National Bridge Inspection Standards &
Bridge Maintenance Program Review
Licking County
August 4, 2021

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

IN ATTENDANCE:

Jared Knerr, Licking County Engineer
Mark Sherman, CEAO Federal Bridge QA/QC Engineer
Mark Stockman, CEAO Federal Bridge QA/QC Engineer Omar Abu-Hajar, ODOT
Bill Evans, Licking County
Jared Backs, ODOT
Kenny Tong, FHWA

SCOPE OF REVIEW:

The review consisted of interviews with Licking County personnel, reviews of inspection and inventory data, and reviews of Licking County bridge records. The office evaluation assessed Licking County's organization, procedures, resources, and documentation regarding the inspection, inventory, and maintenance operations for bridges. In addition, field reviews of 6 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 Licking County to represent a variety of structure types and conditions. The bridges checked during the field review were:

Asset Name	Bridge Type	County Rating	NBIS Rating
LIC-C0002-0390_(4534735)	Steel Pony Truss	3	Agreed
LIC-T0067-0200_(4532988)	Concrete Tee beams	5	Agreed
LIC-T0207-0005_(4532856)	Steel Pony Truss	4	Agreed
LIC-C0539-0005_A(4536150)	Prestressed Box Beams	4	Agreed
LIC-C0138-0115_(4533682)	Steel Beam	4	Our rating 5
LIC-C0040-0080_(4536193)	Concrete Cont. Slab	5	Agreed

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.

Licking County has inspection responsibilities for **433** bridges, **226** of which are longer than 20 feet in length and **207** 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:

Licking County Supplements their own staff to do the inspections. Utilizing Popa Consultants. Previous inspection reports are available at site for review. The previous year's inspection reports are on paper and transferred to AssetWise in the office. Bridge comments are recorded in the inspection form. Bridge plans are available in the office. Photos are available for every bridge, and photos are taken (if needed) of defects during inspection and posted in Assetwise.
The County has **0** bridges that require a snooper.
A Team Leader is present at routine inspections.

Frequency of Inspections (Metric 6 & 7)

Ohio State Transportation Laws require all State and local bridges to be inspected annually.
Licking County had **433** 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 Engineer determines the need for a routine inspection frequency greater than once a year, based on inspections and history.
There are no bridges that require inspection more frequently than one year.
Licking County had 13 bridge overdue for Fracture Critical inspection at the time of this field review. (However, this bridge (**LIC-T0306-0015 _(4539044)**) has been closed and will not have a FC inspection.

METRIC 6 Insp. Frequency Routine							
Bridge Inspections Overdue			# OVERDUE		% PASS	COMPLIANCE	
Data Tab	NBIS -	24 months	0		100.0%	(C)	
Col. AB	ORC -	Calendar Year	0		100.0%	(C)	
	BIM -	18 months	0		100.0%	(C)	
METRIC 8 - Insp. Frequency Underwater							
Dive Inspections Overdue			# OVERDUE	# UW	% PASS	COMPLIANCE	
Data Tab Col. Z		60 months	0	0	100.0%	(C)	
METRIC 10 - Insp. Frequency FC Member							
FC Inspections Overdue			# OVERDUE	# FC	% PASS	COMPLIANCE	
Data Tab Col. Y		24 months	1	33	99.6%	(SC)	LIC-T0306-0015 _(4539044) Bridge has been closed for over a year. (Compliant)

From Snapshot Files

Qualification and Duties of Personnel (metric 2)

Name of individual who is the **Program Manager** (makes final decision). List qualifications/yrs. experience (bridge inspection experience)

(Metric 1&2)

- Name: Jared Knerr
- Yrs. Inspection related experience: PE, bridge inspection certification, 9 years
- List courses attended (& approx dates)

Bridge Inspection Level 1 Basic Nov 12-14 2013
Bridge Inspection Level 2 Advanced Dec 17-19 2013
Bridge Inspection Refresher 8/9/2017;
BrR Load Rating Nov 7-8 2018

Name of individual in charge of bridge inspection unit (**Reviewer**). List qualifications/yrs. experience (bridge inspection experience)

(Metric 1)

- Name: Jared Knerr
- Yrs. Inspection related experience: _See above_____
- List courses attended (& approx dates) _____

