

National Bridge Inspection Standards & Bridge Maintenance Program Review

Gallia County

August 17, 2021

By: Mark Sherman, PE

CEAO Federal Bridge QA/QC Engineer

IN ATTENDANCE:

Brett Boothe, Gallia County Engineer

Mark Sherman, CEAO Federal Bridge QA/QC Engineer

Jason Popa, Consultant

Omar Abu-Hajar, ODOT

Alexis Bogen, FHWA

SCOPE OF REVIEW:

The review consisted of interviews with Gallia County personnel, reviews of inspection and inventory data, and reviews of Gallia County bridge records. The office evaluation assessed Gallia County's organization, procedures, resources, and documentation regarding the inspection, inventory, and maintenance operations for bridges. In addition, field reviews of 8 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 Gallia County to represent a variety of structure types and conditions. The bridges checked during the field review were:

<u>Asset Name</u>	<u>Bridge Type</u>	<u>County Rating</u>	<u>NBIS Rating</u>
GAL-C0089-03.250_(2739763)	Steel Beam	5	Agreed
GAL-T0687-00.670_(2740893)	Steel Culvert	4	Agreed
GAL-T0465-00.920_(2742861)	Steel Beam	4	Agreed (possible 3)
GAL-C0003-08.610_(2743426)	Steel Pony Truss	5	Agreed
GAL-C0029-04.410_(2742780)	Steel Pony Truss	4	Agreed
GAL-C0088-00.010_(2735369)	Concrete Arch	5	Agreed
GAL-C0065-00.540_(2742381)	Concrete Slab	5	Agreed
GAL-T0420-00.000_(2742330)	Steel Through Truss	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.

Gallia County has inspection responsibilities for **279** bridges, **143** of which are longer than 20 feet in length and **136** 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:

Gallia County supplements their own staff with Popa Consultants to do the inspections. 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.

Gallia County had **276** 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.

Gallia County had **0** bridges overdue for Fracture Critical inspection at the time of this field review.

METRIC 6 Insp. Frequency Routine						
Bridge Inspections Overdue			# OVERDUE	% PASS	COMPLIANCE	
Data Tab	NBIS -	24 months	4	97.1%	(SC)	
Col. AB	ORC -	Calendar Year	4	97.1%	(SC)	
	BIM -	18 months	4	97.1%	(SC)	
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	0	20	100.0%	(C)

(OK no issue) 3 are Conveyors, 1 is a closed Flyash pipe

From Snapshot Files

Qualification and Duties of Personnel

Program Manager:

Brett Boothe, Gallia County Engineer

List qualifications/ yrs. Experience.

20 years.

List courses attended (& approx. dates).

Not on file with ODOT

Team Leader and Team Reviewer and Load Rating Engineer:

Jason Popa PE, Consultant: Ohio PE # 60606

List qualifications/ yrs. experience (bridge inspection experience)

30 yrs. Experience

List courses attended (& approx. dates).

The University of Akron, Bachelors of Science - Civil Engineering, 1991

ODOT Comprehensive Bridge Inspection Seminar – 1995

ODOT Bridge Inspection Training Level 2 – 2006

ODOT Scour Assessment Training – 2008

FHWA LRFR Load Rating - 2008

ODOT Load Rating Hand Calculations - 2009

ODOT Manual of Bridge Inspection Update – 2011

ODOT Bridge Inspection Refresher Training – 2011

ODOT Culvert Inventory and Inspection - 2014

ODOT Structure Management System Training – 2013

FHWA NHI Fracture Critical Techniques for Steel Bridges Training – 2013

FHWA Introduction to Element Level Inspection - 2014

ODOT Culvert Inventory and Inspection - 2015

FHWA NHI Bridge Maintenance Training - 2015

MDOT AASHTOWare Bridge Load Rating Training - 2017

ODOT Bridge Inspection Refresher Training - 2017

ODOT AASHTOWare Bridge Load Rating Training – 2019

FHWA NHI Safety Inspection of In-Service Bridges - 2020

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:

GAL-C0089-03.250_(2739763)

Steel Beams

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....5 Agreed within 1 pt. It is becoming a 4 quickly as the loss of section appears to be significant in the webs of the interior beams near the abutments.
- Item 60 Substructure.....5 Agreed
- Item 61 Channel.....7 Agreed
 - Item 61.01 Scour.....6 Agreed
- Item 62 Culvert.....N
- Item 36 Railing..... 0 0 0 0 Agreed
- Item 72 Approach Alignment 8 Agreed within 1 pt. the NE approach has a decent curve and traffic does slow down a little. See Table See Approach Item discussion in manual.

