

# National Bridge Inspection Standards & Bridge Maintenance Program Review Medina County

July 16, 2021

(October 14<sup>th</sup> 2021 Data update)

By: Mark Sherman, PE

CEAO Federal Bridge QA/QC Engineer

## IN ATTENDANCE:

Andy Conrad, Medina County Engineer

Mark Sherman, CEAO Federal Bridge QA/QC Engineer

Emry Hollopeter, Medina County

Matt Sigler, County

Mike Brokaw, ODOT

Alexis Bogen, FHWA

## SCOPE OF REVIEW:

The review consisted of interviews with **Medina** County personnel, reviews of inspection and inventory data, and reviews of **Medina** County bridge records. The office evaluation assessed

**Medina** 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 **Medina** 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>
<a href="#">MED-C0035-0164_(5233917)</a>	Prestressed Box Beams	3	Agreed
<a href="#">MED-T0028-0160_(5233682)</a>	Steel Beam	4	Agreed
<a href="#">MED-T0102-0219_(5235065)</a>	Timber slab	5	We believe a 6 is more accurate
<a href="#">MED-C0019-0404_(5233437)</a>	Concrete slab	5	Agreed
<a href="#">MED-T0118-0408_(5238773)</a>	Steel Culvert multi-cell	5	Agreed
<a href="#">MED-C0140-0238_(5235391)</a>	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.

**Medina County** has inspection responsibilities for **289** bridges, **119** of which are longer than 20 feet in length and **170** 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:**

**Medina County** uses their own staff 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.

**Medina County** had **289** 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.

Medina 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	0	100.0%	(C)	MED-SMITH-RR02_(5266106) Railroad Bridge not to be rated
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	0	3	100.0%	(C)

From Snapshot files

**Qualification and Duties of Personnel** (metric 2)

**Program Manager:**

Andy Conrad, Medina County Engineer

List qualifications/yrs. Experience.

10 years.

List courses attended (& approx dates).

Bridge Inspection Level 1 & Level 2 – 2017

Bridge inspection Updates/Refresher 3/23/2021

**Team Reviewer ad Load Rating Engineer:**

Andy Conrad: Ohio PE # 68225

List qualifications/yrs. experience (bridge inspection experience)

10 yrs. Experience

List courses attended (& approx. dates).

See above

**Team Leader**

Matt Sigler

- Yrs. Inspection related experience:

9 years.

- List courses attended (& approx. dates)

Bridge Inspection level 1- 2017 & Level 2- 2018

**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:**

MED-C0035-0164\_(5233917) Prestressed Concrete boxes

Item 58 Deck..... 4 Agreed

Item 59 Superstructure.....3 Agreed

Item 60 Substructure.....3 Agreed

Item 61 Channel.....na

Item 61.01 Scour.....na

Item 62 Culvert.....N

Item 36 Railing..... 0 0 0 0 Agreed

Item 72 Approach Alignment ..... 7 Agreed

Comments: Comments in Assetwise need to be added to Assetwise.

Defect Photos: Some photos in Assetwise, but need more, especially the defect photos.

Channel Photos: NA over RR

**(NOTE: this bridge is slated for replacement next year)**

**MED-T0028-0160\_(5233682)** Steel Beam

- 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 Agreed
- Item 72 Approach Alignment ..... 7 Agreed

Comments: **Your locations of defects are good, but the extent and severity need more attention. L.E.S. is a good thing.**

Defect Photos: **Your office example files show a great deal of photos and details for those bridges, that make for a complete file. Would like to see some of those make it into Assetwise.**

Channel Photos: **File Photos are great, plus you have channel x-sections! Need them added in Assetwise.**

**MED-T0102-0219\_(5235065)** Timber Slab

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....5 Agreed within 1 pt. We would have gone with a 6 on this one using table 39.
- Item 60 Substructure.....5 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 ..... 8 Agreed

Comments: **Good Comments**

Defect Photos: **See previous comments.**

Channel Photos: **See previous remarks.**

**MED-C0019-0404\_(5233437)** Concrete Slab

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....5 Agreed
- Item 60 Substructure.....7 **Controlled by Scour, needs to be a 6**
- Item 61 Channel.....7 Agreed
  - Item 61.01 Scour.....6 Agreed
- Item 62 Culvert.....N
- Item 36 Railing ..... 0 0 0 0
- Item 72 Approach Alignment ..... 5 **Based on discussion in Manual for this item we would rate this a 7.**

Comments: **Good, but brief Comments**

Defect Photos: **See previous comments.**

Channel Photos: **See previous remarks**

**MED-T0118-0408\_(5238773)** Steel Culvert multi-cell

- Item 58 Deck.....N
- Item 59 Superstructure.....N
- Item 60 Substructure.....N
- Item 61 Channel.....7 Agreed
  - Item 61.01 Scour.....7 Agreed

