

**National Bridge Inspection Standards &
Bridge Maintenance Program Review
Warren County**

September 29, 2021

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

IN ATTENDANCE:

Neil Tunison, County Engineer
Mark Sherman, CEAO Federal Bridge QA/QC Engineer
Roy Henson, Warren County
Dominic Brigano, Warren County
Omar Abu-hajar, ODOT
Alexis Bogen, FHWA

SCOPE OF REVIEW:

The review consisted of interviews with Warren County personnel, reviews of inspection and inventory data, and reviews of Warren County bridge records. The office evaluation assessed Warren County’s organization, procedures, resources, and documentation regarding the inspection, inventory, and maintenance operations for bridges. In addition, field reviews of 7 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 Warren 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
WAR-T0095-0177_(8332606)	Concrete Slab	5	Agreed
WAR-T0071-0039_(8334439)	Prestressed Box Beam	4	Agreed
WAR-T0081-0122_(8334463)	Steel Beam	5	Agreed
WAR-T0084-0085_(8334412)	Aluminum Arch Culvert	5	Agreed
WAR-C0010-0070_(8334358)	Steel Arch Culvert	5	Agreed
WAR-C0156-0150_(8333289)	Steel Pony Truss	7	May be a 6
WAR-T0216-0050_(8333777)	Steel 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.

Warren County has inspection responsibilities for **389** bridges, **187** 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:

Warren 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 **22** bridges that require a snooper, only 4 have had a snooper inspection..

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.

Warren County had **389** 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 one bridge **SFN = 8334439** that requires inspection more frequently than one year. (3 months)
Warren County has no bridges overdue for inspection.

Qualification and Duties of Personnel (metric 2)

Program Manager: & Reviewer:

Roy Henson – Bridge Engineer with approval from County Engineer or Chief Deputy Engineer.

- **Yrs. Inspection related experience:** PE with 18 years of inspection, inventory, and management of County bridges

- **List courses attended (& approx. dates)**

ODOT Bridge Inspection Level 1 (2-25-05),
ODOT Bridge Inspection Level 2 (6-16-11),
ODOT Scour Analysis (2008), ODOT Bridge Inventory Training (June 2010),
ODOT SMS Training (2-6-13),
FHA Element Level Bridge Inspection (4-15-14),
ODOT Bridge Inspection Refresher Training (6-21-17)

Team Leader:

Dominic Brigano – Assistant Bridge Engineer

- **Yrs. Inspection related experience:** PE with 11 years of inspection, inventory, and management of County bridges

- **List courses attended (& approx. dates)**

ODOT Bridge Inspection Level 1 (5-19-11),
ODOT Bridge Inspection Level 2 (6-16-11),
ODOT Bridge Inventory Training (June 2010),
ODOT SMS Training (2-6-13),
FHA Element Level Bridge Inspection (4-15-14),
ODOT Bridge Inspection Refresher for Element Level (8-27-15),
ODOT Bridge Inspection Refresher Training (6-21-17)

Chad Harville – Project Technician

- **Yrs. Inspection related experience:**

3 years of inspection for County bridges

- **List courses attended (& approx. dates)**

ODOT Bridge Inspection Level 1 (8-30-18),
ODOT Bridge Inspection Level 2 (9-27-18)

Milo Banta – Bridge Inspector & Highway Department Employee

- **Yrs. Inspection related experience:**

3 years of inspection for County bridges

- **List courses attended (& approx. dates)**

ODOT Bridge Inspection Level 1 (8-30-18),
ODOT Bridge Inspection Level 2 (9-27-18)

Load rating Engineer:

. **List Ohio PE # Roy Henson #69153 & Dominic Brigano #80169**

Underwater Bridge inspector:

- **Name:** Consultant from Collins Engineers, Inc. – Brian Dilworth, PE

- **Yrs. Inspection related experience:** 15 years

- **List courses attended (& approx. dates)**

National Highway Institute Underwater Bridge Inspection (May 2007)

National Highway Institute Safety Inspection of In-Service Bridges (August 2015)

Inspection Reports (metric 12)

As part of this review, **seven** 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:

WAR-T0095-0177_(8332606) Concrete Slab

- Item 58 Deck..... 5 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 Agreed
- Item 72 Approach Alignment 8 *(Somewhat poor visibility on the approach, should be closer to a 6. See Manual for description guide.)*

Comments: [Very good Comments](#)
Defect Photos: [Very good Defect Photos](#)
Channel Photos: [Very Good Photos](#)

WAR-T0071-0039_(8334439) Prestressed Box Beam

- Item 58 Deck..... 4 Agreed
- Item 59 Superstructure.....4 Agreed
- Item 60 Substructure.....8 Agreed
- Item 61 Channel.....8 Agreed
 - Item 61.01 Scour.....7 Agreed
- Item 62 Culvert.....N
- Item 36 Railing..... 0 0 0 0 Agreed
- Item 72 Approach Alignment 7 *(Based on geometry and manual guide this should be a 4 or 5)*

Comments: [Excellent Comments](#)
Defect Photos: [Very good Defect Photos](#)
Channel Photos: [Acceptable Channel Photos](#)

WAR-T0081-0122_(8334463) Steel Beams

- Item 58 Deck..... 7 Agreed
- Item 59 Superstructure.....5 Agreed
- Item 60 Substructure.....5 Agreed
- Item 61 Channel.....6 Agreed
 - Item 61.01 Scour.....5 Agreed
- Item 62 Culvert.....N
- Item 36 Railing..... 0 0 0 0
- Item 72 Approach Alignment 6 *(Based on geometry and manual guide this should be a 4)*
- Item 71 Waterway Adequacy8 Agreed

