the pertinent background information.

At this time we’re excited to inform you the new Minnesota Truck-Weight-Calculator is available for your use on the NDSU MN Truck Weight Calculator webpage. On this page, you’ll also find other very useful resources to help with laws governing gross weights, axle weights, tire weights, road-restriction weights, and seasonally increased (winter and harvest) weights, and the differences between the state and local transportation systems, etc.

SALT Bridge had the privilege to work with Greg Hayes, Coordinator-Instructor for Minnesota Truck Weight Compliance Training at Alexandria Technical and Community College, and who recently received the “Outstanding Service to MCEA” award in 2018. We also had the pleasure working with Bradley Wentz, Program Director of Advanced Traffic Analysis Center at the Upper Great Plains Transportation Institute at NDSU (and former Becker County Engineer). Brad did a great job leading this project to completion. Brad will continue to assure NDSU provides the necessary maintenance and application technical support for our Truck Weight Calculator Tool through April 1, 2020.

Rich Sanders, Polk County Engineer and chair of the MCEA Oversize/Overweight Permitting Committee (OOPC) will be discussing next steps or opportunities with Brad Wentz, Greg Hayes, State Aid Bridge and the OOPC to adapt the Truck Weight Calculator Tool and other resources to create an effective overweight permitting tool for local roadways. State Aid Bridge will stay involved, as they have developed and are currently implementing, a calculator tool and process to evaluate overweight permits for local bridges. Please reference the 2018 newsletter (PDF) to learn more about the A, B, C Permit Truck Classification Calculator for local bridges. For an even deeper understanding of the A, B, C Permit Truck Classification Calculator and other helpful resources and guides, please reference the new and improved State Aid Bridge Website.

Fatigue Study

Fatigue in steel bridges is a major concern nationwide, as many bridges are approaching an age when fatigue life of certain details will be reached. In 2007, a Local Road Research Board (LRRB) research project was conducted for assisting in evaluating bridges for their fracture and fatigue susceptibility. Click here to view the Implementing a Fatigue Detail Classification Scheme for MnDOT’s Steel Bridges findings.

It was important to gain an understanding of how fatigue details reduce overall bridge inventory life. In this research, 18 fatigue details were identified and ranked according to risk of cracking. For susceptible state owned bridges, fatigue detail information, ranking, and data were uploaded into the Structure Information Management System (SIMS) in the Structure Inventory and Appraisal (SIA) one column form. Also, a steel (continue on page 13)
cracking defect element was added for fatigue prone details to track the presence and severity of cracks due to fatigue or other causes. Unfortunately, locally owned steel bridges were not included in this original research and implementation effort but we agree that susceptible locally owned bridges should be inventoried for fatigue prone details and tracked for potential steel cracking. Note, the cracking defect element information feeds into the Local BRIM to help prioritize our local bridges for replacement, rehabilitation, or maintenance.

State Aid Bridge discussed this situation with the County Engineers Bridge Committee (CEBC) at their 2018 fall meeting, and they concurred to have Minnesota’s steel local bridges inventoried for fatigue prone details. However, because we have over 1,000 steel bridges on the local bridge inventory, the CEBC suggested that we should screen this list down to capture the most susceptible steel bridges to fatigue, and they suggested factoring in the average daily truck traffic volumes into the screening process. These suggestions were well taken, and the State Bridge Engineer also suggested screening for the higher risk fatigue details per the research results. State Aid Bridge is working with Barritt Lovelace with Collins Engineers, Inc. to develop a reasonable screening criteria, a project scope and fee to perform this important inventory work. We’ll work with the LRRB, the Bridge Office, and State Aid to secure funds to get this project underway shortly.

Excerpt of the Detail Classification Table from the 2007 LRRB Incorporation of Fatigue Detail Classification of Steel Bridges into the MnDOT Database (PDF).

Inverted Tee Beam Standard Superstructure Plans

The first inverted T-beam was built for MnDOT in 2005 as a rapid construction alternative to concrete slab spans that eliminates the need for falsework and gives you the shallow structure depth of a slab span. The prefabricated T shaped beams serve as the formwork for a cast-in-place 6” to 7” deck. A dozen or so have been built since then with slight variations to the design and shape due to continued cracking issues in the cast-in-place concrete deck. MnDOT stopped using inverted T-beams for awhile because of the deck cracking issues, but recently tried adding polypropylene fibers to the deck concrete and had very positive results. They’re now making an effort to bring them back and have put together a team from SALT Bridge and the Bridge Office to develop standard sheets to use in state and local bridge plans, similar to precast box culvert standards.

This type of bridge has typically been a more expensive option, but the hope is that with more repetitive use, both by the state and by the locals, the price will eventually work its way down to be a more competitive bridge option.

The goal is to make standard sheets to accommodate three of the most commonly used deck widths, 26’, 28’ and 32’. The first step would be to develop standards for single spans, then move to 3 span and possibly 2 span options as well. Single spans would reach up to about 50 feet without the use of debonded strands and up to about 60 feet if debonded strands are utilized.