Item 62 Culvert.....5 Agreed  
 Item 36 Railing..... 0 0 0 0 Agreed  
 Item 72 Approach Alignment ..... 7 Agreed  
 Comments: Good Comments  
 Defect Photos: See previous comments.  
 Channel Photos: See previous remarks

**MED-C0140-0238\_(5235391)** Concrete Continuous slab

Item 58 Deck.....5 Agreed  
 Item 59 Superstructure.....5 Agreed  
 Item 60 Substructure.....7 Agreed  
 Item 61 Channel.....9 Agreed  
 Item 61.01 Scour.....7 Agreed  
 Item 62 Culvert.....N  
 Item 36 Railing..... 0 0 0 0 Agreed  
 Item 72 Approach Alignment ..... 8 Agreed  
 Comments: Great Comments  
 Defect Photos: See previous comments.  
 Channel Photos: See previous remarks

**Channel Photos:** In General, your file Channel photos are great, plus you have channel x-sections! Need them added in Assetwise in many cases.

**Comments:** Your locations of defects are good, but the extent and severity need more attention and greater focus on Location Extent and severity. We only disagreed on one item

METRIC 12 - Routine Inspection		**(from files examination)				
Field Ratings	# > +/-1	# Ratings	% PASS	COMPLIANCE		
field ratings	0	24	100.0%	(C)		
Comments	Missing	# < 6	% PASS			
Tab	Comments when Rating < 6	12	141	91.5%	(C)	See Comment TAB
	Inadequate comments**	1	6	83.3%	(SC)	MED-C0019-0404_(5233437)
	Error	Total Scour	% PASS			
Comments	Rating should be = Scour	0	117	100.0%	within tolerance +/- 1	
Tab	Noncompliant Scour Rating Err	0	117	100.0%	(C)	

From Snapshot/ field review Files MED-C019-0404 scour controls Substructure rating.

Note: Data taken from Assetwise in October update.

**Inventory Items**

Review of the bridge data showed 12 out of 141 bridges were missing comments when the rating was <=5. This requirement became effective Nov of 2020. 0 bridges should have Scour governing the substructure rating.

**Files:** Medina County keeps files listed below as follows:

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

- Inspection reports, including old inspections Highway Garage Filing Room
- Design Calculations Engineering Center and Highway Garage filing room
- Plans Scanned in computer server
- Load analysis calculations Highway Garage Filing Room & Scanned in computer server
- Inventory forms Garage Filing Room
- Photos and sketches Garage Filing Room
- Repairs and maintenance history Garage Filing Room
- Scour evaluation In bridge file
- Scour POA N/A
- Fracture Critical File Structure File in Garage Filing Room
- Load Posting/Closing Scanned in computer server
- Underwater inspections N/A
- Special inspection eqpt. or procedures File Structure File in Garage Filing Room
- Flood data, waterway adequacy, channel cross sections Highway Garage Filing Room & Scanned in computer server

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 119 (100.00%) of the County NBIS bridges have been Load Rated or Load Rating was not applicable. There are 0 NBIS bridges evaluated by documented engineering judgement using the BR100 form.

Load Ratings were checked for SFNs. 5233208; 5233216; 5234272 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.

One Bridge has the %legal load not tied to the lowest Load Rating Factor

[MED-C0004-0278\\_\(5233216\)](#) Looks like it might be nothing more than a rounding issue.

One bridge [MED-T0068-0543\\_\(5234530\)](#) has code F Assigned Rating in columns X & Y This code is only used for Concrete Frames and not permitted for steel beams. See Load Rating TAB in Snapshot file.

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	2
Col. AV	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

Rounding  
Off by 1

From Snapshot files

**Load Posting** (metric 14)

Medina County has 11 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.

The County has 7 bridge that are posted, but no posting date entered in Assetwise for sign installation.

- MED-C0002-0258\_(5231434)
- MED-C0004-0278\_(5233216)
- MED-C0035-0164\_(5233917)
- MED-T0291-0000\_(5235618)
- MED-T0102-0219\_(5235065)
- MED-T0069-0160\_(5234549)
- MED-C0050-0752\_(5234328)

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	119	100.0%	(C)
Op RF = 0 but not closed	0	119	100.0%	(C)
% Legal < 100 but not posted	0	119	100.0%	(C)
Item 41 = B	0	119	100.0%	(C)

From Snapshot files

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

**Fracture Critical Bridges** (Metric 16)

Medina County has 3 bridges that are Fracture Critical.

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

FC plans for SFN 5234298; Reviewed by Hammontree; SFN 5243416; reviewed by REL

Gusset Plate calculations were satisfactory for SFN 5234298; 5243416.

**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.

## Bridge Maintenance

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 **\$125,000.00**.

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

**Action Items for Medina County:**

- Metric 12 Scour Rating controls Substructure when scour rating is lower.
- Metrics 13&14 Correct data entry errors in Assetwise as indicated in report discussion above.