National Bridge Inspection Standards & Bridge Maintenance Program Review Muskingum County October 16, 2020

By: Mark Stockman, PE, PS
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IN ATTENDANCE:

Barbara Matheny
Bob Wilson
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Muskingum County personnel, reviews of inspection and inventory data, and reviews of Muskingum County bridge records. The office evaluation assessed Muskingum 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 checked during the field review were:

SFN	CTY-RTE-SECT	TYPE	County Rating	Suggested NBIS Rating
6046282	MUS T0114 00.660	Steel Beam	4	same
6048269	MUS C0082 00.240	Steel Culvert	7	same
6041316	MUS T0174 00.570	Concrete Slab	5	same
6046371	MUS T0156 01.750	Steel Beam	4	same
6047203	MUS T0155 00.330	Concrete Slab	5	same
6049192	MUS C0067 02.860	Steel Truss	4	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.

Muskingum County has inspection responsibilities for 407 bridges, 205 of which are longer than 20 feet in length and 202 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

Muskingum County uses their own staff to do the inspections. Previous inspection reports are available at site for review. Bridge inspections are recorded offline using Inspectech. Bridge comments are recorded on an Excel spreadsheet and are brought to the bridge. Bridge plans are not carried to the bridge site for review. Bridge plans are available on file at the Bridge Office. Photos are available for every bridge, and photos are taken of defects during inspection.

The County indicated that an average of 15 inspections per day were completed in 2020. Truss (pony/through/deck) takes 1 hour. It takes 0.5 hours for Beam/Girders. For a slab, it takes about 0.5 hours. For a Culvert, it takes about 0.5 hours.

The County has 14 bridges that require a snooper for inspection.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Muskingum County had 268 bridges inspected in 2020. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually. The Inspectors determines the need for a routine inspection frequency greater than once a year, based usually on the condition of the bridge, sometimes water levels.

There are 11 bridges that requires inspection more frequently than one year –

- 6033121 (inspected every 6 months)
- 6031307 (inspected every 6 months)
- 6034330 (inspected every 6 months)
- 6042147 (inspected every 6 months)

- 6030564 (inspected every 6 months)
- 6046282 (inspected every 6 months)
- 6037240 (inspected every 6 months)
- 6037674 (inspected every 6 months)
- 6049192 (inspected after cleaned)
- 6050212 (inspected when dry)
- 6044239 (inspected when dry)

Qualification and Duties of Personnel

Mr. Mark Eicher, PE – Mr. Eicher is the Program Manager. He is a PE and has 10 years of inspection related experience. Comprehensive class was in 2010 and is Compliant. Refresher class was in 2020 and is Compliant. All are uploaded to Asset Wise and approved.

Mr. Robert Wilson – Mr. Wilson is a Team Leader. He has 16 years of inspection related experience. Comprehensive class was 2005 and 2006. He completed a Legacy Grandfather clause checklist and it is Compliant. Refresher class was in 2021 and is Compliant. All are uploaded to Asset Wise and approved.

Mrs. Barb Matheny– Ms. Matheny is a Team leader. She is a PE and has 8 years of inspection related experience. Comprehensive class was in 2014 and is Compliant. Refresher class was in 2020 and is Compliant. All are uploaded to Asset Wise and approved.

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.

50 bridges were missing comments (rating was <6 and comment field was blank). 3 bridges had a scour rating lower than Sub or Culvert (scour should control Sub or Culvert rating) and one bridge had the scour rating 2 values lower than the Substructure. The county indicated that not all comments had been uploaded to AssetWise in the past. They were reminded that all ratings <6 need complete detailed comments uploaded to AssetWise.

Field Review

MUS-T0114-00.660_(6046282) Steel Beam

Ratings = ... Good

Photos = ... need better photos of piling to justify the rating of 4

Channel Photos = ... 2 photos - only 1 is good , other one is wrong angle

Comments= Notes for Substructure and Superstructure are required to be in AW. Need to add quantities and/or measurements

MUS-C0082-00.240_(6048269) Steel Culvert

Ratings = Good

Photos = Good

Channel Photos = 2 - Good

Comments= Notes for Culvert are required to be in AW. Need to add quantities and/or measurements

MUS-T0174-00.570_(6051316) Conc Slab

Ratings = Good

Photos = Good

Channel Photos = OK, cow in the way for other but should get a better one in future

Comments= Notes for Substructure and Channel are required to be in AW. Comments do not address Super or deck defects

MUS-T0156-01.750_(6046371) Steel Beam

Ratings = Good

Photos = GOOD

Channel Photos = 2 are good

Comments= Notes for Superstr, Substr and Channel are required to be in AW. Comments do not address the Sub or Channel. Add size of perfs in web at lower flange Bm 2.