There would be 5 to 6 sheets to modify and insert into the bridge plans similar to the precast box culvert standards. But unlike culvert plans, the county will need to hire a consultant to put the plan together, design abutments, etc. These standards are in the early stages and probably won’t be ready until around the 2020 construction season.
Local Rating and Permitting Updates

A, B, C Truck Evaluation for Local Bridges

Local agencies are responsible for regulating the movement of oversize and overweight motor vehicles on local bridges through appropriate routing and mitigation measures. These responsibilities are accomplished through the issuance of permits for vehicles and loads whose size or gross weight exceeds the limits allowed by law in Minnesota.

Oversize/overweight permit vehicles come in many different sizes and weights, so MnDOT developed a list of standard overweight permit vehicle configurations that envelope the majority of overweight permit vehicles in the state. These overweight configurations are classified as Class A, Class B or Class C, as shown in the Figure 2.

To help local agencies with the operation of overweight permitting, State Aid Bridge started evaluating local bridges that are in the statewide SHV load rating contract for the Minnesota standard overweight permit vehicles using the AASHTOWare Bridge Rating (BrR) program.

To use the overweight permit data from the SHV contracts more effectively, State Aid Bridge developed a spreadsheet program called, “A, B, C Permit Truck Classification Calculator” (see Figure 1).

The primary purpose of the calculator tool is to help local bridge owners determine if the overweight truck is an A, B, C or Above C permit truck. The calculator takes into account the overweight vehicle configurations (total axle weight, axle spacing, and total gross vehicle weight) and in return classifies the truck as A, B, C or Above C.

Above C trucks are vehicles that are outside the A, B, C truck classification parameters. In this case, bridges requested in this type of permit application would have to be analyzed for this specific vehicle. They require detailed and more extensive load rating analysis, therefore it is recommended to have your local bridge consultant perform the load rating analysis of your bridge(s) for the Above C type vehicle. Once the class of the overweight permit vehicle is known, the owner can pull the bridge inventory sheet and load rating form and determine the A, B, and C permit restriction codes.

Having this valuable information on hand, the bridge owners can provide consistent quality service by reviewing and issuing overweight permit applications more quickly. The A, B, C Truck Classification Calculator is posted on the State Aid Bridge Tools webpage, along with instructions.

At this point, not all local bridges have been evaluated for the A, B, C trucks, therefore for bridge owners that need their bridges evaluated, please send your list of bridges that are located on your overweight hauling routes to Moises Dimaculangan, SALT Local Bridge Load Rating Engineer.

State Aid Bridge has already analyzed hundreds of bridges for the A, B, C trucks for several counties which include: Clay, Freeborn, Houston, Lyon, McLeod, Nicollet, Morrison, Pennington and Polk counties, just to name a few. To better understand more about the A, B, C and Above C permitting program and how the process works, please contact Moises Dimaculangan or Dave Conkel.

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Emergency Vehicles Load Rating Update

In the 2018 State Aid Bridge newsletter, we stated that approximately 2,200 local bridges (non-culverts) are susceptible to emergency vehicles based on the requirements that the FHWA has established as part of the FHWA Fixing America’s Surface Transportation Act (FAST ACT). State Aid Bridge has determined that of the 2,200 bridges, approximately 1,800 would require load posting for emergency vehicles. They also discovered that there are 434 bridges left to load rate that are non-compatible with the AASHTOWare BrR program. Therefore these bridges will either need to be evaluated using another load rating software program or for some that lack the necessary detailed plan, an experienced load rating engineer may use professional engineering judgement to determine the load rating. Also, this load rating engineer must use current bridge inspection information and data, available knowledge of the design live load and live load history to support the load rating by engineering judgement. Plans from a similar bridge structure, with known details, designed or built during the same time period may also provide the basis for a load rating by engineering judgement. These non-BrR compatible bridges will be included in the upcoming SHV load rating contract 7.

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SHV Load Rating Contract 6 Update

We are currently in SHV load rating contract 6 that has approximately 700 local bridges that are being evaluated, included are 25 complex structures and 300 metal culverts that will need to be evaluated as well. Prior to the SHV contract 6, metal culverts were either evaluated using Form 90 or Physical Inspection Rating (PIR). Now the FHWA is requiring MnDOT to evaluate them using a comprehensive load rating procedure. By FHWA endorsement and recommendation, we took the metal culvert spreadsheet program that was originally developed by the Ohio DOT and the National Corrugated Steel Pipe Association (NCSPA) and later modified and refined by the Michigan DOT, and updated it per the latest AASHTO LRFD Bridge Design Specifications. MnDOT’s legal and standard overweight permit vehicles were also added to the spreadsheet. To assist users on how to operate the MnDOT LRFR metal culvert spreadsheet, a guide was also developed to provide direction on how to load rate metal culverts when using the program. So far, we have encountered a number of metal culverts that have reached a point at which they were not able to handle the anticipated load and needed to be posted, closed, or replaced. The MnDOT LRFR metal culvert spreadsheet is posted on the [State Aid Bridge Tools webpage](#), along with instructions.

