

National Bridge Inspection Standards & Bridge Maintenance Program Review

Summit County

September 11, 2019

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

IN ATTENDANCE:

Robert Hochevar, Summit County
Frank Getz, Arcadis
Dave Smith, Summit County
Kenny Tong, FHWA

George Kamvouris, Summit County
Roger Boltz, Summit County
Mark Stockman, CEAO Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Summit County personnel, reviews of inspection and inventory data, and reviews of Summit County bridge records. The office evaluation assessed Summit County's organization, procedures, resources, and documentation regarding the inspection, inventory, and maintenance operations for bridges. In addition, field reviews of nine 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 Summit 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
7732023	SUM C0017 017.630	121	1930	77'	6A	same
7730357	SUM M0005 06.490	321	1990	66'	6A	same
7745168	SUM C0010 06.590	195	1940	14'	6A	5A
7732163	SUM C0079 002.830	112	1950	67'	6P	same
7732325	SUM C0114 03.200	395	1965	16'	4A	3A
7745036	SUM C0009 05.830	595	1827	22'	5A	same
7745087	SUM C0009 08.700	231	1978	125'	4P	same
7732155	SUM C0079 002.210	231	1913	65'	3P	same
7735138	SUM C0206 01.500	231	1974	49'	3A	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:

<https://www.govinfo.gov/content/pkg/CFR-2011-title23-vol1/pdf/CFR-2011-title23-vol1-part650-subpartC.pdf>

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. Summit County has 2 bridges on the NHS.

Summit County has inspection responsibilities for 283 bridges, 152 of which are longer than 20 feet in length and 131 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 11 bridges had the NBIS designation Y/N possibly coded incorrectly. The inspector needs to verify the f-f abutment distance and make corrections to Item 306 NBIS length.

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

Summit County uses their own staff to do the inspections. The county uses a consultant to perform inspections on a few bridges yearly for QA/QC purposes. Previous inspection reports are available at site for review. The inspections are recorded on paper under the bridge, then entered into SMS at the office. Comments are recorded in SMS with the field inspection report and with photos uploaded to the SCE computer network and SMS. Bridge comments are brought to the bridge. The previous inspection reports are available at site during review. Photos are available for every bridge and are taken of defects during inspections.

The County indicated that an average of 2.5 inspections per day were completed in 2018. For Truss (pony/through/deck) it takes about 8 hours. It takes 3 hours for Beam/Girders. For a slab, it takes 2.5 hours. For a Culvert, it takes 2 hours.

The County has 10 bridges that require a snooper for inspection.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Summit County had 316 bridges inspected in 2018. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually. There is 1 bridge that requires inspection more frequently than one year – SFN 7735138 and is inspected every 3 months until replaced. Bridge inspection frequency is determined by the Program Manager and is based on input from inspectors, reviewer and/or consultants or based on condition

rating and photos supplemented by field check by Program Manager or Cursory Reviewer. Frequency is based on the examination of current and anticipated conditions.

Qualification and Duties of Personnel

Mr. Alan Brubaker is the County Engineer, and has overall responsibility for the Bridge Program.

Mr. Robert Hochevar is the Program Manager and Reviewer. Mr. Hochevar is a P.E. and has 37 years of inspection related experience. He took Element Level Bridge Inspection Training in 2015. He took ODOT Manual of Bridge Inspection Update in 2011. He took ODOT Bridge Inspection Training in 1987 and 1990. He took FHA Stream Stability & Scour at Highway Bridges in 1991. In 1987, he took a few courses at George Washington University for Highway Bridges and Underwater Inspection Bridges. Mr. Hochevar is qualified as Program Manager and Reviewer.

Mr. Brian Conley is a Team Leader. He has 24 years of experience with Summit County Engineers. He took Bridge Inspection Level 1 in 1999 and Level 2 in 2004 and 2011. He took SMS Training in 2013 and took a Bridge Inspection Refresher Course in 2018. Mr. Conley is qualified to be a Team Leader.

Mr. George Kamvouris is a Team Leader. He has 29 years of experience with Summit County Engineers. He took Bridge Inspection Level 1 in 1999 and Level 2 in 2005 and 2011. He took SMS Training in 2013 and took a Bridge Inspection Refresher Course in 2018. He is qualified to be a Team Leader.

Mr. Roger Boltz is a Team Leader. He has 3 years of experience with Summit County Engineers and 17 years with ODOT. He took Bridge Inspection Level 1 in 2005 and Level 2 in 2006 and 2011. He took SMS Training in 2013 and took a Bridge Inspection Refresher Course in 2018. Mr. Boltz is qualified to be a Team Leader.

Mr. Phil Richards is a Team Leader. He has 9 years of experience with Summit County Engineers and 20 additional years on Summit County Engineers Bridge maintenance crew. He took Bridge Inspection Level 1 in 2013 and Level 2 in 2014. He took a Bridge Inspection Refresher Training in 2018. Mr. Richards is qualified to be a Team Leader.