MUS-T0155-00.330_(6047203) Conc Slab

Ratings = Good

Photos = Good

Channel Photos = 2 photos - wrong angle on 1

Comments= Notes for Deck, Superstr and Channel are required to be in AW. LES on Deck and super is good, Comments do not address channel defect.

MUS-C0067-02.860_(6049192) Steel Truss

Ratings = Good

Photos = None

Channel Photos = 2 - GOOD

Comments= Notes for Superstr, and Channel are required to be in AW. Need qty and/or measurements on section loss and perfo

Inventory Items

15 bridges did not have items 92a and 92b coded (FC required, UW required).

4 bridges had Items 63 and 65 (Op and Inv Method of Rating) that was different. They need to be the same.

Channel Photos need to be checked. Many are the wrong angle. The county indicated that channel photos are updated and most are in AssetWise. Only a few that are inaccessible are left to do. County will investigate using drones or taking multiple pictures to show all toe conditions from up and downstream.

Files

Muskingum County keeps all information and documents in Digital bridge files on local server, hard copy files in bridge files and inspector's files, and digital on ODOT Assetwise.

Load Rating

The inventory shows 204 (100.00%) of the County NBIS bridges have been Load Rated or Load Rating was not applicable. There were 28 bridges evaluated by documented engineering judgement.

Load Ratings were checked for SFNs 6046177, 6049192, 6044263, and 6046371. The load posting at the bridge matched the load rating on all bridges. P.E. name and stamp were on all of the bridges. Documentation was on all of the bridges.

Load Posting

Muskingum County has 57 NBIS bridges that are load posted. There are 0 bridges closed for condition ratings. They use a mix of engineering judgement and analysis to determine. R12-H5 and Gross Tonnage are the type of signs used for load posting.

Special Features

Muskingum County has 0 bridges that have special features.

Fracture Critical Bridges

The FC bridge inspection frequency is 24 months. SFN 6051111 and SFN 6040071 reviewed. They both have FCM's identified and Fatigue Prone details shown. The procedure was detailed for both bridges.

Underwater Inspections and Scour

There are 0 bridges require underwater inspections. There are 0 bridges over waterways considered scour susceptible and all bridges are inspected by probing. There are 0 bridges that are scour critical.

QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. The inventory quality assurance checks are performed by CEAO. Inventory data is input into the system through Asset Wise. Updated inventory data is forwarded to ODOT as it is completed and entered directly into their system. There are changes discovered during inspection, it is directly entered into their system also. Whenever changes are made during new construction or rehab, ODOT and others will be notified as it is completed.

Critical Findings

The county does have a Critical Findings Procedure in place located in the SMS. Inspectors inform Mark Eicher and Bridge Crew when emergency repairs or critical findings are necessary. They are documented in the POA file. If a bridge requires emergency repairs, it depends on if it was discovered by inspectors during inspections or by a complaint phoned in or damage caused by an event whether or not it is noted on the inspection report or a separate document. The sign installation staff checks proper placement of signs.

Bridge Maintenance

The County does contract bridge work as needed. The work includes bridges that are most likely to be funded and large enough to be worth being funded. (smaller bridges are not worth the trouble to use LBR funds) The approximate budget is $500,000. Fed Funds and Credit Bridge Funds are used.

The county does force account bridge work and uses in-house staff that consists of 4 full time bridge crew, 2 full time concrete bridge fabricators/ bridge crew, 4 in-house staff to design bridges and not repairs, and 1 full time surveyor. Typical work items include plate weld beams ends, new guardrail, new bridge markers, rip rap, abutment repair, patch deck. Full replacements in-house and superstructure in-house. The approximate budget is $500,000.

Maintenance Projects are identified on inspection spreadsheet. All bridges in need of repair or replacement are rated 1-4 on urgency. Most repairs are in-house by county bridge crew. Sub-contracted projects are most likely to be funded and large enough to be worth being funded. Plans are developed for emergency repairs varies based upon the type of emergency in-house and in the field. Mostly the in-house bridge crew are the ones who do emergency repairs. It is documented with daily diaries, and force account documentation. The Muskingum County Engineer are empowered to order emergency road closures.

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				
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 **				
23	Updating of Data				

** based on results of Field Review

Metric	Action Needed
12	Scour Rating should control Substructure or Deck

12	**NOTE - comments were not uploaded to AW in past, this metric is for future correction**