National Bridge Inspection Standards & Bridge Maintenance Program Review
Adams County
December 2, 2014

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

IN ATTENDANCE:

David Hook, Adams County Engineer
John Young, Team Leader
Danny Lee Pertuset, Bridge Engineer
Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Adams County personnel, reviews of inspection and inventory data, and reviews of Adams County bridge records. The office evaluation assessed Adams County's organization, procedures, resources, and documentation regarding the inspection, inventory, and maintenance operations for bridges. In addition, field reviews of eight 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 Adams 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
0137057	ADA 0C01J-56.80	112	1976	124'	7A	6A
0133876	ADA 0C27C-04.95	595	1937	17'	6A	same
0133892	ADA 0C27A-05.32	111	1937	15'	6A	7A
0136018	ADA 0T126-12.60	321	1965	26'	6A	same
0137588	ADA C0198-09.42	695	1984	14'	6A	same
0135658	ADA T-88A-09.30	321	1952	18'	5A	same
0138223	ADA T-90C-020.10	344	2001	47'	8A	same
0133914	ADA 0C27E-54.80	171	1935	12'	6A	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. Adams County has 0 bridges on the expanded NHS.

Adams County has inspection responsibilities for 256 bridges, 109 of which are longer than 20 feet in length and 147 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. Adams County records showed 262 bridges. The county noted that 6 bridges were not yet put into the SMS yet. 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

Adams County uses their own staff to do the bridge inspections. The inspector brings last year's inspection to the bridge on computer and changes are put into the laptop in the field. Data is put into the CEAO program and spreadsheet at the bridge and will be put into the SMS in the office. The county is transitioning to the SMS. Comments are recorded on a separate spreadsheet. The county was advised that because the CEAO program does not have the correct items to match the SMS, they should move away from using that software. The county was reminded that ratings of below 5 require complete comments describing Location, Extent, and Severity (LES), including pictures and/or sketches. The county will need to improve the comments by adding more detail in the quantities described in the comments.

A review of the BMS inspection records indicated that an average of 5.0 inspections per day were completed in 2013 and the highest number was 13 inspections per day. The inspections include some smaller bridges between 10'-20' as well as NBIS length bridges. It is understood that new bridges and precast structures don't take as much time, and distance between bridges makes a difference. However, the county was advised that a high number of inspections per day (>10), while not a violation of the NBIS, could result in deeper scrutiny of the inspection bridge program by FHWA.

The County does not need a snooper for inspection. The inspector does use photographs to document deficient bridge conditions and but photographs are not available for every bridge.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. The SMS showed Adams County had all bridges inspected in 2013. 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. David Hook is the County Engineer. As such he is ultimately responsible for the bridge program in the county.

Mr. Jon Young is the Program Manager and Team Leader. He is not a PE but he has approximately 15 years inspection experience. He took the ODOT Bridge Inspection courses Level 1&2 in 2001. He took the Inspection Refresher Training, SMS training in 2013. He is qualified as a Program Manager and Team Leader.

Mr. Danny Lee Pertuset is the Reviewer. He is a PE and has 11 years of inspection experience. However, he has not taken the inspection training classes. He has taken inspection refresher classes, specifically Bridge Inspection Manual in 2012 and SMS training in 2013. He is qualified to be a reviewer.

Mr. Danny Lee Pertuset did some of the Load Ratings. He is a registered Professional Engineer in Ohio, license number 76159. He is qualified to do load ratings. Additionally, Mr. Greg Boyer of Prime Engineering did some load ratings. He is a registered Professional Engineer in Ohio, license number 54301. He is qualified to do load ratings.

Inspection Reports

As part of this review, eight bridges were field reviewed to compare conditions with the most recent inspection report. The individual condition ratings for all eight 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, the following inventory items were discussed:

Steel trusses are coded as Thru Trusses (344). Pony trusses should be coded as 34A. (item 43C in the SMS should be A)

14 bridges are coded with a Pier having Unknown Foundations but they are single span bridges so they have no Pier. The coding should be changed to U.