Team Leader - individual in charge of bridge inspection team (INSPECTED BY). List qualifications/yrs. experience (bridge inspection experience)

(Metric 1&3)

- Name: Bill Evans
- Yrs. Inspection related experience: 8
- List courses attended (& approx dates)
    1) FHWA-NHI-130101 Introduction to Safety Inspection of In-service Bridges Dec 21 2015
    2) FHWA-NHI-130055 Safety Inspection of In-service Bridges Jan 25-Feb 5 2016
    3) BrR Load Rating Dec 5-6 2018
    4) Bridge Inspection Refresher Training Nov 20, 2020
    5) Bridge Inspection Updates Webinar Mar 23, 2021

Load Rating Engineer – Name of individual responsible for load ratings (must be PE)
Jared Knerr (Metric 4)

a. List Ohio PE # 65546.

Popa Consultant PEs also used via contract for load rating and FC inspections

Resume' on file

Underwater Bridge inspector: NA

Inspection Reports (metric 12)

As part of this review, eight bridges were field reviewed to compare conditions with the most recent inspection report. The individual condition ratings for all of the field sampled 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.

Field Review:

LIC-C0002-0390_(4534735) Steel Pony Truss

Item 58 Deck…… 3 Agreed
Item 59 Superstructure……3 Agreed
Item 60 Substructure……6 Agreed
Item 61 Channel……6 Agreed
Item 61.01 Scour……7 Agreed
Item 62 Culvert……N
Item 36 Railing…….. 0 0 0 0 Agreed
Item 72 Approach Alignment …….. 5 Agreed

Comments: Comments are generally good. Need to be more specific on some of them. Be sure to include the Location Extent and severity. Sometimes the location or extent was vague.
(*Bridge Programed for replacement.)*

Defect Photos: Excellent photos of defects in Assetwise file!
Channel Photos: Good Channel Photos in Assetwise

LIC-T0067-0200_(4532988) Concrete Tee beams

Item 58 Deck…… 5 Agreed
Item 59 Superstructure……5 Agreed
Item 60 Substructure……5 Agreed
Item 61 Channel……5 Agreed
Item 61.01 Scour……**5** Agreed
Item 62 Culvert……N
Item 36 Railing…….. 0 0 0 0 Agreed
Item 72 Approach Alignment …….. **6** Agreed

Comments: Very Good Comments in general. You gave Location Extent and severity numbers.
Defect Photos: Very Good defect photos as well.
Channel Photos: Your file photos were better than what I was able to take.

LIC-T0207-0005_(4532856) Steel Pony Truss

Item 58 Deck…… 5 Agreed
Item 59 Superstructure……4 Agreed
Item 60 Substructure……7 Agreed
Item 61 Channel……7 Agreed
Item 61.01 Scour……7 Agreed
Item 62 Culvert……N
Item 36 Railing…… 0 0 0 0
Item 72 Approach Alignment …… 6 Agreed
Comments: Great Comments
Defect Photos: Excellent Photos of defects
Channel Photos: Good Photos in Assetwise

LIC-C0539-0005_A(4536150) Prestressed Box Beams

Item 58 Deck…… 4 Agreed
Item 59 Superstructure……4 Agreed
Item 60 Substructure……5 Agreed
Item 61 Channel……5 Agreed
Item 61.01 Scour……6 Agreed
Item 62 Culvert……N
Item 36 Railing …… 0 0 0 0
Item 72 Approach Alignment …… 8 Agreed.
Comments: Excellent Comments
Defect Photos: Excellent Photos
Channel Photos: **(Measurements on File)**

LIC-C0138-0115_(4533682) Steel Beam

Item 58 Deck……4 Agreed
Item 59 Superstructure……5 Agreed
Item 60 Substructure……**5** Agreed
Item 61 Channel……5 Agreed
Item 61.01 Scour……4 Agreed
Item 62 Culvert……N
Item 36 Railing…… 0 0 0 0 Agreed
Item 72 Approach Alignment ……8 Agreed
Comments: Some Great Comments, like the one below about beam #7 (even better if dimensions were included.) Others need a little more
Defect Photos: Great Photos, like the one below that accompanied the comment above. The white paint really makes the defect stand out! (They would be even better if you had something in there to demonstrate the scale like a hammer or ruler. It is hard to gage the size and extent of section loss without something to give some scale.)
Channel Photos: Acceptable photos in Assetwise