Comments: Very Good Comments in Assetwise.
 Defect Photos: Very Good Photos in Assetwise.
 Channel Photos: Photos in Assetwise are acceptable, however they can be greatly improved if taken when vegetation is not obscuring the abutments.

GAL-T0687-00.670_(2740893)

Steel Culvert

- Item 58 Deck..... N
- Item 59 Superstructure.....N
- Item 60 Substructure.....N
- Item 61 Channel.....5 Agreed
 - Item 61.01 Scour.....6 Agreed
- Item 62 Culvert.....4 Agreed
- Item 36 Railing..... 0 0 0 0 Agreed
- Item 72 Approach Alignment 4 Agreed

Comments: Good comments. A little on the brief side.
 Defect Photos: Great defect photos in Assetwise.
 Channel Photos: Good Channel Photos

GAL-T0465-00.920_(2742861)

Steel Beams

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....6 Agreed
- Item 60 Substructure.....4 Agreed within 1 pt. Stone separation has increased since last comments. This could easily be a 3 and should probably have a monitoring system in place.
- Item 61 Channel.....6 Agreed
 - Item 61.01 Scour.....7 Agreed
- Item 62 Culvert.....N
- Item 36 Railing..... 0 0 0 0
- Item 72 Approach Alignment 8 (Based on geometry and proximity of approach curve, I recommend an 7 rating.)

Comments: Good Comments in general
 Defect Photos: Very good Defect Photos in Assetwise

Channel Photos: Channel photos are acceptable

GAL-C0003-08.610_(2743426) Steel Pony Truss

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....5 Agreed
- Item 60 Substructure.....5 Agreed
- Item 61 Channel.....6 Agreed
 - Item 61.01 Scour.....7 Agreed
- Item 62 Culvert.....N
- Item 36 Railing 0 0 0 0
- Item 72 Approach Alignment 4 Agreed

Comments: Good, but brief Comments need to be more specific with respect to Location Extent and severity.

Defect Photos: Expected a little more in the way of Defect Photos to compliment comments

Channel Photos: Vegetation is preventing a very good photo representation on the downstream side. Upstream side looks good.

GAL-C0029-04.410_(2742780) Steel Pony Truss

- Item 58 Deck.....5 Agreed
- Item 59 Superstructure.....5 Agreed
- Item 60 Substructure.....4 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 6 Agreed

Comments: Very Good Comments

Defect Photos: Expected more Defect Photos, particularly concerning the abutments

Channel Photos: Very Good Channel Photos

GAL-C0088-00.010_(2735369) Concrete Arch-Deck

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....5 Agreed
- Item 60 Substructure.....6 Agreed
- Item 61 Channel.....5 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 minimal, but accurate

Defect Photos: Need more Defect Photos in Assetwise.

Channel Photos: Good Channel Photos

GAL-C0065-00.540_(2742381) Concrete Slab

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....6 Agreed
- Item 60 Substructure.....5 Agreed
- Item 61 Channel.....5 Agreed
 - Item 61.01 Scour.....6 Looks like some wide spread undermining or abutment scour going on.

Could easily be a 5 or 4 depending on measurements

Item 62 Culvert.....N
Item 36 Railing..... 0 0 0 0 Agreed
Item 72 Approach Alignment 8 Agreed
Comments: [Good comments in Assetwise](#)
Defect Photos: [Good Defect Photos in Assetwise.](#)
Channel Photos: [Good Channel Photos](#)

[GAL-T0420-00.000_\(2742330\)](#) Steel through Truss with Steel beam approach spans

Item 58 Deck..... 4 Agreed
Item 59 Superstructure.....5 Agreed
Item 60 Substructure.....5 Agreed
Item 61 Channel.....7 Agreed
Item 61.01 Scour.....6 Agreed
Item 62 Culvert.....N
Item 36 Railing..... 0 0 0 0 Agreed
Item 72 Approach Alignment 6 Agreed
Comments: [Good Comments in Assetwise](#)
Defect Photos: [Good Defect Photos in Assetwise.](#)
Channel Photos: [Acceptable Channel Photos](#)

Inventory Items

Review of the bridge data showed **7** out of **141** bridges were missing comments when the rating was <=5. This requirement became effective Nov of 2020. **4** bridges should have Scour governing the substructure rating. **SFNs: GAL-C0180-05.900_(2738325); GAL-T0432-00.200_(2742039); GAL-T0268-01.070_(2736772); GAL-C0180-05.900_(2738325).** And **0** of those bridges have a disparity of 2 or more change in points for scour.

