

**National Bridge Inspection Standards &
 Bridge Maintenance Program Review
 Preble County
 July 8, 2013**

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

IN ATTENDANCE:

Kyle Cross, Preble County Engineer
 Ron Smith, Preble County Bridge Inspector
 Mark Stockman, CEAO Federal Bridge QA/QC Engineer

SCOPE OF REVIEW:

The review consisted of interviews with Preble County personnel, reviews of inspection and inventory data, and reviews of Preble County bridge records. The office evaluation assessed Preble 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 Preble 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
6837190	PRE C0034-0800	121	1920	34'	3A	same
6833160	PRE T0158-0050	321	1900	49'	4A	same
6836348	PRE C0097-0290	231	1900/70	73'	4P	same
6833365	PRE C0031-0285	131	1980	62'	3A	4P
6836356	PRE C0097-0165	111	1900	24'	3A	same
6830315	PRE C0012-0780	321	1968/92	54'	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 NHS system beginning April 1, 2015.

Preble County has inspection responsibilities for 416 bridges, 229 of which are longer than 20 feet in length and 187 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. Preble County records showed 405 bridges (227/178). The county should review their records and be sure the bridges are properly inventoried. The county indicated the difference is likely the city bridges since the county inspects the city bridges. Review of the inventory span lengths showed all bridges were coded correctly as NBIS = Y or N.

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"), but there are some exceptions to complete compliance with the National Bridge Inspection Standards (NBIS) listed below. The County was aware of the timetable of the CEAO Statewide NBIS Plan to obtain complete compliance and they have a schedule to load rate all of their bridges by October 1, 2013 deadline.

Inspection Procedures

Preble County uses their own staff to do the inspections. The inspector brings a blank BR-86 inspection form to the bridge. A laptop is also used at the bridge. Comments from the inspection are brought to the bridge. Ratings are marked up on paper and data is transferred to the computer at the bridge and ratings are put into the BMS using direct entry. Comments are written on the BR-86 and a separate notepad. The county was informed that ratings of 5 or lower require complete comments describing Location, Extent, and Severity, including pictures or sketches. Preble 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 inspections per day were completed in 2012 and the highest number was 7 inspections per day. The frequency of inspections is within NBIS guidelines. The inspections include some smaller bridges between 10'-20' as well as NBIS length bridges.

The County does not need a snooperscope for bridge inspections. The inspector does not use photographs to document deficient bridge conditions and photographs are not available for every bridge. The county was advised that photographs would be a good idea for documenting problems and would be required on the worse bridges.

Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Preble 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. R. Kyle Cross is the County Engineer and as such has overall responsibility for the bridge program. He also serves as the Reviewer. He is a PE and has approximately 6 years inspection experience.

Mr. Ronald A. Smith is the Program Manager and Team Leader. He has 20 years bridge inspection experience. He took the ODOT Bridge Inspection Training in 1994 and the Advanced Training in 1998. He took a Refresher training in 2011. He is qualified as a Program Manager and Team Leader.

Inspection Reports

As part of this review, six bridges were field reviewed to compare conditions with the most recent BR-86. The General Appraisals and Summary Items for all of the 6 bridges matched the Manual within 1 rating value. 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 6836356, 6836348, 6833160 and 6833365 had the approach roadway alignment incorrect
- SFN 6836348 had an incorrect # of lanes on the structure.
- SFN 6836356 had an incorrect structure type because the beam are entirely encased

During the Office portion of the review, additional inventory items in the BMS were checked the following were found:

- 1 bridge was missing latitude and longitude coordinates
- 2 bridges were posted but had % legal at or above 100%

Also during the review of the BMS data, 2 (0.9%) bridges showed the General Appraisal did not match the lowest of the Superstructure, Substructure, or Culvert Summaries. This should be improved in the future. However, the 1-4 codes correlating to 0-9 codes was very good, finding only 2 (0.0%) instances of inconsistency. If deviations are necessary, then the inspection comments should explain why.

Files

Preble County maintains Bridge files in a file cabinet that include inspections, FC files, scour evaluations and POA's, shop drawings, photos and sketches, load postings, and hydraulic data. Design calculations are kept in project files. Load rating reports are in the consultant files or on computer. Repairs and maintenance records are kept in the Softworks software program. Plan in are the plan file and most are also kept on computer.

Bridge load rating files for SFN 6838162, 6830129 and 6831729 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 6838162 and 6830129 were checked and the FCM's were shown and identified. The bridges did have Fatigue Prone details identified. SFN 6830129 had a FC inspection procedure but SFN 6838162 was missing the inspection procedure. The county needs to ensure all FC bridges have an inspection procedure unique to that bridge by April 1, 2015.

Gusset plate calculations were checked for SFN 6838162 and 6830129 and the PE name and signature were located. The unstiffened edge length test was included.

Load Rating

The inventory shows 221 (97.8%) of the County bridges have been load rated. (By the time this report was written, the county had reached 100% of load ratings on the NBIS bridges.

Load Posting

The BMS showed Preble County has 18 bridges that are load posted for capacity and 0 posted for other reasons. 3 bridges are closed. The county is using Operating Rating to post their bridges and Gross Tonnage signs are used.

Special Features

The County has no bridges with special features.

Fracture Critical Bridges

Preble County has 17 fracture critical bridges. All FC inspection are current.

Underwater Inspections and Scour

No bridges need an Underwater inspection. All bridges were evaluated for Scour.

QA/QC

The county does not have an written internal QA/QC procedure, however, reviews are made of the inspection by a qualified independent PE who does not do the inspections.

Critical Findings

The county does not have a Critical Findings procedure. They were given a flowchart developed by ODOT that would satisfy the Metric.

Bridge Maintenance

The County has a county crew of 6 full time employees to do bridge work. Work performed on bridges includes small bridges up to 37' and plating steel beam holes.

The county has a contract construction program that does complete replacements, approximately \$150,000 local funds and \$2,000,000 federal funds per year. The county uses federal funds and does use credit bridge funds.

Plans for emergency projects are done by office staff, and the work is done by county forces. Projects are selected by inspection conditions, correlated with future road resurfacing or reconstruction projects. Labor, equipment and materials are all documented.

CONCLUSIONS AND RECOMMENDATIONS

1. The following should be corrected:

- SFN 6836356, 6836348, 6833160 and 6833365 had the approach roadway alignment incorrect
- SFN 6836348 had an incorrect # of lanes on the structure.
- SFN 6836356 had an incorrect structure type because the beam are entirely encased
- 1 bridge was missing latitude and longitude coordinates
- 2 bridges were posted but had % legal at or above 100%

2. Two (0.9%) bridges showed the General Appraisal did not match the lowest of the Superstructure, Substructure, or Culvert Summaries.

3. Fracture critical inspection procedures were not included in one of the FC files. The county needs to do these by April 1, 2015.

4. Photographs would be a good idea for documenting problems and they are required on the worse bridges.

5. A Critical Findings Procedure needs to be adopted.

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 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 96%				
23	Updating of Data				

** based on results of Field Review

Metric	Action Needed
16	develop FC inspection procedures for each FC bridge within year
21	Adopt Critical Findings procedure in writing within year