National Bridge Inspection Standards &
Bridge Maintenance Program Review
Cuyahoga County
September 28, 2020

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

IN ATTENDANCE:

Jim Hazimahalis
Jon Osterstock
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Cuyahoga County personnel, reviews of inspection and inventory data, and reviews of Cuyahoga County bridge records. The office evaluation assessed Cuyahoga County's organization, procedures, resources, and documentation regarding the inspection, inventory, and maintenance operations for bridges. In addition, field reviews of four 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
1830503	CUY C0143 02.00	Metal Culvert	4P	same
1830996	CUY C0131 1.61	Concrete Frame	4A	same
1876082	CUY ORRCP .42	Pres Box Beam	4A	same
1830783	CUY C0011 2.10	Conc Arch	4P	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.

Cuyahoga County has inspection responsibilities for 359 bridges, 210 of which are longer than 20 feet in length and 149 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

Cuyahoga County uses their own staff to do the inspections. Previous inspection reports are available at site for review. Both. A paper copy of the previous year's inspection is printed and taken out into the field and marked up with current data. The inspector then will enter the report while in the field using a laptop along with labeling photos and entering any maintenance recommendations into the County's ERP system. The comments are recorded and documented on the paper copy then transferred to the Asset Wise report. They are brought to the bridge. Bridge plans are carried to the bridge site for review. Bridge plans are available on file at the Bridge Office. Photos are available for every bridge, and photos are taken of defects during inspection.

Comments for all NBI bridges are supplied in AssetWise for a necessary NBI items rated 5 or lower. The adequacy of the comments was checked on the 4 bridges field reviewed and found to be good, complete and descriptive.

The County indicated that an average of 3 inspections per day were completed in 2020. Truss (pony/through/deck) takes 4 hours. It takes 2.5 hours for Beam/Girders. For a slab, it takes about 1.5 hours. For a Culvert, it takes about 1 hour.

Two bridges showed scour rating of 6 and the substructure and GA was rated 7. The scour controls the substructure rating, so the substructure and GA should have been a 6. However, this is within the tolerance of +/- 1 rating value.
CUY-C0051-02.51_(1830848)
CUY-C0330-00.74_(1834142)

The County has 15 bridges that require a snooper for inspection.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Cuyahoga County had 504 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 Chief Section Engineer (Demetrios J. Hazimihalis) determines the need for a routine inspection

frequency greater than once a year. The criteria used is dependent on the General Appraisal, structure type and amount of daily traffic.
There is one bridge that requires inspection more frequently than one year. Jefferson Avenue Bridge 0057 – SFN – 1831402. Frequency – Every 6 months due to condition of the structure. Fracture Critical every 24 months.

Qualification and Duties of Personnel

Mr. James Hazimahalis is a PE and the Program Manager. He has 20 years of inspection related experience. He took the ODOT Level 1 and Level 2 classes in 2003 and 2004 but they are no longer sufficient. He needs to prepare the Grandfather Clause Checklist and upload it to Asset Wise. He took the Online Refresher in 2020. The Class Transcript is uploaded to Asset Wise and the Refresher is compliant.

Mr. Jon Osterstock is a PE and the Reviewer. He has 17 years of inspection related experience. He took the Level 1 and Level 2 classes in 2017. The ODOT corticates are uploaded to Asset Wise and the comprehensive training is compliant. He took the NHI Fracture Critical class in 2018 which qualifies as a Refresher. The NHI certificate is uploaded to Asset Wise and the Refresher is compliant.

Mr. Matthew Pastorelle is a Team Leader. He has had 10 years of inspection related experience. He took the Level 1 and Level 2 classes in 2010. The ODOT corticates are uploaded to Asset Wise and the comprehensive training is compliant. He too the Element Level refresher class in 2016 which qualifies as a Refresher. The refresher certificate is uploaded to Asset Wise and the Refresher is compliant.