LIC-C0040-0080_(4536193) Concrete Cont. Slab

Item 58 Deck…….. 4 Agreed
Item 59 Superstructure……5 Agreed
Item 60 Substructure…….4 Agreed
Item 61 Channel……..5 Agreed
Item 61.01 Scour……..7 Agreed

Item 62 Culvert……N
Item 36 Railing…….. 0 0 0 0
Item 72 Approach Alignment …….. 8 Agreed

Comments: Comments in general are pretty good, but a few, like those below need that LES touch
The slab has leaching coming through some longitudinal cracks 4 ft in from edges. Looked more extensive…need better measurements.
The construction joint is leaching and spalling. The south span has 3 areas of longitudinal spalls with 1 bar visible in each. Where, and how much of the bar is exposed, for how long? How big are the spalls areas? Need a % of deck area.
North span spalled in 6 areas with 6 bars showing. Ditto above.

Defect Photos: Good photos. I like the photo with the hammer in there for scale. It is good to match up. some of the photos with the comments about the defects to help paint a more complete picture of the bridges condition.

Channel Photos: Barely Acceptable, the 2018 photos in Assetwise do not really show enough of the channel relative to the abutments. Channel measurements may be better suited for this structure

Metric 12 snapshot table: see Comments TAB in Snapshot files

METRIC 12 - Routine Inspection							
Field Ratings		**# > +/-1**	**# Ratings**	**% PASS**		**COMPLIANCE**	
	field ratings	**0**	**24**	100.0%		(C)	
Comments		**Missing**	**# < 6**	**% PASS**			See Comments TAB 6 of the 10 bridges
Tab	Comments when Rating < 6	10	225	95.6%		(C)	LIC-C020
		Error	**Total Scour**	**% PASS**			LIC-C013
Comments	Rating should be = Scour	34	224	84.8%	within tolerance +/- 1		See Comments TAB
Tab	Noncompliant Scour Rating Err	8	224	96.4%		(C)	See Comments TAB column AB

Inventory Items

Review of the bridge data showed **10** out of **225** bridges were missing comments when the rating was <=5. This requirement became effective Nov of 2020. **34** bridges should have Scour governing the substructure rating. **See Comments TAB in Snapshot EXL file:** And **8** of those bridges have a disparity of 2 or more change in points for scour**. SFNs: LIC-C0204-0010_(4535928); LIC-T0029-0020_(4535200); LIC-T0225-0100_(4530918); LIC-C0138-0115_(4533682); LIC-C0041-0090 _(4537920); LIC-T0290-0120_(4536703)**

Bridge Files (metric 15)

Licking County keeps files listed below as follows:

All of the following are kept in electronic format and paper format unless noted.

• . Describe filing system (where files are kept): **(Metric 15)**

- Inspection reports, including old inspections: Digital and paper
- Design Calculations - Digital and paper
- Plans - Digital and paper
- Load analysis calculations - Digital and paper
- Inventory forms - Digital and paper
- Photos and sketches - Digital and paper
- Repairs and maintenance history - Paper
- Scour evaluation - Digital and paper
- Scour POA
- Fracture Critical File - Digital and paper
- Load Posting/Closing – Digital in master list
- Underwater inspections
- Special inspection eqpt. or procedures In AssetWise
- Flood data, waterway adequacy, channel cross sections - Paper

Note the NBIS Retention period: BR-86 report 10 years, All records 3 years after bridge removed, Load rating calculations 3 years after a new rating is done.

Load Rating (metric 13)

The inventory shows 226 (100.00%) of the County NBIS bridges have been Load Rated or Load Rating was not applicable. There are 15 NBIS bridges evaluated by documented engineering judgement using the BR100 form.

Load Ratings were checked for **SFNs 4532856; 4531086; 4536193; 4536150.** 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. BR100 form is available for all engineering judgment bridges.

Zero NBIS bridges have not load rated.