The FHWA SHV mandate has not changed and the work has to be completed by December 31, 2022. This includes all bridges, from simple to complex, and we’re on track to meet this deadline. So after SHV contract 6, we estimated that it will take two more SHV contracts to complete the load rating analysis of the remaining bridges in the local bridge inventory, and to fulfill the FHWA deadline.

Additional SHV contracts may be pursued to evaluate bridges with pier caps and other substructure units that are in poor condition and for the reevaluation of vulnerable local bridges in earlier SHV contracts such as deteriorating timber bridges and bridges in very poor condition. Also any significant changes in state and federal laws related to legal and overweight permit weights may constitute statewide reload rating work. This may include the evaluation of farm equipment, tow trucks and other non-standard vehicles which are being considered for AASHTO Manual for Bridge Evaluations.

Bridge Cost Update

Calendar year 2018 saw a large unit cost increase for PCB type structures and a moderate unit cost increase for the C-SLAB type structures. These two structure types account for the majority of local bridges. As usual, the C-SLAB structure type was the lowest unit cost structure on the local system.

We let two steel pedestrian TRUSS structures in CY 2018 and their unit cost was up from last year. Steel truss bridge prices fluctuate greatly from year to year and likely reasons are the size/length/location of these bridges which can vary widely and these factors can affect the unit cost.

We let two treated timber slab (TTS) span bridges in CY 2018. There was a large unit cost fluctuation between these bridges and this was due to one of them had all steel substructure units (which led to a higher bridge cost).

We let three steel beam (STEEL) bridge in CY 2018. All of these bridges carried railroad traffic on a grade separation project in Moorhead. The unit cost of these bridges were quite a bit higher than usual and this was likely due to robust design of railroad bridges (tight beam spacing, heavy duty substructure units, etc.).

There was a large increase in the number of C-SLAB bridges compared to CY 2017 (21 let in CY 2018 vs. 12 let in CY 2017). There was a large decrease in the number of PCB bridges compared to CY 2017 (17 let in CY 2018 vs. 29 let in CY 2017). The unit cost percentage increases/decreases are shown below.

- **PCB structure cost was up 14 percent** ($136.03/sf in CY 2017 vs. $155.39/sf in CY 2018)
- **C-SLAB structure cost was up 12 percent** ($118.63/sf in CY 2017 vs. $133.16/sf in CY 2018)
- **TRUSS pedestrian structure cost was up 28 percent** ($216.26/sf in CY 2017 vs. $276.13/sf in CY 2018)

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...continued, Bridge Cost Update

We replaced approximately 52 timber bridges and one fracture critical bridges in CY 2018. Timber bridges are considered to be of full timber construction or timber pile/abutment construction. The fracture critical bridges were high trusses, low trusses, and a thru-girder bridge.

Of the 52 timber bridges replaced in CY 2018, 26 of them were replaced with concrete box culverts, 17 were replaced with C-SLAB bridges, and nine were replaced with PCB bridges. There were no timber bridges that were removed from the system, via ROAD IN LIEU projects.

The lone fracture critical bridge (which was a high truss) replaced in CY 2018, was replaced with a C-Slab bridge.

Bridge Assets Management Update and NBIS Compliance Headlines

Change to Inspection Date Reporting Requirement

Due to a handful of agencies missing their inspection dates extremely beyond their due date, the FHWA has required Minnesota to author a Plan of Corrective Action (PCA) for Metric 6 (Title 23 of The Code of Federal Regulations Part 650.311, Routine Inspection Frequency).

As part of this PCA, MnDOT will now begin to monitor the workflow of bridge inspections and the subsequent timeline of the reports. This is required so MnDOT can catch any late inspections before the "extremely late" four-month deadline is passed.

Starting for the 2019 inspection season, at the beginning of every month, MnDOT will send out emails to any agencies that had an inspection due in the last three months but yet to have entered the inspection date into SIMS with a routine inspection report. These reports are not required to be approved or waiting approval, only started with the inspection date entered. This data will serve as a flag indicating that the agency is aware that the inspection is due and have completed the inspection. Agencies that fail to meet the three-month deadline will be considered non-compliant to Metric 23 (Title 23 of The Code of Federal Regulations Part 650.315, Timely Updating of Data), and subject bridge(s) will be reflected on the following year’s compliance report.
...continued, Bridge Assets Management Update and NBIS Compliance Headlines

For agencies that fail to enter the inspection date into SIMS after two weeks of the three-month email notification, a phone call will be made to the agency from the State Aid Bridge Engineer and/or District State Aid Engineer. If still no date has been entered after four months, unfortunately, additional consequences may need to be considered, including but not limited to loss of Program Administrator Status and/or withholding of state aid funds.

New Compliance Report Available on Bridge Reports

MnDOT has published a new report to assist agencies with identification of data that is a compliance issue. The list can be generated for each agency, and the report will list the compliance issues for Metrics 12, 13 and 14. It is recommended that agencies generate this report at the beginning and end of every inspection season and head-off any data that will eventually lead to a marks on their annual compliance report. Like all bridge reports, only data that is finalized in SIMS (after approval by the Program Administrator), +1 day (for overnight data transmittal), will be reflected on this report.

The new report can be accessed in the “Bridge Inspections Reports” folder Bridge Reports.