National Bridge Inspection Standards & Bridge Maintenance Program Review Hocking County October 01, 2019

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

IN ATTENDANCE:

Doug Dillon
Randy Keyes
William Shaw
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Hocking County personnel, reviews of inspection and inventory data, and reviews of Hocking County bridge records. The office evaluation assessed Hocking 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 Hocking 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
3730662	HOC C0002 01.500	231	1958	42'	5A	same
3731685	HOC T0098 00.500	121	2000	25'	7A	same
3740021	HOC C0003 00.850	195	1992	12'	6A	same
3734617	HOC T0561 00.010	121	1998	30'	7A	same
3730352	HOC C033A 00.300	231	1933	55'	6A	same
3732193	HOC T0047 00.010	231	1905	57'	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:
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.

Hocking County has inspection responsibilities for 260 bridges, 197 of which are longer than 20 feet in length and 63 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 all bridges had the NBIS designation Y/N coded correctly.

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

Hocking County uses their own staff to do the inspections. Previous inspection reports are available at site for review. A hard copy of the form is taken to each bridge. Notes and corrections are made in the field. Comments are recorded in SMS and on an inspection report form. They are also brought to the bridge. Bridge plans are carried to the bridge site for review and available at the bridge office. Photos are available for every bridge and are taken of defects during inspections.

The County indicated that an average of 4.1 inspections per day were completed in 2018. Truss is NA. It takes 1 hour for Beam/Girders. For a slab, it takes 1 hour. For a Culvert, it takes 30 minutes.

The County has 3 bridges that could use a snooper for inspection. They can access it with ladders although the snooper makes it much easier and safer.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Hocking County had 260 bridges inspected with 2 follow up inspections in 2018. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually. There are not any bridges that requires inspection more frequently than one year.

Qualification and Duties of Personnel

Mr. William Shaw is the County Engineer, is a PE, and as such, has the final authority over the bridge program.

Mr. Doug Dillon, P.E. and P.S., is the Program Manager and Reviewer. He has 12 years of inspection related experience. He took the ODOT Bridge Inspection Level 1 and 2 in the 1990s. He took a 3 Day Class in the Fall of 1988, and a Refresher Class in 1994. He took ODOT Advanced Structures in 2006 and a Refresher in 2019. He also took LRFD Concrete with a Refresher in 2019. Mr. Dillon is qualified as Program Manager and Reviewer.

Mr. Randall Keyes is a Team Leader. He has 34 years of inspection related experience. He took Bridge Inspection Level 2 in 2011. He took a 3 Day ODOT class along with Load Rating BARS PC & BRASS in 2008. He took Stream Stability and Scour at Highway Bridges in 2009. He took Scour at Highway Bridges in 2009 and Stability Factors and Concepts in 2009. He also took Element Level Bridge Inspection Course in 2016. Mr. Keyes is qualified to be a Team Leader.

William Shaw (PE 43706) is responsible for doing the Load Ratings.

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.

Inventory Items

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

- SFN 3731685
    - Scour code for item 113 should be 5 and not 8
    - The main member item 475 should be a “Beam” and not coded “other”
- SFN 3740021
    - Scour item 113 should be 5 and not 8
- SFN 3734617
    - Scour item 113 should be 5 and not 8
    - The main member item 475 should be a Beam and not coded “other”

Files

Hocking County keeps inspection reports, including old inspections, inventory forms, scour evaluations, and scour POA’s in the Inspector’s Office. Design calculations, Plans, Load Analysis Calculations, special inspection equipment or procedures with load ratings, and flood data are all kept in the Engineer’s Office. Photos and sketches are kept in the Inspector’s office on the computer and on a flash drive. Repairs and maintenance history are kept in the superintendent’s office. All records 3 years after bridge is removed. Load rating calculations is done 3 years after a new rating is done.

Load Rating
The inventory shows 197 (100.00%) of the County bridges have been Load Rated or Load Rating was not applicable. There were 4 bridges evaluated by documented engineering judgement.

Load Ratings were checked for SFNs 3734162, 3740323, 3731057. 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
Hocking County has 0 bridges that are load posted. There are 0 bridges closed for condition ratings. They use gross tonnage signage. Posting is based on Operating Rating.

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

Fracture Critical Bridges
Hocking County does not have any bridges that are Fracture Critical.

Underwater Inspections and Scour
There are 0 bridges require underwater inspections. There are 259 bridges considered scour susceptible and 259 bridges that are inspected by probing. All bridges over water are evaluated for scour during the inspection. All structures that are in less than 5 feet of water are checked by probing.

QA/QC
The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. Quality Assurance checks are checked during the inspection process. Inventory is checked for needed updates after bridge work and during the inspection process. Data entry within 180 days is input into SMS. Updated inventory data is forwarded to ODOT after the following – within 180 days of inspection when changes are discovered during inspection and ASAP after the work is complete when there are changes from new construction or rehab.

Inventory QA are performed during the inspection process yearly.

Critical Findings
The county does have a Critical Findings Procedure in place located in the SMS. Maintenance items are included in the annual inspection report. Inspectors inform maintenance personnel of routine bridge maintenance problems written and by email. Very minor items may be oral but not normally. Inspectors notify the Engineer and/or the Administrative Assistant when emergency repairs or critical findings are necessary. It is documented in the office. Office then tracks time, location, and materials that are used. It is noted on the inspection form comments especially if it involves scour countermeasures. If a bridge requires emergency repairs, it would be noted on the form and on a separate document. The Bridge Inspector checks proper placement of signs. They were instructed to use the SMS Critical Findings Report.

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.

Hocking County has maintenance responsibilities for 260 bridges, 196 of which are longer than 20 feet in length and 64 which are 10 feet to 20 feet long. The County does force account bridge work as needed. The work includes large bridge replacements. The approximate budget is $2.4 Million over 6 years. Fed funds are used for large structures only. Credit Bridge Funds are not used.

The county uses in-house staff that consists of 6 people, which increases or decreases as necessary. They use them to do pre-casting, erection, and replacements. The approximate annual budget for in-house repairs and replacements is approximately $400,000.

Projects are identified and selected by using a five-year plan as a guide, which may change as condition warrants. Plans are developed in house for emergency repairs. Direction is given to crews by the County Engineer. The county bridge crew does the work of the emergency repairs. Repair work is documented on the daily work records. The County Engineer and Administrative Assistant are both empowered to order emergency road closures. Closures are done by the sign crew.

CONCLUSIONS AND RECOMMENDATIONS

- SFN 3731685
  - Scour code for item 113 should be 5 and not 8
  - The main member item 475 should be a "Beam" and not coded "other"
- SFN 3740021
  - Scour item 113 should be 5 and not 8
- SFN 3734617
  - Scour item 113 should be 5 and not 8
  - The main member item 475 should be a Beam and not coded "other"

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