National Bridge Inspection Standards &
Bridge Maintenance Program Review
Allen County
December 5, 2013

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

IN ATTENDANCE:

Brion Rhodes, Chief Deputy Engineer
Scott Little, Team Member
Jim Hanf, Team Leader
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Allen County personnel, reviews of inspection and inventory data, and reviews of Allen County bridge records. The office evaluation assessed Allen 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 Allen 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
0241059	ALL C0024-0119	111	1934	21'	4A	same
0232505	ALL T0108-0085	321	1919/61	28'	3P	same
0249610	ALL ML011-0010	231	1983	187'	4P	same
0239143	ALL C0209-0285	34A	1995	151'	5A	same
0243655	ALL T0257-0074	321	1965	38'	5B	4P
0247596	ALL MB270-0641	195	1925	76'	4A	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 NHS system beginning April 1, 2015.

Allen County has inspection responsibilities for 372 bridges, 250 of which are longer than 20 feet in length and 122 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. Allen County records showed 378 bridges but their records include some bridges less than 10'. The county should review compare their list against the one from the BMS and assure that all bridges are properly included. Review of the inventory span lengths showed possible 12 bridges had the NBIS Y/N coded incorrectly. The county will review the lengths and make any corrections necessary.

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"), and there are only minor issues in regards to complete compliance with the National Bridge Inspection Standards (NBIS). Comments are listed below.

Inspection Procedures

Allen County uses their own staff to do the inspections. The inspector brings last year's inspection form to the bridge. Comments from the previous inspection are also brought to the bridge. Ratings are marked up on paper in the field and are put into the BMS. The inventory is input to the BMS using the CEAO program, and inspections are input using direct entry to the BMS. Comments are written on the BR-86 paper form and also kept in a local Bridge Database. The county was informed that ratings of 5 or lower require complete comments describing Location, Extent, and Severity, (LES) including pictures or sketches. The comments that the county has been making were sometimes quite thorough, but improvements could be made in detailing the Location, Extent, and Severity of the defects. Allen County inspection personnel are inspecting bridges in compliance with the Manual and the NBIS. The ratings properly reflected the field conditions within 1 rating value when compared to the Manual.

A review of the BMS inspection records indicated that an average of 3.7 inspections per day were completed in 2012 and the highest number was 11 inspections per day. The inspections include some smaller bridges between 10'-20' as well as NBIS length bridges. The county was

advised that a high number of inspections per day (>10), while not a violation of the NBIS, it could result in deeper scrutiny of the inspection bridge program.

The County uses the ODOT snooper on 7 bridges, although it could be used on as many as 16. The frequency ranges from every other year to once every 5 years. The inspector does use photographs to document deficient bridge conditions and photographs are available for every bridge.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Allen County was current on all annual inspections. The NBIS maximum inspection frequency of two years is met. All Bridges over 10 feet in length are inspected annually. No bridges are inspected more often than once per year.

Qualification and Duties of Personnel

Mr. Timothy Piper is the County Engineer and as such has overall responsibility for the bridge program. He is a PE and PS.

Mr. Brion Rhodes is the Program Manager and Reviewer. He is a PE and PS and has approximately 16 years inspection experience. He took the ODOT Level 1 & 2 Bridge Inspection courses in 2008. He also took the Refresher (SMS class) in 2013. He is qualified as a Program Manager and Reviewer.

Mr. Scott Little is a Team Member. He has approximately 4 years of bridge inspection experience. Also, Mr. Little took the ODOT level 1 and 2 Bridge Inspection classes in 2010 and the SMS Refresher training in 2013. He is qualified as a Team Member.

Mr. Jim Hanf is a Team Leader. He took the ODOT level 1 and 2 Bridge Inspection classes in 2009 and the Refresher (SMS class) in March 2013. He has 19 years inspection experience. He is qualified as a Team Leader.

Mr. Mike Stechschulte is a Team Member. He completed the ODOT Level 1 and 2 Bridge Inspection classes in 2009. He has 17 years bridge construction experience and 3 years inspection experience. He is qualified as a Team Member.

Inspection Reports

As part of this review, six bridges were field reviewed to compare conditions with the most recent BR-86. The General Appraisals for all bridges, except one, matched the Manual and that one was within 1 rating value. Four Summary Items differed from the Manual by 1 rating, which is allowed. Summary items correspond with the NBIS inspection items. All discrepancies were discussed at the bridge site. The inspection condition ratings were done in compliance with the Manual.

Inventory Items

During the Field Review, the CEAO QA/QC Engineer checked select inventory items and the following minor issues were found:
- SFN 0243655, SFN 0249610, and SFN 0239143 had incorrect Approach Roadway Width (item 49).
-SFN 0239143 also had an incorrect rating in the guardrail survey Item 69.

During the Office portion of the review, additional inventory items in the BMS were checked the following were found:
-Discrepancies were found on 2 bridges where the # of Spans and Span Length did not correlate to the Overall Length. SFN's 0249688, 0241636. These bridges should be checked to be sure the codings are correct.
- SFN 0249580 is a steel pony truss that was coded FC=N. It should be coded FC=Y and the county should ensure the FC inspection and complete FC plan, including FPD and Procedure are done.

