National Bridge Inspection Standards &
Bridge Maintenance Program Review
Morrow County
April 29, 2021

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

IN ATTENDANCE:

Don Glosser, Morrow Deputy County Engineer
Mark Sherman, CEAO Federal Bridge QA/QC Engineer
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Morrow County personnel, reviews of inspection and inventory data, and reviews of Morrow County bridge records. The office evaluation assessed Morrow 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 Mark Sherman to represent a variety of structure types and conditions. The bridges checked during the field review were:

Asset Name	Bridge Type	County Rating	Suggested NBIS Rating
MRW-T0215-0020805_(5932378)	Steel Truss	3	Agreed
MRW-C0206-0111719_(5932580)	Steel Beams	5	Agreed
MRW-T0208-0140629_(5932955)	Metal Culvert	5	Agreed
MRW-T0210-0005712_(5930928)	Steel Beams	3	Agreed
MRW-C0219-0069824_(5934419)	Masonry Arch	4	Agreed
MRW-T0224-0072004_(5932408)	Concrete Tee Beam	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.

Morrow County has inspection responsibilities for **352** bridges, **179** of which are longer than 20 feet in length and **173** 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:

Morrow County uses their own staff to do the inspections. Previous inspection reports are available at site for review. The previous year's inspection reports on Android Tablets 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.
43 bridges were lacking comments for items rated less than or equal to 5.

Frequency of Inspections (Metric 6 & 7)

Ohio State Transportation Laws require all State and local bridges to be inspected annually.
Morrow County had **352** 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 **8** bridges that require inspection more frequently than one year.

SFN 5931533	**CR149**	**4 – 6 months**
SFN 5933250	**CR61**	**4 – 6 months**
SFN 5932602	**TR221**	**4 – 6 months**
SFN 5932378	**TR215**	**3 – 4 months**
SFN 5932858	**TR208**	**4 – 6 months**
SFN 5932734	**CR146**	**4 – 6 months**
SFN 5930812	**CR57**	**4 – 6 months**
SFN 5932610	**CR30**	**3 – 4 months**

At the time of this revised data review Morrow County had **3** bridges overdue for inspection.
MRW-C0022-0482522_(5933706)
MRW-T0215-0020805_(5932378)
MRW-T0178-0321224_(5933048)

Qualification and Duties of Personnel (metric 2)

Program Manager: & Reviewer: - Name: _ **Don Glosser, PE – County Bridge & Drainage Engineer**
- Yrs. Inspection related experience: __**43 years of experience, including 17 years of bridge inspection field experience.**

- List courses attended (& approx dates) _
ODOT Bridge Inspection training courses in the 1980's.

ODOT Bridge Inspection Refresher Training – 2011.
ODOT Bridge Inspection Level 1 & 2 – 2012.
ODOT SMS Training -2013.
ODOT Bridge Inspection Refresher Training – 2017.

- Indicate the percentage of time spent on the listed duties in the previous year

%TIME
35% Bridge/Culvert inspection
10% Bridge Design/Plan prep
10% Bridge Construction
5% Bridge Maintenance
_____ Overload/Superload
5% Surveying
35% Other – **Drainage Engineer**
_____100%

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

(Metric 1&3)
Bart Dennison, PE, PS – County Engineer
- Yrs. Inspection related experience: _ **22 years of experience, including 12 years of bridge inspection field experience.**

- List courses attended (& approx dates) _____**ODOT Bridge Inspector Refresher Training - 2011**

Team Member of bridge inspection team (Include information for each additional team member – copy and paste as needed). List qualifications/yrs. experience (bridge inspection experience)

- Name: __ **Brian Seybert – Assistant Engineer**
- Yrs. Inspection related experience: _**Associates Degree in Civil Engineering – 1993 (Univ. of Toledo); 25 years engineering experience w/1 year of bridge inspection field experience.**
- List courses attended (& approx dates) __**None – (Will be scheduled for next available ODOT Bridge Inspection Level 1 & 2 courses)**

- Indicate the percentage of time spent on the listed duties in the previous year

%TIME
5% Bridge/Culvert inspection
25% Bridge Design/Plan prep
_____ Bridge Construction
_____ Bridge Maintenance
_____ Overload/Superload
25% Surveying
55% Other - **County Operations**
_____100%

Team Member of bridge inspection team (Include information for each additional team member – copy and paste as needed). List qualifications/yrs. experience (bridge inspection experience)

- Name: __ **Scott Benson – Assistant County Road Superintendent**
- Yrs. Inspection related experience: __ **18 years bridge construction experience at the county level.**
- List courses attended (& approx dates) __ **None – (Will be scheduled for next available ODOT Bridge Inspection Level 1 & 2 courses)**

- Indicate the percentage of time spent on the listed duties in the previous year

%TIME
10% Bridge/Culvert inspection
_____ Bridge Design/Plan prep
40% Bridge Construction
50% Bridge Maintenance**/Road Maintenance**

Load Rating Engineer – Name of individual responsible for load ratings (must be PE) **(Metric 4)** **County Bridge & Drainage Engineer – Don Glosser, PE**

a. List Ohio PE # __ **48573**

Underwater Bridge inspector: N/A

Inspection Reports (metric 12)