Office Files: (metric 15)

Gallia County keeps files listed below as follows:

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

- Inspection reports, including old inspections
- Design Calculations
- Plans
- Load analysis calculations
- Inventory forms
- Photos and sketches
- Repairs and maintenance history
- Scour evaluation **N/A**
- Scour POA **N/A**
- Fracture Critical File
- Load Posting/Closing
- Underwater inspections **N/A**
- Special inspection eqpt. or procedures **N/A**
- Flood data, waterway adequacy, channel cross sections

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 **141 (100.00%)** of the County NBIS bridges have been Load Rated or Load Rating was not applicable. There are **9** NBIS bridges evaluated by documented engineering judgement using the BR100 form.

Load Ratings were checked for **SFNs 2743426; 2742780; 2738260**. 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.

Zero bridges had Oper. ratings equal to the Inv. rating. Column AM in the Load Rating Tab of Snapshot file.

Zero Bridges have the %legal load not tied to the lowest Load Rating Factor

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. AV	Item 70 correct?		0
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

From Snapshot files

Load Posting (metric 14)

Gallia County has **26** NBIS bridges that are load posted. There is **1** bridge 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 **28** bridges that are posted, but no posting date entered in Assetwise for sign installation. See Load Rating TAB column AM highlighted in Pink (ITEM 70.01)

There are **0** bridges 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

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

METRIC 14 - Posting	Load rating data tab				
From Files review	# errors	#sampled	% PASS	COMPLIANCE	
Op RF < 3 tons but not closed	0	136	100.0%	(C)	
Op RF = 0 but not closed	0	136	100.0%	(C)	25 bridges missing date of posting signs in Assetwise See Load Rating TAB column AM Item 70.01
% Legal < 100 but not posted	0	136	100.0%	(C)	
Item 41 = B	0	136	100.0%	(C)	

From Snapshot files

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

Fracture Critical Bridges (Metric 16)

There are 20 FC bridge in Gallia County. The FC bridge inspection frequency is 12 months, done with routine annual inspections.

FC plans for **SFN 2743426; 2742780**, were reviewed and found to be satisfactory.

Gusset Plate calculations were satisfactory for **SFN 2742780** and found to be satisfactory.

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

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.

Comments: From the field inspection report reviews, the comments were generally complete and accurate, however, in a few instances more detail comments were warranted. Need to elaborate on the Location, Severity and Extent. From the Snapshot Assetwise data review, only a handful of bridges were missing comments.

METRIC 12 - Routine Inspection		**(from files examination)						
Field Ratings	# > +/-1	# Ratings	% PASS	COMPLIANCE				
field ratings	0	24	100.0%	(C)	GAL-C0180-05.310_(2738309)	GAL-T0709-00.060_(2740915)	GAL-T0902-00.0300_(2738635)	
Comments	Missing	# < 6	% PASS		GAL-C0146-00.590_(2743477)	GAL-C0100-00.020_(2738961)	GAL-C0109-01.090_(2740451)	GAL-C0146-00.590_(2743477);
Tab	Comments when Rating < 6	7	141	95.0%	(C)	7 bridges above missing channel comments the rest of the bridges missing scour comments have them in the NBI Item 60.		
	Inadequate comments**	2	30	93.3%	(C)	GAL-C0065-00.540_(2742381) Scour rating should be closer to a 4 which impacts the substructure rating		
	Error	Total Scour	% PASS		GAL-T0465-00.920_(2742861) Abutment condition warrants a 3 but is within 1 point so OK			
Comments	Rating should be = Scour	4	132	97.0%	within tolerance +/- 1	GAL-C0180-05.900_(2738325); GAL-T0432-00.200_(2742039); GAL-T0268-01.070_(2736772); GAL-C0180-05.900_(2738325)		
Tab	Noncompliant Scour Rating Err	0	132	100.0%	(C)	Scour over rules Substructure in the 4 bridges noted above		

From Snapshot files

Channel Photos: Channel Photos in Assetwise were generally good. A few had vegetation obstructions, or were at a poor angle.

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 **\$0 - \$2M** 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 **\$200K - \$500K**

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
- (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

Action Items for Gallia County:

Metrics 13&14 Add posting sign installation dates.

