

**National Bridge Inspection Standards &
Bridge Maintenance Program Review
Tuscarawas County
February 17, 2020**

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

IN ATTENDANCE:

Joe Bachman
Chris Arthurs
Genaro DeMonte
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Tuscarawas County personnel, reviews of inspection and inventory data, and reviews of Tuscarawas County bridge records. The office evaluation assessed Tuscarawas 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 checked during the field review were:

SFN	CTY-RTE-SECT	TYPE	County Rating	Suggested NBIS Rating
7935668	TUS T0066 0306	Concrete Girder	4P	same
7932545	TUS T0332 0288	Concrete Slab	5A	same
7933541	TUS T0292 62	Concrete Slab	5A	same
7934173	TUS T0162 0221	Steel Beam	5A	same
7930129	TUS C0014 0708	Steel Culvert	5A	6A
7936397	TUS CANAL 0531	Steel Truss	6P	same

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/fapag/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.

Tuscarawas County has inspection responsibilities for 268 bridges, 172 of which are longer than 20 feet in length and 96 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

Tuscarawas County uses their own staff to do the inspections. Previous inspection reports are available at site for review. Bridge inspections are recorded in the field on paper. Bridge comments are recorded and are brought to the bridge. Bridge plans are available on file at the Bridge Office. Photos are available for every bridge, and photos are taken of defects during inspection.

The County indicated that an average of 7-10 inspections per day were completed in 2020. Truss (pony/through/deck) takes 4 hours. It takes 1 hour for Beam/Girders. For a slab, it takes about 1 hour. For a Culvert, it takes about 1/2 hour.

The County has 20 bridges that require a snoopers for inspection. They do them on approx. 3 year frequency, depending on the condition.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Tuscarawas County had 268 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 bridge conditions noted.

There are 0 bridges that requires inspection more frequently than one year.

Qualification and Duties of Personnel

Mr. Joe Bachman – PM. He has 33 years of inspection related experience. Comprehensive – Not Compliant. Need to prepare the Grandfather Clause Checklist and upload it to Asset Wise. Refresher – Compliant. Completed last in 2017 and uploaded to Asset Wise.

Mr. Chris Arthurs – TL, PE. He has 25 years of inspection related experience. Comprehensive – Compliant and uploaded to Asset Wise. Refresher – Compliant. Need to uploaded to Asset Wise.

Mr. John Wackerly – TL, PE. He has had 30+ years of inspection related experience. Comprehensive – Compliant. Refresher – Compliant.

Inspection Reports

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 six 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.

Inventory Items

During the Files review, the following inventory items were identified and discussed with the county –

- Need FC Plan – need fracture critical inspection procedure
- Need UW Inspection procedure

Files

Tuscarawas County keeps all information and documents in a digital file with backup.

Load Rating

The inventory shows 269 (100.00%) of the County bridges have been Load Rated or Load Rating was not applicable. There were 5 bridges evaluated by documented engineering judgement.

Load Ratings were checked for SFNs 7931263, 7936397, 7935722, 7937199. 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.

Review of the load rating data in AssetWise showed the following. see load rating tab in Snapshot Spreadsheet for details:

- Item 709 missing on 7930129
- % Legal did not match lowest rating factor on 7 bridges (EV RFs are to be included)
- Item 70 was not correct on 2 bridges
- Item 580 depth of fill not completed on 7930129

Load Posting

Tuscarawas County has 2 NBIS bridges that are load posted. There is 1 bridge closed for condition ratings. They use a mix of engineering judgement and analysis to determine. Gross Tonnage is the type of sign used for load posting and posting is based on Operating Rating.

Special Features

Tuscarawas County has 0 bridges that have special features.

Fracture Critical Bridges

The FC bridge inspection frequency is 24 months. Tuscarawas County had SFN 7931719 and SFN 7931468 FC files reviewed. They both have FCM's identified and Fatigue Prone details shown. The procedure was not detailed for either bridge. This was discussed at the final review meeting. The county will need to prepare a FC inspection procedure for each FC bridge..