Mr. Dave Smith is a Team Leader. He has 28 years of experience with Summit County Engineers. He took Basic Bridge Inspection Training in 1999. He took Ohio's Comprehensive Bridge Inspection School in 2001. He took SMS Training in 2013. He took Intro to Element Level Bridge Inspection in 2014 and Bridge Inspection Refresher Training in 2018. Mr. Smith is qualified to be a Team Leader.

Mr. Tom Fosnaught is a Team Member. He has 3 years of experience with Summit County Engineers. He took Bridge Inspection Level 1 and Level 2 in 2017. Mr. Fosnaught is qualified to be a Team Member.

Robert Hochevar (PE 51352) is responsible for doing the Load Ratings.

Capt. Travis M. Clower, MBA, PE, and Owner of Integrity Aquatic, Inc is the one who does the Dive Inspections. He has 26 years of experience. He took the NHI Underwater Bridge Inspection Course in 2013, NHI Bridge Inspection Refresher Training in 2012, NHI Safety Inspection of In-Service Bridges in 2002, and NHI Bridge Inspection Refresher Training in 2017. Mr. Clower is qualified to do the Dive Inspections.

Inspection Reports

As part of this review, nine bridges were field reviewed to compare conditions with the most recent inspection report. The individual condition ratings for all nine 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 Field Review, the CEAO QA/QC Engineer checked select inventory items and the following issues were found:

- SFN 7732023
 - Scour item 113 needs to be 5 and not 8
 - Item 72 Approach Alignment needs to be 8 and not 6
- SFN 7733057
 - Item 414 Expansion Joint should be strip seal, not sliding metal plate angle
- SFN 7745168
 - Culvert Summary needs to be 5 and not 6
 - General Appraisal should be 5A and not 6A
 - Approach Alignment item 72 needs to be 8 and not 6
- SFN 7732163
 - Deck Items – Floor/Slab needs to be 2 and not 1; Edge of Floor/Slab(LF) needs to be 2 and not 1; Deck Summary needs to be 6 and not 7
 - Approach alignment item 72 needs to be 8 and not 6
- SFN 7732325
 - Culvert Items – General item c44 should be 3 and not 2, as well as the Culvert Summary should be 3 and not 4
 - General Appraisal should be 3A and not 4A
 - There needs to be better comments on the Field Report
 - Approach alignment item 72 needs to be 8 and not 6
- SFN 7745036
 - Scour item should be either 5 or 4, but not 8
 - Inspection comments need to be improved to describe the scour dimensions
- SFN 7745087
 - Superstructure Summary needs to be 3 and not 4 based on 13 strands out of 26 are exposed or discounted
 - There needs to be better comments on the Field Report

- Approach alignment needs to be 8 and not 6
- SFN 7732155
 - Railing condition item c11 should be 2 and not 1
 - Scour item 113 should be 5 and not 8
 - Approach alignment item 72 needs to be 8 and not 6

Files

Summit County keeps inspection reports, including old inspections in the Program Manager's office. Design Calculations are kept with the design file in Program Manager's office or in archives. Plans can be found on SCE Network and in the SMS. Hard copies are kept in a fireproof plan file cabinet also. Inventory forms are kept in the SMS. Hard copy BM-191's are kept in the Program Manager's office. Photos and sketches are kept in the Project Manger's Office, on the SCE Network, in the SMS, and in the archives. Repairs and Maintenance History are kept in Program Manager's office, SCE Network, and the Public Works Department Tracking System. Scour Evaluations are documented in the SMS. Fracture Critical Files, Load Posting/Closing Files, and Underwater Inspections are all kept in the Program Manager's Office, SCE Network, and in the SMS.

Load Rating

The inventory shows 152 (100.00%) of the County bridges have been Load Rated or Load Rating was not applicable. There were 12 bridges evaluated by documented engineering judgement. BR100 forms are available for all engineering judgment bridges.

Load Ratings were checked for SFNs 7735138, 7757042, 7732155. The load posting at the bridge matched the load rating on all bridges. P.E. name and stamp were on all load ratings. NOTE – 7135138 was posted in January 2020 due to findings during the interim inspection.

Load Posting

Summit County has 15 bridges that are load posted. This is determined by a mix of both engineering judgment and analysis. There is 1 bridge closed for condition ratings (SFN 7735146). They use SHV and gross tonnage signage. Posting is based on Operating Rating.

Special Features

Summit County does not have any bridges that have special features.

Fracture Critical Bridges

Summit County has 2 bridges labeled as a fracture critical bridge in the SMS. There are 2 bridges with gusset plates (SFN 7732201 will be removed from the inventory since it does not carry vehicular traffic on the bridge and there is no vehicular traffic under the bridge). The FC inspection for the other bridge SFN 7730306 is current. The FCM's are identified, FP details are shown and the Procedure is detailed. Gusset Plate calculations for this bridge are in the file.

Underwater Inspections and Scour

There are 16 bridges require underwater inspections. They are all listed on the Underwater Inspection List that they provided. There are 278 bridges considered scour susceptible and 261 bridges that are inspected by probing. The underwater inspection frequency is done every 60 months. Channel Scour Photos are done

QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. Inventory date is input into SMS as required by the Team Leader, Program Manager, or Qualified Consultant. The updated inventory data needs to be forwarded to ODOT within 180 days. Changes discovered during inspection are done annually or sooner. The inventory is updates as the inspection reports are reviewed and submitted. Inspection updates are sent as required throughout the year.