Comments: [Excellent Comments](#)
Defect Photos: [Very good Defect Photos](#)
Channel Photos: [Great Channel Photos](#)

WAR-T0084-0085_(8334412) Aluminum Arch Culvert

Item 58 Deck..... N
Item 59 Superstructure.....N
Item 60 Substructure.....N
Item 61 Channel.....6 Agreed
Item 61.01 Scour.....7 Agreed
Item 62 Culvert.....5 Agreed
Item 36 Railing..... N N 0 0 Agreed
Item 72 Approach Alignment 6 Agreed
Comments: Excellent Comments
Defect Photos: Very good Defect Photos
Channel Photos: Good Channel Photos

WAR-C0010-0070_(8334358) Steel Culvert

Item 58 Deck.....N
Item 59 Superstructure.....N
Item 60 Substructure.....N
Item 61 Channel.....6 Agreed
Item 61.01 Scour.....5 (Footing embedded in solid limestone rock, should be more like a 7)
Item 62 Culvert.....5 Agreed
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: Very good Comments
Defect Photos: Very good Defect Photos
Channel Photos: Good Channel Photos

BUT-C0053-0177_(0934569) Steel Culvert

Item 58 Deck..... N Agreed
Item 59 Superstructure.....N Agreed
Item 60 Substructure.....N Agreed
Item 61 Channel.....6 Agreed
Item 61.01 Scour.....5 Agreed
Item 62 Culvert.....5 Agreed
Item 36 Railing..... N N 1 1
Item 72 Approach Alignment 7 Agreed
Comments: Very good Comments
Defect Photos: Very good Defect Photos
Channel Photos: Very Good Photos

WAR-C0156-0150_(8333289) Simple span Steel pony truss

Item 58 Deck..... 5 Deck rusting is wide spread and asphalt is visible in several places, rating is a 4.(but is within the 1pt tolerance rule.)
Item 59 Superstructure.....7 Stringers appear to be losing section now. Need measurements to confirm. This may be a 6, if proven section loss.
Item 60 Substructure.....7 Agreed
Item 61 Channel.....8 Agreed
Item 61.01 Scour.....7 Agreed
Item 62 Culvert.....N

Item 36 Railing..... 0 0 0 0 (not up to current Standards)
Item 72 Approach Alignment 6 Agreed
Comments: Very good Comments
Defect Photos: Very good Defect Photos
Channel Photos: Very Good (Photos)

WAR-T0216-0050_(8333777) Steel Beams

Item 58 Deck..... 6 Agreed
Item 59 Superstructure.....8 Agreed
Item 60 Substructure.....5 Agreed
Item 61 Channel.....6 Agreed
Item 61.01 Scour.....5 Agreed
Item 62 Culvert.....N
Item 36 Railing..... 0 0 0 0
Item 72 Approach Alignment 8 Agreed
Comments: Very good Comments
Defect Photos: Very good Defect Photos
Channel Photos: Very Good (Photos)

Inventory Items

Review of the bridge data showed **3 out of 185** bridges were missing comments in the scour item when the rating was ≤ 5 , and review of the **7** bridges in the field showed **0** 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)

Warren County keeps files listed below as follows: Inspection reports, including old inspections (Bridge Plans Electronic Folder)

- Design Calculations (Bridge Project Electronic Folder)
- Plans (Bridge Plans and Bridge Project Electronic Folders)
- Load analysis calculations (Bridge Plans and Bridge Project Electronic Folders)
- Inventory forms (AssetWise)
- Photos and sketches (Bridge Replacement List, Bridge Plans, and Bridge Project Electronic Folders)
- Repairs and maintenance history (Bridge Maintenance List Electronic Folder)
- Scour evaluation (Bridge Plans Electronic Folder)
- Scour POA (Bridge Plans Electronic Folder – when needed)
- Fracture Critical File (Bridge Plans Electronic Folder)
- Load Posting/Closing (Bridge Plans Electronic Folder)
- Underwater inspections (Bridge Plans Electronic Folder)
- Special inspection eqpt. or procedures (Bridge Plans Electronic Folder)
- Flood data, waterway adequacy, channel cross sections (Bridge Plans and Bridge Project Electronic Folders)

Load Rating (metric 13)

The inventory shows **187 (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.

Load Ratings were checked for **SFNs 8332266; 8331783; 8334773**. 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.

Two NBIS bridges **SFNs 8333793; 8332564** not load rated due to indefinite closures.

Load Posting (metric 14)

Warren County has **21** NBIS bridges that are load posted. There are **3** bridges closed for condition ratings. Posting is based on Operating Rating. **R12-H5** signs are the type of sign used for load posting.

[Sherod Road Bridge #220-0.37, SFN = 8333793](#)

[Cold Springs Road Bridge #945-0.02, SFN = 8332564](#)

[Waynesville Road Bridge #39-8.24, SFN = 8331669](#)

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 8333289; 8334102** were reviewed and the FCM's identified.

Gusset Plate calculations were satisfactory for both **SFNs 8333289; 8334102**

Underwater Inspections and Scour (metric 9&17)

Warren County has **7** bridges that require dive inspections. **SFNs 8335184; 8334269; 8331367; 8333475; 8335001; 8330573; 8335125**

One bridge **SFN# 8335184** file was reviewed and has been inspected with in FHWA parameters.

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 **\$1,250,000.00** 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 **\$350,000.00**.

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