Mr. Jeff Dobransky is a Team Leader. He has 35 years of inspection related experience. He took the ODOT Level 1 and Level 2 classes in 1999 and 2004 but they are no longer sufficient. He needs to prepare the Grandfather Clause Checklist and upload it to Asset Wise. He took the Element Level refresher class in 2015 which qualifies as a Refresher and the ODOT online Refresher in Jan 2021. The refresher certificate and online transcript is uploaded to Asset Wise and the Refresher is compliant.
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Mr. David Griesmer is a Team Leader. He has 9 years of inspection related experience. He has had 10 years of inspection related experience. He took the Level 1 and Level 2 classes in 2009 and 2010. The ODOT corticates are uploaded to Asset Wise and the comprehensive training is compliant. He took the Element Level refresher class in 2015 which qualifies as a Refresher and the ODOT online Refresher in Jan 2021. The refresher certificate and online transcript is uploaded to Asset Wise and the Refresher is compliant.

Inspection Reports

As part of this review, four bridges were field reviewed to compare conditions with the most recent inspection report. The individual condition ratings for all four 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, no inventory errors were found.

Files

Cuyahoga County keeps all information and documents as follows. Inspection reports, including old inspections, are kept as a hard copy in the filing cabinet and a digital copy on the server. Design Calculations are kept in the bridge design office, and a hard copy is kept in the files. The plans, load analysis calculations, scour evaluations, scour POA, fracture critical files, load posting/closing files, and underwater inspections are all kept as a hard copy in the storage and a PDF copy on the server. Photos and sketches are kept as a PDF copy on the server.

Load Rating

The inventory shows 210 (100.00%) of the County NBIS bridges have been Load Rated or Load Rating was not applicable. There were 4 bridges evaluated by documented engineering judgement. The county will check their files on these 4 bridges and be sure that there is a BR100 in the file

Load Ratings were checked for SFNs 0430552, 0432091, 0432408, 0432903. 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.

Load Posting

Cuyahoga County has 14 NBIS bridges that are load posted. There are 5 bridges closed for condition ratings. They use a mix of Structural Analysis utilizing Load Rating Software Programs to determine. The large sign R12-H5 is the type of sign used for load posting.

Special Features

Cuyahoga County has 1 bridge that has special features – Columbus Road Lift Bridge (SFN 1833758)

Fracture Critical Bridges

The FC bridge inspection frequency is 24 months. Cuyahoga County had SFN 1832107 and SFN 1833758 reviewed. SFN 1832107 had FCM's identified, but the FCM's did not include the floor beams and they should have because the spacing is> 14'. The county should also reexamine if verticals are FC since they might be in compression. The inspection procedure needs to include risk factors and be specific to each FC bridge.

SFN 1832107 inspection procedure needs to include risk factors and be specific to each FC bridge.

Gusset plate calculations were reviewed and they are good.

Underwater Inspections and Scour

There are 5 bridges require underwater inspections. There are 274 bridges over waterways considered scour susceptible and the 272 bridges inspected by probing. There are 0 bridges that are scour critical.

The UW inspection report for 1876082 was reviewed along with the UW insp procedure. The report is complete but the procedure needs to be a separate document for each UW inspection bridge. It is incomplete as presented in the report. Use Bridge Insp Manual Appendix F to create the UW Inspection Procedure.

QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. Typically, Inventory Quality Assurance checks are made when a new structure is put into place, rehabilitated or Load Rated as a rule. Inventory is looked over annually – typically in the dead period after mid- February. Bridge Inspection/Maintenance Staff typically will update the inventory on the AssetWise System. There are changes discovered during inspection, however, this is a rare occasion as the Inventory Data rarely changes other than Load Rating, ADT, etc. Whenever changes are made during new construction or rehab, ODOT and others will be notified.

Critical Findings

The county does have a Critical Findings Procedure in place located in the AssetWise. Routine Bridge Maintenance problems are documented into the County's ERP system. Once entered into the system, the inspector will assign the work project/assignment to a Maintenance Supervisor who then will schedule the work to be performed. All labor, material and equipment is logged into the Force Account format for auditing purposes. Bridge Inspectors immediately notify Demetrios J. Hazimihalis or Jon Osterstock when Emergency Repairs or Critical Findings are necessary. The Emergency action is documented into the County ERP system. All the details associated with the Emergency Action along with photos are download into the system. The Work Order is then reviewed by the Program Manager or Engineer IV. Once reviewed and a plan of action or repair method is developed, the Work Order is assigned to a Maintenance Supervisor. The Maintenance Supervisor will then develop an estimate for the work to be performed and track labor, material and equipment costs associated with the project. Emergency repairs are noted as part of the inspection report and detailed into the County's ERP system. The Bridge Inspection Teams will inspect and check the proper placement of signs. Also, the County Sign Shop will also perform QA/QC checks on County Roads to ensure that the Signs are placed properly and that the Signs are in working order.