Inventory QA are performed during the inspection process yearly.

Critical Findings

The county does have a Critical Findings Procedure in place located in the SMS. Inspectors notify the Program Manager or Cursory Reviewer verbally or by email, and also by notation on the inspection report of routine bridge maintenance problems. They then usually perform a site visit and then the Program Manager completes a request for service as required. Critical Findings found during an inspection are addressed in accordance with the Critical Findings flowchart and actions as defined in the ODOT Manual of Bridge Inspection. Critical Findings that are determined to be an emergency are also addressed as such per SCE's Bridge Emergency Action Plan. If a bridge requires emergency repairs it is noted on the Inspection Field Report, Critical Findings Report, and also on the SCE Bridge Inventory List. Bridge Inspectors, Bridge Cursory Reviewer, Bridge Program Manager, and the Bridge Maintenance Manager are the ones who checks proper placement of signs. They were instructed to use the SMS Critical Findings Report.

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.

The County has maintenance responsibilities for 283 bridges, 152 of which are longer than 20 feet in length and 131 which are 10 feet to 20 feet in length. The County does force account bridge work as needed. The work includes waterproofing and resurfacing, bridge rail upgrades, deck replacements/overlays, and bridge replacements. The approximate annual budget is \$3,100,000. Fed funds (LBR) and credit bridge funds are both used. \$255,000 of Credit Bridge Funds are anticipated to be used in 2019.

The county uses in-house staff that consists of a supervisor, crew leader, and three bridge workers. They use them to do bridge washing, brush removal, ditch cleaning, concrete & steel repairs, railing, joint repair, and replacement, bank stabilization, and sign maintenance. The staff includes various county maintenance personnel. The approximate annual budget for in-house repairs and replacements is approximately \$500,000.

Projects are identified and selected by deficiencies and needed maintenance. Repair items are identified and noted on the bridge field inspection reports by bridge inspectors during the annual bridge inspections. Emergency and higher priority items are brought to the attention of the Program Manager in a timely manner. The inspectors' supervisor reviews and confirms the identified items before forwarding on to the Program Manager. The Program Manager reviews and confirms the identified items and then compiles a master list during the review and approval of the field inspection reports for each bridge. The list is supplemented by field visits by the Program Manager as needed. Projects are then prioritized and selected as budget limitations permit.

Emergency repair strategies are developed organically by involving the appropriate in-house engineering disciplines and members of the Public Works Department. If feasible, plans are developed in-house. If not, engineering consultants are engaged. Alternately, a design-build contract may be pursued. Depending upon the scope of the repairs, emergency work is completed by in-house maintenance crews or a specialty contractor. Repair work is documented by a Request for Service (work order) log, daily time sheets and digital photographs.

CONCLUSIONS AND RECOMMENDATIONS

- SFN 7732023
 - Scour needs to be 5 and not 8
 - Approach Alignment needs to be 8 and not 6
- SFN 7745168
 - N62 Culvert Summary needs to be 5 and not 6
 - General Appraisal should be 5A and not 6A
 - Approach Alignment needs to be 8 and not 6
- SFN 7732163
 - Deck Items – Floor/Slab needs to be 2 and not 1; Edge of Floor/Slab(LF) needs to be 2 and not 1; Deck Summary needs to be 6 and not 7
 - Approach alignment needs to be 8 and not 6
- SFN 7732325
 - Culvert Items – General should be 3 and not 2, as well as the Culvert Summary should be 3 and not 4
 - General Appraisal under Sign/Utility should be 3A and not 4A
 - There needs to be better comments on the Field Report
 - Approach alignment needs to be 8 and not 6
- SFN 7745036
 - Scour should be either 5 or 4, but not 8

- SFN 7745087
 - Superstructure Summary needs to be 3 and not 4
 - There needs to be better comments on the Field Report
 - Approach alignment needs to be 8 and not 6
- SFN 7732155
 - Deck Railing should be 2 and not 1
 - Scour should be 5 and not 8
 - Approach alignment needs to be 8 and not 6
- Calculations are going to be checked for Inv RF too low or OP RF too high
- SFN 7739389
 - Load Rating Software (Item 708) shows not calculated but Method of Rating is calculated, so that needs to be fixed to assigned rating
- Will Check Inv RF extremely low compared to OP RF (SFN 7735197, SFN 7730187)
- SFN 7738404
 - Load Rating needs to be done
- There are two blank FC Y/N and UW Y/N designations for SFN 7730179 and SFN 7730187 – they will complete this at next inspection
- 11 bridges had the NBIS designation Y/N possibly coded incorrectly. The inspector needs to verify the f-f abutment distance and make corrections to Item 306 NBIS length.

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 nine 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	Action Needed
12	Provide complete comments on all bridges where the Summary <=5
22	Check Approach Alignment Item 72 on all bridges