Also during the review of the BMS data, 6 (2.4%) bridges showed the General Appraisal did not match the lowest of the Superstructure, Substructure, or Culvert Summaries. This should be improved. Also, the 1-4 codes correlation to 0-9 codes showed 50 (1.0%) instances of inconsistency. If deviations in the 1-4 coding are necessary, then the inspection comments should explain why.

Files

Allen County maintains Bridge files in various places. Originals are in the vault, bridge files are in Brion or Scott's cabinets, Plans, Drawings, FC files, photos and load ratings are stored digitally. Maintenance records are kept by the Bridge Maintenance Superintendent.

Bridge load rating files for SFN 0249610, 0234699 and 0249602 were checked and found satisfactory, including the PE name and stamp of the load rating engineer. Section loss is accounted for in the calculations.

FC files for SFN 0236829 and 0253898 were checked and the FCM's were shown and identified. The bridges did have a Fracture Critical Plan but it did not include Fatigue Prone details. A FC inspection Procedure was not done for either bridge. The county should prepare a Fatigue Prone Details list and Inspection Procedure for each FC bridge. Gusset plate calculations were checked for these two bridges and it was found that the Gusset Plate calculations did not include the unstiffened edge length test. This is an issue with different opinions as to it's importance and the issue was explained to the county. It was recommended that the county have the unstiffened edge length checked, just so that they know where they are on that issue.

Load Rating

The inventory shows 250 (100.0%) of the County bridges have been load rated or evaluated with Engineering Judgment.

Load Posting

The BMS showed Allen County has 16 bridges that are load posted for capacity and 0 posted for other reasons. 2 bridges are closed. If the county needs to post a bridge they use Operating Rating to post their bridges and Silhouette signs are used (they used Gross tonnage in the past). 3 bridges were recommended for posting and 6 bridges were below 100% legal but not posted. These are all steel culverts with shallow fill and the county is doing testing on these to determine the necessity of posting.

Special Features

The County has no bridges with special features as defined by the Manual.

Fracture Critical Bridges

Allen County has 22 fracture critical bridges. All FC inspections are current. One bridge was found to be coded incorrectly as FC=N. The county will correct this and the correct FC count will go to 23.

Underwater Inspections and Scour

No bridges need an Underwater inspection according to the county and the BMS.

QA/QC

The county does use reviews and trains the Bridge Superintendent in Inspection for QA/QC purposes. The QA/QC section of the new Bridge Inspection Manual meets the FHWA requirement.

Critical Findings

The county did not have a Critical Findings procedure at the QAR review. They will create one. The county was given a copy of the ODOT flowchart.

Bridge Maintenance

The County has a county bridge crew of 4 men to do bridge work and a budget of approximately $250,000. Work performed on bridges includes clear brush, deck and approach repair, guardrail, and erosion control.

The county has a contract construction program that does complete replacements. The amount varies from year to year (some years $0). The county uses federal funds and does use credit bridge funds.

Plans for emergency projects are done by the bridge staff, or consultants, depending on the nature of the repair. The work is done by county forces. Projects are selected by inspection conditions, traffic count, and budget. Labor, equipment and materials are all documented.

CONCLUSIONS AND RECOMMENDATIONS

1. The following should be corrected:

- SFN 0243655, SFN 0249610, and SFN 0239143 had incorrect Approach Roadway Width (item 49).
-SFN 0239143 also had an incorrect rating in the guardrail survey Item 69.
-Discrepancies were found on 2 bridges where the # of Spans and Span Length did not correlate to the Overall Length. SFN's 0249688, 0241636. These bridges should be checked to be sure the codings are correct.
- SFN 0249580 is a steel pony truss that was coded FC=N. It should be coded FC=Y and the county should ensure the FC inspection and complete FC plan, including FPD and Procedure are done.

2. Also during the review of the BMS data, 6 (2.4%) bridges showed the General Appraisal did not match the lowest of the Superstructure, Substructure, or Culvert Summaries. This should be improved. Also, the 1-4 codes correlation to 0-9 codes showed 50 (1.0%) instances of inconsistency. If deviations in the 1-4 coding are necessary, then the inspection comments should explain why.

3. The county records showed a different number of bridges than the BMS. The county should review the bridges to be sure the number of bridges is correct in the BMS.

4. Review of the inventory span lengths showed possibly 12 bridges had the NBIS Y/N coded incorrectly. The county should check the measurements in the field and make any corrections that are necessary.

5. Comments should be improved to assure that Location, Extent and Severity are properly described, especially when the GA<6.

6. SFN 0236829 and 0253898 had a Fracture Critical Plan but it did not include Fatigue Prone details or FC inspection Procedure. The county should prepare a FP details list and Inspection Procedure for each FC bridge.

7. The county did not have a Critical Findings procedure. They will need to create one.

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

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 ** 97%				
23	Updating of Data				

* based on office review

** based on results of Field Review

Metric	Action Needed
12	Use complete L-E-S comments when Summary is 5 or lower
16	Develop FC plan and do FC Inspection for SFN 0249580 by next inspection cycle
16	Develop Fatigue Prone details and Procedure for all FC bridges within 1 yr.
21	Develop Critical Findings Procedure