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 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:

MRW-T0215-0020805_(5932378) Steel Truss
Item 58 Deck…….. 5 Agreed (deck wear area calculations may lower this to a 4)
Item 59 Superstructure……4 Agreed
Item 60 Substructure…….3 Agreed (Loss of bearing support area is a concern, especially since the abutment is unreinforced.)
Item 61 Channel……..5 Agreed
Item 61.01 Scour……..6 Agreed
Item 62 Culvert……N
Item 36 Railing……1 N 1 N (Should be 0 0 0 0 (not up to current Standards))
Item 72 Approach Alignment …….. 7 Agreed
Comments: While you have comments that are somewhat descriptive, it would be much better if they were more precise with measurements. Like your deck comments.
Defect Photos: Very good Defect Photos
Channel Photos: Needs to be taken at a better angle as to get both abutments in view, or use multiple imaging

MRW-C0206-0111719_(5932580) Steel Beam
Item 58 Deck…….. 5 Agreed
Item 59 Superstructure……5 Agreed
Item 60 Substructure…….5 Agreed (within 1 pt. tolerance, we suggest a 7)
Item 61 Channel……..6 Agreed
Item 61.01 Scour……..7 Agreed

Item 62 Culvert……N

Item 41 Posted…….. P 20 tons Your percentage does not match the posting. You need to change your rating method to Engineering Judgement, if you are going to post lower than what you are calculating the load rating to be.

Item 36 Railing …… 0 0 0 0 Agreed

Item 72 Approach Alignment …… 8 Agreed

Comments: Good, but could be better with more of a concentration of location, extent and severity.

Defect Photos: Defect Photos are somewhat lacking in detail and completeness.

Channel Photos: Channel Photos meet the minimum. Pulling back a bit would better capture the channel and its relationship to the bridge.

MRW-T0208-0140629_(5932955) Steel Culvert

Item 58 Deck…….. N

Item 59 Superstructure……N

Item 60 Substructure…….N

Item 61 Channel……..7 Agreed

Item 61.01 Scour……..6 Agreed

Item 62 Culvert……..5 Given the extent of the severity shown in the photos below and the area affected, we would give this pipe a rating of 4 or less, but you are within the 1pt tolerance.

Item 36 Railing…….. 0 0 0 0 Agreed

Item 72 Approach Alignment …… 7 Agreed

Comments: See previous comments

Defect Photos: No Defect Photos could use them to reinforce your condition rating.

Channel Photos: Acceptable Channel Photos

MRW-T0210-0005712_(5930928) Steel Beams

Item 58 Deck…….. 5 Agreed

Item 59 Superstructure……6 Agreed

Item 60 Substructure…….3 Agreed

Item 61 Channel……..5 Agreed

Item 61.01 Scour…….4 Agreed

Item 62 Culvert……..N

Item 36 Railing…….. 0 0 0 0 Agreed … need to put up barrels of something, as railing is useless.

Item 72 Approach Alignment …… 6 Agreed

Comments: See previous comments (We understand it is scheduled for replacement next year.)

Defect Photos: No Defect Photos could use them to reinforce your condition rating.

Channel Photos: Good Channel Photos

MRW-C0219-0069824_(5934419) Masonry Arch bridge

Item 58 Deck……..N

Item 59 Superstructure……4 Agreed

Item 60 Substructure…….5 Agreed

Item 61 Channel……..4 Agreed Need Comments

Item 61.01 Scour…….6 Agreed

Item 62 Culvert……..N

Item 36 Railing…….. N N 0 0 Should be 0 0 0 0 (not up to current Standards)

Item 72 Approach Alignment …… 7 Agreed

Comments: Good Comments in general, but lacking comments for the Channel rating of 4.

Defect Photos: Good Defect Photos, but could be better in the location and extent area.

Channel Photos: Good channel Photos

MRW-T0224-0072004_(5932408) Concrete Tee-beam

Item 58 Deck…….. 6 Agreed
Item 59 Superstructure……5 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 Agreed
Item 72 Approach Alignment …….. 7 Agreed
Comments: Need more Comments
Defect Photos: Good Defect Photos, some labeling of them would be more beneficial.
Channel Photos: Channel Photos looking away from the bridge, not toward the bridge

Comments: In general the field comments and Defect photos needed to be improved.
The data check in Assetwise yielded similar results, as show below.

METRIC 12 - Routine Inspection						
Field Ratings		**# > +/-1**	**# Ratings**	**% PASS**	**COMPLIANCE**	
	field ratings	**0**	**24**	100.0%	(C)	
Comments		**Missing**	**# < 6**	**% PASS**		
Tab	Comments when Rating < 6	43	173	75.1%	(NC)	Too many fields lacking comment where required. See Comments TAB
		Error	**Total Scour**	**% PASS**		
Comments	Rating should be = Scour	28	171	83.6%	within tolerance +/- 1	28 bridges have scour controlling the Substructure condition rating. See Comments TAB
Tab	Noncompliant Scour Rating Err	9	171	94.7%	(C)	9 bridges have scour 2 or more points below Sub. See Comments TAB

From Snapshot file

Channel Photos: Channel Photos were a mixed bag. Some good some looking the wrong way and others missing altogether. Need to make the channel photos a priority.