3 bridges have the Operating and Inventory Rating Factors equal to each other. This should only happen with shallow cover steel culverts.

20 bridges were evaluated by Field Evaluation and Engineering Judgment. This is acceptable except that they need to have a BR-100 Load Rating Summary completed and placed in the bridge file.

71 ratings showed a discrepancy in the rating consistency. The rule is a 9,8,7 in the 0-9 scale correlates to a 1 in the 1-4 scale; 6,5 correlates to a 2; 4.3 correlates to a 3; and 2,1,0 correlates to a 4. This rule was not followed in 4.1% of the time. A more reasonable number would be 1% or lower and any ratings deviating from the rule should be explained in the comments.

8 bridges showed a FC inspection date in 2012 and the 2014 date was not yet in the BMS. These would become overdue if not corrected.

9 bridges showed a problem in the overall length when compared to the spans and span lengths. These need checked and corrected, either the number of spans or the overall length is wrong.

13 bridges had missing latitude longitude coordinates. These need updated.

During the Field Review, the CEAO QA/QC Engineer checked select inventory items and the following issues were found:

SFN 0137057, 0133914 and 0133892 Deck Width was wrong

SFN 0133892 Guardrail type was wrong

SFN 0136018 Approach Roadway Alignment was wrong

SFN 0136018 Approach Pavement Material was wrong

SFN 0133892, 0133914 and 0136018 Approach Roadway Width was wrong.

SFN 0135658 Deck Drainage was wrong

SFN 0135658 Number of Lanes on Structure was wrong

SFN 0138223 Structure Type was wrong

SFN 0133914 Culvert Type Item 575 was wrong

Files
Adams County maintains Bridge files in individual files either in filing cabinets or on computer. FC files are incomplete and are discussed later under the FC section. The county was advised to consider channel X-sections on bridges where a pier is in the water.

Load Rating
The inventory shows 108 (100.0%) of the County bridges have been Load Rated or evaluated by Engineering Judgment. 1 bridge is not load rated because it is a conveyor belt over the road. (20 bridges were evaluated by Field Evaluation and Documented Engineering Judgment, code 0)

Load Ratings were checked for SFN 0131156, 0135461 and 0133744. On 2 of the bridges the load posting at the bridge did not match the load ratings. The proper way to determine the load posting was explained to the county. The county was advised that they should review all posted bridges to ensure that they match the load rating in the file.

BR-100 Load Rating Summaries should be done for the 20 bridges rated by Documented Engineering Judgment and they should contain the “reasoning” that was used to arrive at the load rating.

Also, the load ratings did not contain a PE stamp and signature. However, the county had a stamped and signed cover letter to state that all load ratings were done by a PE.

Load Posting
Adams County has 35 bridges that are load posted. 0 bridges are closed. If the county needs to post a bridge they base the posting on Operating Rating and Gross Tonnage signs are used. The proper way to determine the load posting was explained to the county. Some bridges were found to not have signs at the bridge when they should have been posted. The county was urged to post signs as soon as possible.

Special Features
The County has 0 bridges with special features.

Fracture Critical Bridges
Adams County has 19 bridges labeled as a fracture critical bridge in the SMS, but one is the conveyor belt over the road, so they have 18 FC bridges.

FC Files were checked for SFN 0133299 and 0134619. FC files did not contain the identification of the FC Members. The files also did not contain the Fatigue Prone details and FC Inspection Procedures. The requirements of the Metrics was explained to the county and a sample FC Plan was given to them.

Gusset Plate calculations were checked for SFN 0130257. Unstiffened Edge Length calculations were not in the calculations. The issue of gusset plates with Unstiffened Edge Length calculations that result in NG was explained to the county.