See Snapshot files for details

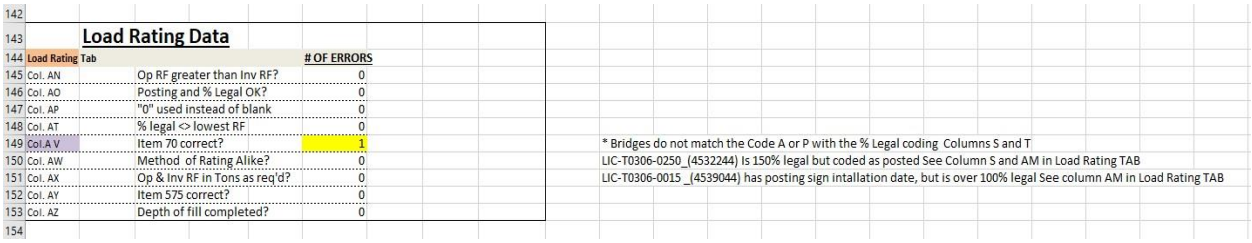
5	**METRIC 14 - Posting**	Load rating data tab			
6	**From Files review**	**# errors**	**#sampled**	**% PASS**	**COMPLIANCE**
7	Op RF < 3 tons but not closed	0	226	100.0%	(C)
8	Op RF = 0 but not closed	0	226	100.0%	(C)
9	% Legal < 100 but not posted	0	226	100.0%	(C)
10	Item 41 = B	0	226	100.0%	(C)
11					

From Snapshot files

Load Posting (metric 14)

Licking County has **30** NBIS bridges that are load posted. There is **0** bridges closed for condition ratings. Posting is based on Operating Rating. R12-H5 signs are the type of sign used for load posting.

The County has 1 bridge that is posted, but no posting date entered in Assetwise for sign installation.



Load Rating Data		
Load Rating Tab		# OF ERRORS
Col. AN	Op RF greater than Inv RF?	0
Col. AO	Posting and % Legal OK?	0
Col. AP	"0" used instead of blank	0
Col. AT	% legal <> lowest RF	0
Col. A V	Item 70 correct?	1
Col. AW	Method of Rating Alike?	0
Col. AX	Op & Inv RF in Tons as req'd?	0
Col. AY	Item 575 correct?	0
Col. AZ	Depth of fill completed?	0

* Bridges do not match the Code A or P with the % Legal coding Columns S and T
LIC-T0306-0250_(4532244) Is 150% legal but coded as posted See Column S and AM in Load Rating TAB
LIC-T0306-0015 _(4539044) has posting sign intallation date, but is over 100% legal See column AM in Load Rating TAB

From Snapshot Files

There is **1** bridge where the % legal (Item 41) does not match the Posting code A or P (Item 734 See Column S & T in the Load Rating TAB

LIC-T0306-0250_(4532244)

There are 0 bridges rated 3 or less that are not closed.

Special Features: There are **0** bridges with unique or special features.

Fracture Critical Bridges (Metric 16)

Licking County has **33** bridges that are fracture critical. The FC bridge inspection frequency is 12 months, done with routine annual inspections.

FC plans for **SFN 4532856; 4531086** were reviewed and the FCMs identified.

Gusset Plate calculations were satisfactory for **SFN 4532856; 4531086**.

Underwater Inspections and Scour: (metric 9 & 17) **NA**

QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. The Inventory items are checked and updated during annual inspections.

Critical Findings (Metric 21)

The county currently does not have any critical findings, but does have a Critical Findings Procedure in place (using the ODOT inspection manual). The county engineer is the bridge inspector and develops the plans for emergency
work.

Bridge Maintenance (From Questionnaire)

The County does contract bridge work. The typical work is for large bridges, replacements and repairs. Fed Funds are sometimes used for bridge deck replacement and Credit Bridge Funds are used for bridge replacements. The annual budget varies from year to year but averages **$1.0M** for Contract work.

The county does force account bridge work and uses highway maintenance crews as needed. Typical work items include all repairs and medium replacements. The annual budget for force account work is approximately **$150K.**

The chart below is a review of the 23 Metrics used to measure NBIS compliance and the chart represent 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 (Adhering to approved PCA)
(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
10	10 overdue FC bridges needing inspection
6	3 routine inspected bridge overdue for inspection by 18 months