Inventory Items

Review of the bridge data showed **43 out of 173** bridges were missing comments in the scour item when the rating was <=5, and review of the 6 bridges in the field showed 4 bridges where comments were incomplete, missing sufficient detail with LES described in AssetWise when the rating was 5 or lower. This requirement became effective Nov of 2020.

Bridge Files (metric 15)

Morrow County keeps files listed below as follows: Inspection reports, inventory values, inspection photos, inspection sketches, and channel cross section information is stored within ODOT's Assetwise database, with the originals in physical office files. (From Questionnaire)

- Inspection reports, including old inspections **Physical bridge files and computer files.**
- Design Calculations **Physical bridge files and computer files.**
- Plans **Physical bridge files and computer files.**
- Load analysis calculations **Physical bridge files and computer files.**
- Inventory forms **Physical bridge files, computer files and AssetWise.**
- Photos and sketches **Physical bridge files and computer files.**
- Repairs and maintenance history **Physical bridge files and computer files.**
- Scour evaluation **NA**
- Scour POA **NA**

- Fracture Critical File **Physical bridge files and computer files.**
- Load Posting/Closing **Physical bridge files and computer files.**
- Underwater inspections **NA**
- Special inspection eqpt. or procedures
- Flood data, waterway adequacy, channel cross sections **Physical bridge files and computer files.**

Load Rating (metric 13)

The inventory shows 179 (100.00%) of the County NBIS bridges have been Load Rated or Load Rating was not applicable. There are 22 NBIS bridges evaluated by documented engineering judgement using the BR100 form.

Number of NBIS length bridges not load rated **(Metric 13)** **None.**

List the NBIS length bridges considered "not ratable" including reason for being considered "not ratable" **(Metric 13)** **None.**

Number of NBIS length bridges load posted **(Metric 14)** **39**

List bridges closed due to condition rating (rough check) **8**

List bridges rated less than 100% Ohio legal load and not physically load posted, and resolution **None**

Number of NBIS bridges with Gusset Plates analyzed. **(Metric 13)** **17**

Load Ratings were checked for **SFNs 5930472 and 5931037.** 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.

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?	5
Col. AW	Method of Rating Alike?	0
Col. AX	Op & Inv RF in Tons as req'd?	4
Col. AY	Item 575 correct?	0
Col. AZ	Depth of fill completed?	0

You have 33 bridge that are posted with no sign installation date entered into Assetwise Field 70.01

MRW-C0206-0111719_(5932580)
MRW-T0092-0015539_(5930707)
MRW-C0019-0164811_(5930650)
MRW-T0055-0157510_(5932653)
MRW-C0149-0036920_(5931533)
The 5 bridges above are not coded correctly. See Load Rating TAB Columns AV and S&T

MRW-C0179-0294528_(5933412); MRW-T0110-00.41 _(5931968)
MRW-C0184-0173 _(5930903); MRW-T0191-0432819_(5930421)
The 4 bridges above load factors are to be in tons using the method coded in Column X

(From Snapshot file)

Load Posting (metric 14)

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

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

Fracture Critical Bridges (Metric 16)

The FC bridge inspection frequency is 12 months, done with routine annual inspections.

FC plans for **SFN 5931037** was reviewed and the FCM's identified.

Gusset Plate calculations were satisfactory for **SFN 5931037** . The aforementioned Fracture critical analysis for the bridge and gusset plates was performed by Richland Engineering Ltd.

Underwater Inspections and Scour (metric 9 & 17)

Morrow County has two bridges that require dive inspections. SFNs 0936871 (2019); 0935360 (2020) by Terracon
Both have been inspected with in FHWA parameters.

METRIC 16 - Fracture Critical Inspection				
From Files review	**Missing**	**# FC**	**% PASS**	**COMPLIANCE**
Fract Critical Member ID	0	2	100.0%	(C)
Fatigue Prone Detail	0	2	100.0%	(C)
Gusset Plate Calculations	0	2	100.0%	(C)
FC Inspection Procedure	0	2	100.0%	(C)
METRIC 17 - Underwater Inspection				
From Files review	**Missing**	**# UW**	**% PASS**	**COMPLIANCE**
UW Inspection Procedure	0	1	100.0%	(C)
Location of UW elements	0	1	100.0%	(C)
UW frequency identified	0	**1**	100.0%	(C)

From Snapshot file

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 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 for Contract work is **$350,000-$450,000.**
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 **$200,000.00.**

The chart on the following page is a review of the 23 Metrics used to measure NBIS compliance and the charts 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 needed in the following Metrics:

Metric 1& 2 Don Glosser needs to be Program manager. Bart can only be team leader until all of the training can be documented or retaken.

Metric 10 & 12 & 14 2021 Bridge inspections need to get caught up.
Assetwise bridge data needs to be cleaned up. See Load Rating TAB and Comments TAB
Many bridge need Channel photos added or improved and uploaded into Assetwise