Underwater Inspections and Scour

0 bridges need an underwater inspection. 0 bridges were coded as Scour Critical. All bridges have been evaluated for scour and none are 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.

Critical Findings

The county did not have a Critical Findings procedure in place. They were given a copy of the model flowchart and urged to adopt a Procedure as required by the Metrics.

Bridge Maintenance

The County does force account bridge work as needed. They use a bridge crew of 3 to do bridge work. Work performed on bridges includes any type that can be done by a small crew, typically on spans 30' or less. Approximately $75,000 is budgeted for force account materials annually.

The county has a contract construction program that does bridge replacements over 30' span. Typically the County does not use federal funds and credit bridge funds, however they have one project in the pipeline for future federal funding. The construction program uses about $75,000 of county funds.

Plans for emergency projects are done in house by consultants for severe work and by the road superintendent for moderate work. The work is done by contractor or county forces, depending on the complexity. Projects are selected by the sufficiency rating and inspecgtor recommendation. Labor, equipment and materials are all documented.

CONCLUSIONS AND RECOMMENDATIONS

1. Steel trusses are coded as Thru Trusses (344). Pony trusses should be coded as 34A. (item 43C in the SMS should be A)

14 bridges are coded with a Pier having Unknown Foundations but they are single span bridges so they have no Pier. The coding should be changed to U.

3 bridges have the Operating and Inventory Rating Factors equal to each other. This should be checked and corrected since it should only happen with shallow cover steel culverts.

71 ratings showed a discrepancy in the rating consistency. The rule is a 9,8,7 in the 0-9 scale correlates to a 1 in the 1-4 scale; 6,5 correlates to a 2; 4.3 correlates to a 3; and 2,1,0 correlates to a 4. This rule was not followed in 4.1% of the time. The inspector should follow this rule closer and document in the comments when he deviates from the rule.

8 bridges showed a FC inspection date in 2012 and the 2014 date was not yet in the BMS. These should have the FC inspection date updated.

9 bridges showed a problem in the overall length when compared to the spans and span lengths. These need checked and corrected, either the number of spans or the overall length is wrong.

13 bridges had missing latitude longitude coordinates. These need updated.

SFN 0137057, 0133914 and 0133892 Deck Width was wrong

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SFN 0135658 Deck Drainage was wrong

SFN 0135658 Number of Lanes on Structure was wrong

SFN 0138223 Structure Type was wrong

SFN 0133914 Culvert Type Item 575 was wrong

2. The county uses the CEAO program to gather field data. They were advised that because the CEAO program does not have the correct items to match the SMS, they should move away from using that software.

3. The county was advised to consider channel X-sections on bridges where a pier is in the water. They were also advised that any bridges with potential scour issues should have a written scour evaluation.

4. The county was informed that ratings of below 5 require complete comments describing Location, Extent, and Severity (LES), including pictures and/or sketches. The county should improve their inspection comments by adding more detail in the quantities described in the comments.

5. The county was advised that they should review all posted bridges to ensure that the posting sign matches the load rating in the file. Bridges that don't have signs need to be corrected as soon as possible.

6. BR-100 Load Rating Summaries should be done for the 20 bridges rated by Documented Engineering Judgment and they should contain the "reasoning" that was used to arrive at the load rating.

7. The county was given a copy of the model flowchart for the Critical Findings Procedure and and urged to adopt the Procedure (or something similar) as required by the Metrics.

8. The FC files did not contain the identification of the FC Members. The files also did not contain the Fatigue Prone details and FC Inspection Procedures. The county needs to add these items to the Bridge file to meet the requirements of the Metrics.

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 eight 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 **	96%	■			
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 **	94%		■		
23	Updating of Data		■			

** based on results of Field Review

Metric	Action Needed
10	update 2012 FC inspection dates to later date
14	post all bridges that have load analysis indicating < 100% legal
16	Add FC member Identification, Fatigue Prone details and Insp. Procedure to files