National Bridge Inspection Standards &
Bridge Maintenance Program Review
Lucas County
August 7, 2019

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

IN ATTENDANCE:

Bryan Zienta
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Lucas County personnel, reviews of inspection and inventory data, and reviews of Lucas County bridge records. The office evaluation assessed Lucas 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 Lucas 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
4830254	LUC C1571 00.800	153	1916	43'	4P	same
4831829	LUC C0564 00.220	112	1980	56'	7A	same
4830512	LUC C0086 03.290	231	2012	37'	9A	same
4830938	LUC C0043 03.990	111	1911	13'	4A	same
4832086	LUC C0005 01.040	231	1982	99'	8A	same
4830181	LUC C0032 08.18	171	2017	17'	9A	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:

https://www.govinfo.gov/content/pkg/CFR-2011-title23-vol1/pdf/CFR-2011-title23-vol1-part650-subpartC.pdf

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.

Lucas County has inspection responsibilities for 195 bridges, 120 of which are longer than 20 feet in length and 75 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 that 7 bridges had the NBIS designation Y/N possibly coded incorrectly. The county will have to check the f-f abutment distance and make corrections to Item 306 NBIS length.

The office review and the field review demonstrated that County personnel were inspecting and coding bridges in accordance with ODOT's Bridge Inspection Manual ("Manual").

Inspection Procedures

Lucas County uses their own staff to do the inspections. Previous inspection reports are available at site for review. The inspections are recorded in the field on an ODOT SMS System. Comments are recorded in SMS. Bridge comments are brought to the bridge. The previous inspection reports are available at site during review. Photos are available for every bridge and are taken of defects during inspections.

The County indicated that an average of 8 inspections per day were completed in 2018. For Truss (pony/through/deck) it takes about 1 hour. It takes 1-2 hours for Beam/Girders. SFN 4860101 may take 4-8 hours, however. For a slab, it takes 1 hour. For a Culvert, it takes 15 minutes plus travel time.

The County has 0 bridges that require a snooper for inspection.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Lucas County had 181+ bridges inspected in 2018. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually. There are 0 bridges that require inspection more frequently than one year. Bridge inspection frequency is determined by the Bridge Engineer. Frequency is based on the examination of current and anticipated conditions.

Qualification and Duties of Personnel

Mr. Keith Early is the County Engineer. As such he is the final authority on the bridge inspection program.

Mr. Bryan Zienta is the Program Manager, Reviewer, and Team Leader. Mr. Zienta is a P.E. and has 26+ years of inspection related experience. He took the Bridge Inspection Level 1 and Level 2 in 1994 and 2008. He took both levels again in 2012. He had a Bridge Inspection Refresher in 2017. Mr. Zienta is qualified as Program Manager, Program Reviewer, and Team Leader.

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 when compared to the Manual. Summary ratings correspond with the NBIS inspection items.

Inventory Items

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

- SFN 4830181
  - Item 575 Culvert Type should be 9 and not "N"
- SFN 4830512
  - Channel Alignment item c51 should be 2 and not 1, which would make the Channel Summary 6 and not 9
- SFN 4831829
  - The approach alignment Item 72 needs to be 8 and not 6
- SFN 4830253
  - Channel Alignment (c51) needs to be 2 and not 1. The Channel Summary needs to be 6 and not 7
  - Better comments need to be on the field report since the general appraisal = 4.
  - Approach alignment Item 72 needs to be 8 and not 6

Files

Lucas County keeps old paper copies (over 20 years old) of inspection reports in storage. The past 20 years worth are backed up on a network server and on CDs. Design Calculations are kept in older files in storage. Some are stored in computer files and backed up on a network server. Hard copies of plans are hung and stored in the office. All current plans have been scanned and are accessible on the network computer. Load analysis calculations are available in a 3 ring binder. Inventory forms are kept in storage. Photos are available for all bridges. Repairs and maintenance history are kept in files and on the computer network. The load rating report is on file as a hard copy and on the network in electronic format. The underwater inspection is kept in electronic format on the network computer, and a hard copy in the maintenance file for that bridge in the inspection program file. Almost all of the named ditches and streams have channel profiles kept on file in the County Engineer's Office.