Underwater Inspections and Scour

There are 5 bridges that require underwater inspections. There are 0 bridges that are scour critical. The UW inspection file was reviewed for 7930003. The inspection report did not identify the frequency of inspection and was not clear on the location of the UW elements. The file did not contain an UW Inspection Procedure. This was discussed with the county. They need to prepare an UW inspection procedure for each UW inspection bridge using the Ohio BIM appendix F as a guide.

QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. The Engineer checks any issues brought to light during inspection. Inventory is looked over as necessary. Bridge Inspection/Maintenance Staff typically will update the inventory on the AssetWise System. Updated inventory data is forwarded to ODOT as it is completed. There are changes discovered during inspection, ODOT will be notified as it is completed. Whenever changes are made during new construction or rehab, ODOT and others will be notified as it is completed.

Critical Findings

Critical Findings policy is in the Ohio Bridge Inspection Manual and they are reported in AssetWise. Inspectors inform maintenance personnel of routine bridge maintenance problems written and orally via the Engineer. The inspectors notify the Engineer when emergency repairs or critical findings are critical. They are documented on time sheets and project specific accounting. If a bridge requires emergency repairs, it is noted on both the inspection report or a separate document. The bridge inspector checks proper placement of signs.

Bridge Maintenance

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.

Tuscarawas County has maintenance responsibilities for 268 bridges, 172 of which are longer than 20 feet in length and 96 which are 10 feet to 20 feet long. The County does force account bridge work as needed. The work includes complete replacement, waterproofing, repaving, and painting. The approximate budget is \$250,000. Fed Funds and Credit Bridge Funds are used.

The county uses in-house staff that consists of 3 people on bridge crew for 2 to 4 months per year. Typical work items include complete replacement, rail repair, various repairs as needed. The approximate budget is \$200,000.

Maintenance Projects are identified and selected based on annual inspections. Plans are developed for emergency repairs varies based upon the type of emergency. Typically, in-house crews are the ones who do the emergency repairs. Repair work is documented on time sheets. There is separate accounting for significant projects.

Emergency Road Closures can be ordered by all on-duty supervisory personnel.

CONCLUSIONS AND RECOMMENDATIONS

- SFN 7935668
 - Photos – Not sufficient – have the superstar honeycombing but not the abutment vertical crack
 - Channel Photos – Not sufficient – need view towards bridge U & D
 - Load limit sign missing on south side
 - Comments need quantities, LES
- SFN 7932545
 - Channel Photos – Not sufficient – wrong direction
 - No comments in AW – Need comments for channel
- SFN 7934173
 - Channel Photos – Only 1 in 2015 – too dark, need a new one every 5 years
 - Comments need LES
- SFN 7930129
 - Culvert – Would rate it a 6
 - Photos – None
 - Channel Photos – Only 1 – supposed to be 1 upstream and 1 downstream
 - No comments – Need culvert comments
- SFN 7936397
 - Channel Photos – 1 photo wrong angle
- FC files need to include FC Inspection Procedure.

- UW Inspection files need to include UW inspection procedure and Bridge training class certificates of UW inspection personnel
- These data errors shown in the Load Rating tab in the Snapshot spreadsheet need corrected
 - Item 709 missing on 7930129
 - % Legal did not match lowest rating factor on 7 bridges (EV RFs are to be included)
 - Item 70 was not correct on 2 bridges
 - Item 580 depth of fill not completed
- Comments are compliant per the Metric, however there were a few bridges that were missing comments and the scour should have controlled the substructure rating. Many comments needed better detail (location – extent – severity)
- When posting happens after an inspection, keep item 41 the same until the next inspection and add the posting date
- Chris Arthurs needs to upload his Refresher certificate to AssetWise
- Joe Bachman needs to complete the Grandfather clause checklist and upload it to AssetWise

The chart on the following page is a review of the 23 Metrics used to measure NBIS compliance and the chart represents 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

Metric 2 – Joe needs to do grandfather's clause, Chris needs some paperwork
Metric 5 – Obtain Dive inspector qualification. Ensure meets comprehensive and refresher
Metric 12 – Scour Rating should control Substructure or Deck
Metric 14 – Add load posting date and info to Asset Wise
Metric 16 – Supply FC Insp Procedure for each FC Bridge
Metric 17 – Supply UW Insp Procedure for each UW Bridge