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 does force account bridge work as needed. The work includes total replacement and deck replacements. The approximate budget is $8,000,000. Fed Funds are used, but Credit Bridge Funds are not used.

The county uses in-house staff that consists of 35 staffing, as needed for the job. On call contractors are available for projects over 100,000. Typical work items include concrete, asphalt, steel, coatings, guardrail, and stream work. The approximate budget is $2,500,000.

Maintenance Projects are identified after the Annual Bridge Inspection. The Maintenance recommendations are identified for a structure and entered into the County ERP system. These recommendations are reviewed by management. Depending upon the level given to a maintenance recommendation, a plan will be developed by material type to determine, labor, material and equipment for each structure. Then the projects will be assigned to the supervisors via the ERP system. The supervisors will then develop a scope and estimate each project. Then they will be assigned to the work crews. The supervisor will oversee ordering material and quality assurance on the job. Technical questions shall be discussed with Chief Section Engineer or Engineer IV. Project will be closed out after review by either Chief Section Engineer, Engineer IV or Senior Project Manager on staff.

Bridge Replacements and Rehab Projects are discussed annually. The Bridge Design Team and Bridge Inspection Teams meet and discuss structures that need to be replaced, structures that will need to be sent out for construction and structures that can be handled in house. The Planning Department then handles securing funding for those projects that cannot be handled in house.

If a structure needs to be closed, the County has the necessary means to do so via the County’s Sign Shop. Depending upon the size, cost and complexity, County Bridge Maintenance Forces or through an On-Call Contractor Program developed at the County are the ones who does the work of the emergency repairs. Repair Work Is documented through the County’s ERP (Enterprise Resource Planning Program). This program documents an estimate and actual expenditures for the repair work to be performed then tracks Labor, Material and Equipment used to complete the repair.

Emergency Road Closures are made by the Chief Section Engineer. An Emergency Road Closure is first identified by the Bridge Inspection Team. Once the Team has identified an item that could affect the travelling public, the Inspection Team Leader contacts the Chief Section Engineer to communicate their findings. The Inspection Team then will attempt to close the road and detour traffic. The Chief Section Engineer then contacts the local municipality that the structure needs to be closed due to a safety issue and requests assistance from local law enforcement until the County Sign Shop can arrive to set up barricades and a detour. At the same time, the Chief Section Engineer notifies the County Administration that a closure has been put into place so that a press release can be sent out to the travelling public.

CONCLUSIONS AND RECOMMENDATIONS

- SFN 1830503
    - Channel Photos – Need a better picture of south side
- SFN 1831771
    - This bridge was replaced – no review
- SFN 1835203
    - Could not access – was not reviewed
- James Hazimahalis needs to complete the Grandfather Clause Checklist and upload it to Asset Wise.
- Jeff Dobransky needs to prepare the Grandfather Clause Checklist and upload it to Asset Wise.
- SFN 1832107 and SFN 1833758 reviewed. SFN 1832107 FC files need improvement. See discussion above for details. All FC bridges should be checked for FC plan completeness
- 1876082 UW inspection procedure needs to be created. Use BIM appendix F. Check all UW inspection bridges for complete UW inspection procedure unique to each bridge.
- 4 bridges are load rated by documented engineering judgement. The county will check their files on these 4 bridges and be sure that there is a BR100 in the file

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 fourbridges 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.

(C)	Compliant	**(CC)**	Conditionally Compliant (per approved PCA)
(SC)	Substantially 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
2	Must meet comprehensive within 6 months
3	Must take refresher within 12 months and meet comprehensive within 6 months
2&3	if not taken with 6/12 nonths - considered NC Non-compliant
5	Be sure diver certifications are in the file and uploaded to ASsetWise
16	Need FPD list, FCM ID, Frequency and Risk Factors in the Insp Procedure
17	Need complete and unique UW inspection procedure, use ODOT MBI Appendix F