Load Rating

The inventory shows 115 (100.00%) of the County bridges have been Load Rated or Load Rating was not applicable. There was 1 bridge evaluated by documented engineering judgement. A BR100 is available for the engineering judgment load rating.

Load Ratings were checked for SFNs 4830253, 4830903, 4831586, 4831004. The load posting at the bridge matched the load rating on all bridges. P.E. name and stamp were on all load ratings.

Load Posting
Lucas County has 1 bridge that is load posted (SFN 4830253). This is determined by analysis – consultant performed finite element analysis. There are 0 bridges that are closed for condition ratings. They use SHV signage. Posting is based on Operating Rating.

Special Features
Lucas County does not have any bridges that have special features.

Fracture Critical Bridges
Lucas County does not have any bridges labeled as a fracture critical bridge in the SMS. There are 0 bridges with gusset plates.

Underwater Inspections and Scour
There is 1 bridge (SFN 4860101) that require underwater inspections. There are 195 bridges considered scour susceptible and 194 bridges that are inspected by probing. The underwater inspection frequency is every 5 years or more frequent if necessary, as determined by previous inspections.

QA/QC
The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. The entire inventory was updated 10 years ago over a 2-year period and each bridge was load rated. As bridges are replaced or re-habilitated, the inventory is updated.

Inventory QA are performed during the inspection process yearly.

Critical Findings
The county does have a Critical Findings Procedure in place. Inspectors inform maintenance personnel of routine bridge maintenance problems with a written work order along with a verbal work order. If maintenance requiring immediate attention is identified, a call is made to County Maintenance personnel and followed up with a work order. If the problem doesn't require immediate attention, it is added to the list of maintenance items given to County Maintenance personnel annually. If a bridge requires emergency repairs it is noted as a separate work document. The emergency repair would begin and would be corrected before the inspection report was submitted. The Bridge Engineer/Bridge Inspector, the Traffic Engineer and if a problem is identified by Maintenance Personnel in the field is the one who checks proper placement of signs.

Bridge Maintenance
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 that all bridges had the NBIS designation Y/N coded correctly.

The County has maintenance responsibilities for 195 bridges, 120 of which are longer than 20 feet in length and 75 which are 10 feet to 20 feet in length. The County does force account bridge work as needed. The work includes painting, replacement, wearing surface replacement, pier encasements. The approximate annual budget is $645,000. Fed funds and credit bridge funds are both used.

The county uses in-house staff to do deck cleaning, pothole repair, guardrail repair, embankment slip repair, and crack sealing. The staff includes various county maintenance personnel. The approximate annual budget for in-house repairs and replacements is approximately $11,000.

Projects are identified and selected from previous year's bridge inspections depending on what funding is available and what nearby projects are scheduled. The plans for emergency repairs are prepared in house when needed or a simple work order is prepared. County Maintenance personnel is who does the emergency repairs. Repair work is documented by work orders or by contract documents. The Bridge Engineer, County Engineer or Deputy County Engineer is who orders emergency road closures. It is then followed up with a resolution by the County Commissioners.

CONCLUSIONS AND RECOMMENDATIONS

- SFN 4830181
  - Item 575 Culvert Type should be 9 and not "N"
- SFN 4830512
  - Channel Alignment item c51 should be 2 and not 1, which would make the Channel Summary 6 and not 9
- SFN 4831829
  - The approach alignment Item 72 needs to be 8 and not 6
- SFN 4830253
  - Channel Alignment (c51) needs to be 2 and not 1. The Channel Summary needs to be 6 and not 7
  - Better comments need to be on the field report since the general appraisal = 4.
  - Approach alignment Item 72 needs to be 8 and not 6
- SFN 4831446 needs to change the Bridge/Culvert Type Item 575 from N to 9
- 7 bridges had the NBIS designation Y/N possibly coded incorrectly. The county will have to check the f-f abutment distance and make corrections to Item 306 NBIS length.

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 ** 97%				
23	Updating of Data				

** based on results of Field Review

Metric	Action Needed