

National Bridge Inspection Standards & Bridge Maintenance Program Review Trumbull County May 16, 2018

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

IN ATTENDANCE:

Gary Shaffer, PE, TCE
Tom Gentis, PE, TCE
Ray Repko, PE, MS Consultants
Paul Martin, EI, MS Consultants
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

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

SFN	CTY-RTE-SECT	TYPE	YEAR BUILT /REHAB	OVERALL LENGTH	County RATING	Suggested NBIS RATING
7832001	TRU C0043 00.010	34A	1954/96	42'	3P	same
7835566	TRU WMRKT 0 03	172	1930	235'	4A	same
7840829	TRU T093A 0.100	321	1969/01	59'	4A	same
7840926	TRU C169A 0.140	231	1982	69'	5A	same
7844948	TRU C276B 000.150	395	1947	55'	4A	same
7843275	TRU C159B 000.020	111	1939	28'	7P	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/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. Trumbull County has 2 bridges on the expanded NHS.

Trumbull County has inspection responsibilities for 375 bridges, 180 of which are longer than 20 feet in length and 195 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 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"). There were some minor issues in regards to complete compliance with the National Bridge Inspection Standards (NBIS). Comments are listed below.

Inspection Procedures

Trumbull County uses MS consultants to do the bridge inspections. The inspector brings last year's inspection and a separate comments sheet to the bridge. It is reviewed then marked up immediately after the inspection is performed. SMS input is done in the office. Photos are not available for every bridge, however, the photos of deficiencies from the previous inspection are bound with the report used in the field. Older photos of deficiencies are kept on file at the office. The county was reminded that ratings of 5 and below require complete comments describing Location, Extent, and Severity (LES), including pictures and/or sketches.

The county indicated that an average of 4.2 inspections per day were completed in 2017. The inspections include some smaller bridges between 10'-20' as well as NBIS length bridges.

The County has 5 bridges that are required to use a snooper for inspection. All but 1 of those bridges was inspected using ODOT's reach vehicle in 2015.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. The SMS showed Trumbull County had all bridges inspected in 2017. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually.

Qualification and Duties of Personnel

Mr. Ray Repko is the Program Manager and Reviewer. He completed training for Element Level Bridge Inspection in 2014. He also attended the Structure Management System Open Lab. He has 40 years of experience and is qualified to be the Program Manager and Reviewer.

Mr. Paul Martin is a Team Leader and has 23 years of experience. He has taken the ODOT Element Level Inspection Training course in 2016 and the FHWA Introduction to Element Level Bridge Inspection in 2014. He is qualified to be a Team Leader.

Mr. Ray Repko, PE #46878 and other qualified MS personnel perform and review the load ratings. TCE also uses various other qualified consultants to do load ratings.

Mr. Adam Crace, PE, with Stantec Consulting Services, Inc, completed the dive inspections. He completed a NHI Course Safety Inspection of In-Service Bridges in 2006. He also had a Bridge Inspection Refresher course in 2011.

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. All discrepancies were discussed at the bridge site.

Inventory Items

During the Office Review, no inventory problems were found. However, there were 18 FC inspections that were missing the Item 92A (FC insp required Y/N) and 17 Dive inspections that were missing Item 92B (Dive insp required Y/N). Those items will be completed at the next routine inspection. The county was reminded that inventory changes need to be made within 180 days.

During the Field Review, the CEAO QA/QC Engineer checked select inventory items and no issues were found:

Files

Trumbull County keeps all bridge related documents in manila folders in the Engineering Department of TCE, which include ODOT field inspection reports, load rating reports, scour evaluation and POA, fracture critical reports, and inspection field remarks. Repairs and maintenance history are kept in highway department database and updated in Bridge Book. Available plans are kept in the TCE vault. Photos and sketches are maintained by MS consultants and filed in bridge files as necessary.

Load Rating

The inventory shows 180 (100.0%) of the County bridges have been Load Rated or Load Rating was not applicable. 19 were evaluated by documented engineering judgement. The county already had a BR-100 for some bridges and will be creating BR-100 forms for the

remaining bridges. The County was also reminded that any bridges with the General Appraisal moving from a 5 to 4 triggers a new load rating.

Load Ratings were checked for SFN 7832001, 7840926, 7843275. The load posting at the bridge matched the load ratings for all 3 bridges. PE name and stamp were on all load ratings, and there was documentation for all of them.

Load Posting

Trumbull County has 14 bridges that are load posted. The county uses Operating Rating to determine the need for posting. This is determined by analysis and engineering judgment. 2 bridges are closed for condition ratings – SFN 7845022 and SFN 7844514

Special Features

The County has no bridge with special features.

Fracture Critical Bridges

Trumbull County has 9 bridges labeled as a fracture critical bridge in the SMS. 9 have gusset plates – Steel Truss Pony Bridges, Type 34A. FC files were checked for 7832001 and found to be complete with FCM's identified, FP Details were shown and the FC inspection procedure was completed.

Underwater Inspections and Scour

7 bridges need an underwater inspection. 177 structures were coded as Scour Susceptible being all over water. They all have a Scour POA on file. There are 0 bridges that are considered scour critical. The county was advised if they had any potential scour issues, a written scour evaluation should be placed in the file.

QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. The ODOT Field Inspection Report and remarks sheet for each bridge are inspected and reviewed by a PE (Ray Repko) and field checked if necessary.

Critical Findings

The county did have a Critical Findings Procedure in place. They also had Critical Findings Documentation. The county was reminded that there is a Critical finding report in the SMS to document any critical findings that are found.

Bridge Maintenance

The County does force account bridge work as needed. They use a bridge crew of 4 workers to do bridge work. Work performed on bridges includes deck repairs, patching, sealing, some guardrail repairs. Approximately \$150,000 is budgeted for in-house repairs and replacements annually.

The county has a contract construction program that does deck repairs, rail repairs and replacement along with welding repairs. The annual budget for this is \$500,000. The County rarely uses federal funds and sometimes uses credit bridge funds when available.

Plans for emergency projects are done in house through the bridge crew. The work is also contracted out as necessary. Repair work is documented by timesheets, in-house inspectors, field notes, and work orders. The following people are empowered to order emergency road closures: County Engineer, Deputy Engineer, Bridge Program Manager, and Emergency Services.

CONCLUSIONS AND RECOMMENDATIONS

1. BR-100 for some engineering judgment bridges need to be completed.
2. There were 18 FC inspections that were missing the Item 92A (FC insp required Y/N) and 17 Dive inspections that were missing Item 92B (Dive insp required Y/N). Those items will be completed at the next routine inspection

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 ** 100%				
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 ** 97%				
23	Updating of Data				

** based on results of Field Review

Metric	Action Needed