National Bridge Inspection Standards & Bridge Maintenance Program Review Stark County May 31, 2018

By: Mark Stockman, PE, PS
CEAO Federal Bridge QA/QC Engineer

IN ATTENDANCE:

Matt Johnson, Palmer Engineering
Scott Basinger, Stark County
Justin Rufener, Palmer Engineering
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Stark County personnel, reviews of inspection and inventory data, and reviews of Stark County bridge records. The office evaluation assessed Stark County's organization, procedures, resources, and documentation regarding the inspection, inventory, and maintenance operations for bridges. In addition, field reviews of six bridges were conducted to determine if ratings were consistent with the ODOT Coding Manual and FHWA Recording and Coding Guide and to determine if inventory items were coded correctly. The bridges were selected by Stark County to represent a variety of structure types and conditions. The bridges checked during the field review were:

SFN	CTY-RTE-SECT	TYPE	YEAR BUILT /REHAB	OVERALL LENGTH	County RATING	Suggested NBIS RATING
7633165	STA T0298 1.61 22	321	1938	32'	6A	same
7631979	STA C0247 1.06 46	111	1954	20'	5A	same
7633092	STA C0255 0.68 06	155	1923	40'	6A	5A
7634048	STA C0333 1.13 52	231	1955	37'	5A	same
7641524	STA C0300 1.90 20	395	1989	11'	4A	same
7641621	STA C0300 3.06 19	171	1990	17'	6A	same

FINDINGS AND COMMENTS:

General

Ohio State statutes establish requirements governing the safety inspection of all bridges within the State borders. ODOT with participation of FHWA has developed the ODOT publication Bridge Inspection Manual, hereafter referred to as the Manual, which establishes guidance and requirements regarding bridge inspections within the State. FHWA has determined that ODOT guidance meets or exceeds the FHWA NBIS requirements.

The federal regulations for administering the NBIS are located in the Code of Federal Regulations 23 Highways – Part 650 Subpart C - National Bridge Inspection Standards. The regulations can be found at the following web site:
http://wwwcf.fhwa.dot.gov/legsregs/directives/fapg/cfr0650c.htm

Ohio currently rates bridge element conditions with a 1-4 scale. Summary items conform to the definitions and rating scales established by the NBIS. The NBIS do not require element level condition rating for County bridges unless they are on the expanded National Highway System (NHS) beginning October 1, 2014. Stark County has 1 bridge on the expanded NHS, STA-M12TH-CA 0515_(7631324).

Stark County has inspection responsibilities for 328 bridges, 199 of which are longer than 20 feet in length and 129 which are 10 feet to 20 feet long. The NBIS inspection and load rating requirements only pertain to highway bridges in excess of 20' long on public roads. Review of the inventory span lengths showed all bridges had the NBIS designation Y/N coded correctly.

The office review and the field review demonstrated that County inspections were in accordance with ODOT's Bridge Inspection Manual ("Manual"). There were some minor issues in regards to complete compliance with the National Bridge Inspection Standards (NBIS). Comments are listed below.

Inspection Procedures

Stark County uses a consultant to do the bridge inspections. In the past a laptop was used to enter data directly into the CEAO BIP. A tablet is now used to enter data directly into the SMS. Comments are recorded in SMS. The county was reminded that ratings of 5 and below require complete comments describing Location, Extent, and Severity (LES), including pictures and/or sketches. The inspections include complete detailed comments and are thorough.

The county indicated that an average of 15 inspections per day were completed in 2017. The county was reminded that 10 inspections per day is a number suggested by FHWA. The inspections include some smaller bridges between 10'-20' as well as NBIS length bridges.

The County has 4-5 bridges that are required to use a snooper for inspection. They use ODOT's snooper. The bridges were inspected last year with the snooper for the first time and are not on any specific schedule. They will use a snooper in the future on a as needed basis. The inspector uses photographs to document deficient bridge conditions, and photographs are available for every bridge.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. The SMS showed Stark County had all bridges inspected in 2017. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually. There are currently no bridges that require inspection more frequently than one year.

