National Bridge Inspection Standards &
Bridge Maintenance Program Review
Richland County
October 10, 2020

By: Mark Stockman, PE, PS
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IN ATTENDANCE:

Chad Coward
Mark Stockman, CEAO Federal Bridge QA/QC Engineer
Adam Gove
Matt Christian

SCOPE OF REVIEW:

The review consisted of interviews with Richland County personnel, reviews of inspection and inventory data, and reviews of Richland County bridge records. The office evaluation assessed Richland 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
7031793	RIC C0207 0201	Steel Beam	3	4
7031246	RIC T0130 0289	Concrete Slab	3	4
7033761	RIC C0243 0075	Pres Box Beam	5	4
7035969	RIC C0057 0360	Steel Truss	3	same
7031033	RIC T0251 0016	Concrete Slab	5	same
7031076	RIC C0133 0233	Concrete Frame	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.

Richland County has inspection responsibilities for 359 bridges, 184 of which are longer than 20 feet in length and 175 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

Richland County uses their own staff to do the inspections. Previous inspection reports are available at site for review. Bridge inspections are recorded electronically in the field on laptop via AWAR. Comments are recorded on AWAR inspector comments. They are brought to the bridge. Bridge plans are carried to the bridge site for review if necessary. Bridge plans are available on file at the Bridge Office. Some older structures do not have plans. Photos are available for every bridge, and photos are taken of defects during inspection.

The County indicated that an average of 10 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 0.4 hours. For a Culvert, it takes about 0.3 hours.

The County does not have any bridges that require a snooper for inspection.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Richland County had 359 bridges inspected in 2019. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually. The Program Manager and Team Leader have discussions to determine the need for a routine inspection frequency greater than once a year based on GA Score and the condition of bridge. There is 1 bridge that requires inspection more frequently than one year. (Snake Rd, BLO-TR224-0.60). It is inspected every 6 months.

Qualification and Duties of Personnel

Mr. Adam Gove is the Program Manager and Reviewer. He is a PE and has 17 years of inspection related experience. Refresher in 2017 is approved and uploaded to AssetWise. The

Grandfather clause is approved and uploaded to AssetWise. He is qualified to be the PM and Reviewer.

Mr. Chad Coward is the Reviewer and Team Leader. He is a PE and has 8 years of inspection related experience. Refreshers in 2016 and 2021 are approved and uploaded to AssetWise. Comprehensive classes ODOT L1&2 in 2012 are approved and uploaded to AssetWise. He is qualified to be the Team Leader and Reviewer.

Mr. Matt Christian is a Team Member. He has had 2 years of inspection related experience. Refresher is not taken yet. Comprehensive classes L1&2 were taken in 2018 and have been uploaded to AssetWise.

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.

Channel Comments were found to be partially inadequate, more detail showing Location Extent and Severity should be used when the rating is <6. RIC-T0045-0003 _(7032218) had a scour rating that was lower than the substructure rating and the scour should have controlled the substructure rating.

Field Review (Detailed comments in "Remarks" document)

RIC-C0207-0201 _(7031793) Steel Beam

Substructure = 3 => rating should be 4

Photos = Condition photos are OK as showing the problems,

but you should update them since they are 2017.

Channel photos are not OK

1 upstream photo is taken from under the bridge, not from stream looking at bridge. Downstream photos are too close. This is OK to show detail, but we need an overall downstream photo. One overall downstream is showing total bridge but is taken from the bank, not the stream.

NOTE – if you accept the Substr rating of 4, this raises the GA to 4. We don't want to affect funding so you may leave it at a 3.

Bridge does not show posting in AssetWise. Load rating indicates should be EV posted?

GA = 3 => should be 4

RIC-T0130-0289 _(7031246) Conc Slab

Deck =3 => should be rating of 4

Add comment to "see superstructure comments "

Superstructure = 3 => should be rating of 4

A rating of 3 requires that local failures (thru holes) are possible. I didn't see that on this bridge. We can discuss this, but I think a rating of 4 matches the book better. Also, around the state this would be a 4, not a 3.

Photos = OK

Channel photos = not OK

Downstream photos needs to be from the channel, not from the bank, and the upstream photos are missing

GA = 4 => OK

RIC-C0243-0075 _(7033761) Pres Box Beam

Superstructure = 5 = > Probably should be rated 4.

need to know # of strands in beam to be sure. 16%-25% strands exposed = rating of 5.

Substructure = 5 => should be 4

based on BIM " corrosion holes in 3 piles" = condition rating 4. Your comments call out holes in top of 3 piles. I also found a hole in the bottom of pile #4 in addition to the one at the top.