Qualification and Duties of Personnel

Mr. Scott Basinger, PE, is the Program Manager. He is a PE and has 30 years inspection experience. He took the ODOT Comprehensive Bridge Inspection courses in 1992, 1994, 1997, 1999. In 2008 he took the ODOT Scour Assessment Training. In 2009 he took the ODOT Load Rating Training. He took a Bridge Refresher course SMS Training in 2015. He is qualified as a Program Manager.

Mr. Matt Johnson, PE, is a Reviewer and Team Leader. He took the NHI Safety Inspection of Bridges in 2003. He took a NHI Fracture Critical Inspection course in 2004. He took the NHI Bridge Inspection Refresher in 2013. He is qualified to be a Reviewer and team leader.

Mr. Justin Rufener, PE, is a Reviewer and Team Leader. He took the NHI Bridge Inspection Refresher in 2016. He is qualified to be a Reviewer and team leader.

Scott Basinger, PE #61069 did the load ratings. He is qualified to do load ratings.

Captain Travis Clower, MBA, PE, did the dive inspections. He is a PE and took the NHI Underwater bridge inspection course in 2013. He took a NHI Bridge Inspection Refresher in 2017. He is qualified as a team leader and to do the dive inspections.

Inspection Reports

As part of this review, six bridges were field reviewed to compare conditions with the most recent inspection report. The individual condition ratings for all six bridges properly reflected the field conditions within the tolerance of 1 rating value when compared to the Manual. Summary ratings correspond with the NBIS inspection items. All discrepancies were discussed at the bridge site.

Inventory Items

During the Office Review, no inventory problems were found.

During the Field Review, the CEAO QA/QC Engineer checked select inventory items and the following issues were found:

- SFN 7641524 and 7634048 Scour Code item 113 should be 5, not 8.
- SFN 7633165 Approach Roadway Width should be 24 not 30.
- SFN 7641621 is a concrete frame, but Main Member item 475 is coded as a slab. This item should be corrected to reflect the concrete frame.

- SFN 7633092 is a concrete arch widened with prestressed beams. Since the arch is the predominate structure type, the Main member item 475 should be coded to reflect the arch, not the prestressed beam.

Files

Stark County maintains Bridge files in individual files in SCE main hallway. The Bridge files contain inspection reports, design calculations, plans, load analyses, photos, repair history, FC Plans, Load Posting/Closing documents, special procedures, and flood/hydraulic data. Plans are kept in adjacent flat files. Historical photos and bridge plans have all been scanned and are kept on file on the server.

Load Rating

The inventory shows 199 (100.0%) of the County bridges have been Load Rated or Load Rating was not applicable. 4 were evaluated by documented engineering judgement. 0 did not have vehicular traffic and did not need load rated. The county will be creating BR-100 forms for the bridges using engineering judgment. The County was also reminded that any bridges with the General Appraisal moving from a 5 to 4 triggers a new load rating.

Load Ratings were checked for SFN 7630786, 7630816, and 7633955. The load posting at the bridge matched the load ratings. PE name and stamp were on all load ratings.

Load Posting

Stark County has 5 bridges that are load posted. This is determined by a mix of engineering judgement and analysis. 0 bridges are closed for condition ratings. They use a SHV sign and posting is based on Operating Rating.

Special Features

The County has no bridge with special features.

Fracture Critical Bridges

Stark County has 17 briges labeled as a fracture critical bridge in the SMS. 17 have gusset plates.

FC bridges SFNs 7633882 and 7630654 files were checked. They did include the FCM's. The fatigue prone details were shown, and the procedure was detailed for both of the bridges.

Gusset Plate calculations were checked for 7633882 and they contained a PE stamp and the Unstiffened Edge length test.

Underwater Inspections and Scour

The UW Inspection Report was checked for SFN 7635818. The UW inspection procedure was not done and the frequency needs to be added to the Procedure. 5 bridges need an underwater inspection. There are 0 bridges considered to be Scour Critical. The county was advised if they had any potential scour issues, a written scour evaluation should be placed in the file.

QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. In addition the Team Leaders are rotated on the bridges to provide a fresh viewpoint.

Critical Findings

The county did have a Critical Findings Procedure in place. They were reminded to put a report in SMS if they ever had an actual Critical Finding.

Bridge Maintenance

The County does force account bridge work as needed. They use a bridge crew of 4-5 workers to do bridge work along with a bridge supervisor, and an assistant bridge supervisor. Work performed on bridges include short-span replacements, maintenance items, and bridge railing/guardrail repairs and installations. Approximately $300,000 is budgeted for force account work annually.

The county has a contract construction program that completes bridge replacements, major structural repairs, deep culvert replacements, and projects with force account estimates over $100,000. The approximate annual budget is $2,250,000. The County does use federal funds but has not used credit bridge funds recently.

Projects are identified and selected through a review of annual bridge inspection results along with follow-up site visits. A spreadsheet is used to track and plan projects. For emergency repairs, plans are normally developed through in-house planning. Sometimes plans are done through the use of a design consultant depending on the scope of the repair work necessary. For smaller repairs, the emergency repairs are done by the bridge crew. For more extensive repairs, a contractor does them. The county engineer and/or the assistant county engineer are the ones empowered to order emergency road closures. Direction is given to the traffic department to physical close the road and a press release is issued explaining the closure.

CONCLUSIONS AND RECOMMENDATIONS

1. The following inventory errors should be addressed:

- SFN 7641524 and 7634048 Scour Code item 113 should be 5, not 8.

- SFN 7633165 Approach Roadway Width should be 24 not 30.

- SFN 7641621 is a concrete frame, but Main Member item 475 is coded as a slab. This item should be corrected to reflect the concrete frame.

- SFN 7633092 is a concrete arch widened with prestressed beams. Since the arch is the predominate structure type, the Main member item 475 should be coded to reflect the arch, not the prestressed beam.

2. The county was advised that any bridges with potential scour issues should have a written scour evaluation.

3. The county was reminded that ratings of below 6 require complete comments describing Location, Extent, and Severity (LES), including pictures and/or sketches. The county should be more consistent in the comments.

4. The county will be creating BR-100 forms for the bridges using engineering judgment.

5. The UW inspection procedure was not done and the frequency needs to be added to the Procedure.

The chart on the following page is a review of the 23 Metrics used to measure NBIS compliance and the chart represents a **preliminary**, **tentative** assessment of the county's level of compliance. Action steps for compliance are listed at the bottom. The actual assessments of NBIS compliance are made by FHWA, based on documentation, and any final determinations of compliance may differ from this preliminary assessment. The Metric 12 & 22 result on the following page is based on the field review of the six bridges visited during the QAR using the NBIP Field Review Checklist - PY 2013, Minimum Level Review Items.

PRELIMINARY FHWA 23 Metric Matrix

23 metrics used by FHWA to measure NBIS compliance. Actual "score" by FHWA may differ.

Compliance Codes for the following Metrics:

(C)	Compliant
(SC)	Substantially Compliant
(CC)	Conditionally Compliant
(NC)	Not Compliant

Metric	Description	(C)	(SC)	(CC)	(NC)
1	State Bridge Inspection Organization				
2	Program Manager Qualification				
3	Team Leader Qualification				
4	Load Rating Engineer Qualification				
5	UW Bridge Inspection Diver Qualification				
6	Routine Inspection Frequency - Low Risk				
7	Routine Inspection Frequency - High Risk				
8	UW Inspection Frequency - Low Risk				
9	UW Inspection Frequency - High Risk				
10	FC Inspection Frequency				
11	Frequency Criteria				
12	Inspection Quality ** 100%				
13	Load Rating				
14	Posted or Restricted Bridges				
15	Bridge Files				
16	FC Bridges				
17	UW inspection procedures				
18	Scour Critical Bridges				
19	Complex Bridges				
20	QC/QA				
21	Critical Findings				
22	Inventory ** 99%				
23	Updating of Data				

** based on results of Field Review

Metric	Action Needed
17	create UW inspection procedure for dive bridges, include frequency