NOTE – this would make the GA=4

Photos =+> OK for conditions, Not for channel

Overall, Pixs are ok of beam and piling. But the channel photos do not have an upstream view, and need to add a downstream showing total waterway opening (in case of sandbar in the middle or something). Existing downstream photos are good, but too close. Keep the close ones and add another farther back

GA = 5 => should be 4

RIC-C0057-0360 _(7035969) Steel Truss

Ratings => OK

Comments and photos are OK for condition rating.

Channel Photos are not correct.

downstream and detail photos are good, but upstream photos are missing.

GA = 3 => OK

RIC-T0251-0016 _(7031033) Conc Slab

Channel = 5 => rating could be 6

might want to code 6 since scour is rated 6 and channel is not really showing "major damage". Add comments for Channel to support 5 rating, such as scour length and depth at NW corner. Add pictures to show Channel condition if you keep it a 5

GA = 5 => OK

RIC-C0133-0233 _(7031076) Conc Frame

Deck = 5 => should be 4

Comments in deck need to be duplicated (or referred to) in Superstructure comments.

Super comments still call out delam and no spalling.

Photos = OK for condition

Channel Photos = not needed because Non-NBIS bridge

GA = 4 => OK

Inventory Items

During the Files review, the following inventory items were identified and discussed with the county:

- Item 92A is missing Y/N Switch – RIC-T0258-0040 (7031093)

Numerous channel photos were reviewed and were found to have several problems. Many were lacking photos upstream and downstream and were taken from under the structure looking out instead of from the channel looking at the bridge. These need to be corrected.

Files

Richland County keeps all information and documents in the 2 upright file cabinets. Inspection reports, including old inspections, along with Load Analysis Calculations, Photos and Sketches, Repairs and Maintenance History, Scour POA's, Fracture Critical Reports, Load Posting/Closing Reports, Special Inspection Reports, and Flood Data are all kept in the Bridge Files . Design Calculations are kept in the vault with project files. Scour evaluations are kept on the inspection form. Inventory forms are kept AWAR.

Load Rating

The inventory shows 184 (100.00%) of the County NBIS bridges have been Load Rated or Load Rating was not applicable. There were 15 bridges evaluated by documented engineering judgement.

Load Ratings were checked for SFNs 7030576, 7031793, 7032677, 7033761. The load posting at the bridge matched the load rating on all bridges except one. P.E. name and stamp were on all of the bridges. Documentation was on all of the bridges.

Br100 was reviewed for TR-130-2.89 (7031246). This is a NBI bridge, so the EV box should be checked. There isa BR100 for all engineering judgment bridges.

Load Posting
Richland County has 40 NBI bridges that are load posted. No bridges are closed for condition ratings. They use a mix of engineering judgment and analysis. R12-H5 signs are used.

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

Fracture Critical Bridges
The FC bridge inspection frequency is yearly. SFN 7031432 and SFN 7035969 FC files were reviewed. They both had FCM's identified. However, they both need to show the Fatigue Prone details and had the inspection procedure was only partially detailed. The county was advised to use Inspection Manual Appendix D & E for guidance.

Underwater Inspections and Scour
There are 0 bridges require underwater inspections. There are not any structures over waterways considered scour susceptible and approximately 357 bridges 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. Quality Assurance checks are reviewed and done as a field review of structures with a GA of 4 or less. Inventory is checked during inventory Items spot checks during inspections and done when the inventoried item changes. Updated inventory data needs to be forwarded to ODOT within 180 days. The inventory data is input into the system by AWAR. It is then forwarded to ODOT when there are changes discovered during inspection or new construction or rehab.

Critical Findings
The county does have a Critical Findings Procedure in place located in the SMS. Maintenance problems are identified on the written work orders. Inspectors inform the Highway and Bridge Superintendent when emergency repairs or critical findings are necessary with a written and verbal work order. If a bridge requires emergency repairs, it would be noted on the field inspection comments and work order. The Bridge Inspector and Engineer are the ones that check proper placement of signs.

Bridge Maintenance

Richland County does force account bridge work as needed. The county uses in-house staff that consists of 3-4 highway workers and others as needed. Typical work items include a combination of complete replacements and super/substructure repairs. The approximate budget is $200,000.

The county uses contracts to do replacements. The budget is $600,000 and federal funds and credit bridge funds are used.

Projects are identified and selected based on GA rating, road type, traffic volume, detour length, and expected life of existing structure. Plans are developed for emergency repairs

during discussions with the County Engineer on severity, cost, work orders, and past history of similar repairs. Depending on the project, county crews or contractors are the ones who do the work of the emergency repairs. Repair work is documented on time cards, sketches, plans, and pictures. When there are emergency road closures, highway superintendent, foreman, staff engineers, and bridge inspectors are empowered to do the closings.

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
16	Supply FC Insp Procedure for each FC bridge