# National Bridge Inspection Standards & Bridge Maintenance Program Review Morgan County Oct 27, 2020

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## IN ATTENDANCE:

Clayton McCoy
Stevan Hook
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## SCOPE OF REVIEW:

The review consisted of interviews with Morgan County personnel, reviews of inspection and inventory data, and reviews of Morgan County bridge records. The office evaluation assessed Morgan 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 Morgan County to represent a variety of structure types and conditions. The bridges checked during the field review were:

| SFN | CTY-RTE-SECT | TYPE | County Rating | Suggested NBIS Rating |
|---|---|---|---|---|
| 5833256 | MRG C0070 01.957 | Steel Beam | 4P | 4 |
| 5832071 | MRG C0025 01.190 | Steel Beam | 5A | same |
| 5837480 | MRG T0110 00.530 | Concrete Slab | 5A | 4 |
| 5834449 | MRG C0052 03.819 | Steel Beam | 3P | same |
| 5834287 | MRG T0021 01.658 | Wood Truss | 5P | same |
| 5834198 | MRG T0011 01.411 | Steel Beam | 5A | 4 |

## 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.

Morgan County has inspection responsibilities for 202 bridges, 125 of which are longer than 20 feet in length and 77 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

Morgan County uses their own staff to do the inspections. Previous inspection reports are available at site for review. The previous year's inspection reports (paper) are brought out and changes are made as needed. The changes are then made to the inspection reports online and submitted for review through SMS/AssetWise. Bridge comments are recorded on the previous year's inspection report and then converted to electronic format at the office. Bridge plans are carried to the bridge site for review. Bridge plans are available at the Bridge Office, but not at the Bridge site. Photos are available for every bridge, and photos are taken of defects during inspection.

The County indicated that an average of 8-10 inspections per day were completed in 2020. It takes about 1 hour for Truss (pony/through/deck). It takes 45 minutes for Beam/Girders. For a slab, it takes about 30 minutes. For a Culvert, it takes about 30 minutes.

The County has 11 bridges that they often use a snooper for inspection if it's available, but it's not required by the county.

## Frequency of Inspections

Ohio State Transportation Laws require all State and local bridges to be inspected annually. Morgan County had 202 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 Team Leaders determine the need for a routine inspection frequency greater than once a year, based on deterioration and type of material.

There are not any bridges that require inspections more frequently than one year.

## Qualification and Duties of Personnel

Mr. Stevan Hook is the County Engineer. He was the Program Manager, but that role has been transferred to Clayton McCoy.

Mr. Clayton McCoy –. He is the Program Manager and a PE and has 6 years of inspection related experience. Comprehensive classes were in 2017 and the Refresher in 2020. All are uploaded to AssetWise and Approved.

Mr. John Wackerly is a Team Leader and a PE. He has 30 years of inspection related experience. He teaches NHI bridge inspection classes. His Comprehensive and Refresher are uploaded to Asset Wise and approved.

## Inspection Reports

As part of this review, six bridges were field reviewed to compare conditions with the most recent inspection report. The individual condition ratings for all six 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.

- SFN 5833256
  - Substructure – should be a 4 (not 5) based on backfill coming through the boards behind the abutment piling (timber lagging)
  - Notes for Deck, Substructure, and Superstructure are required to be in AW
  - Need to add comments showing Location, Extent, and Severity (LES), such as quantities and/or measurements such as size of pothole, gap, etc.
- SFN 5832071
  - Notes for Substructure, and Channel are required to be in AW
  - Need to add LES comments, such as quantities and/or measurements such as how much is the footer exposed, Angle of channel flowing into west wingwall, etc.
- SFN 5837480
  - Notes for Substructure need to be in AssetWiswe
  - Scour should be a 4 instead of a 6 based on depth of scour is more than “less than 12” and 1-1/2 feet scour undermining under the floor is more than “minor”
  - Substructure should be a 4 instead of a 5 based on rule that scour controls
  - LES Notes for Substructure are required to be in AW, such as; how much Honeycombing, How far undermined?
- SFN 5834449
  - Photos – Need photo of W. Abutment bottom concrete that is missing
  - Notes for Substructure and Channel are required to be in AW
  - Need LES comments for shifting stones and angle for channel flow. The lower the rating the more comments are needed.
- SFN 5834287
  - Channel Photos – Try for better angles
  - Notes for Substructure are required to be in AW
  - Since the Substructure is rated 5, a better description of abutment defect with LES in the comments is needed.
- SFN 5834198

- Substructure should be a 4 instead of a 5 due to amount of spalling > 10% and cracking > 20%
- Notes for Substructure and Channel are required to be in AW
- Need LES comments showing quantity and/or measurements on section loss or perforations
- Need channel comments and LES on these
- Comments should mention the multiple cracks

## Inventory Items

Complete the FC=Y/N and UW = Y/N switch on MRG-C0035-00.968_(5837278) at the next inspection

Review of the bridge data showed 29 bridges did not have comments in AssetWise when the rating was 5 or lower. This requirement became effective Nov of 2020, so the county will need to add comments in the 2021 inspections.

## Files

Morgan County keeps almost all of their files in the Engineer's office (paper and electronic). Files and photos are housed on the server as well as paper copies of the files in the filing cabinet in the office.

## Load Rating

The inventory shows 202 (100.00%) of the County bridges have been Load Rated or Load Rating was not applicable. There were 3 NBIS bridges evaluated by documented engineering judgement.

Load Ratings were checked for SFNs 5833256, 5834198, 5835070, 5834287. 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

Morgan County has 35 NBIS bridges that are load posted. There are 0 bridges closed for condition ratings. They use analysis to determine. Posting is based on Operating Rating. R12-H5 and Gross Tonnage Signs are the type of sign used for load posting.

## Special Features

There is 1 bridge with unique or special features. Deerfield Township #284 has a steel pin connector at the top of the wooden arch.

## Fracture Critical Bridges

The FC bridge inspection frequency is 24 months. However, for SFN 5835070, the consultant wrote in the FC Insp Procedure that FC inspections at each annual inspection. You are not doing annual FC inspections. For example, the 2020 inspection does not have a FC inspection. FHWA will hold you to this annual frequency since it is in the Procedure. The county should revise this section of the Procedure.

SFN FC plans for 5835070 and SFN 5835135 were reviewed. They both had FCM's identified. However, Fatigue Prone details were complete and the FC Inspection Procedure does not contain Risk Factors. For each FC bridge, complete a unique FC inspection Procedure, adding items such as the access, personnel requirements, risk factors, etc. that fit that bridge. BIM Appendix D may be used as a template for the FC inspection procedure.

The county is aware that the FC Plans are not complete and will complete them this year. Review each FC bridge in tension areas for E and E' welds. Create a Fatigue Prone list if needed. (fatigue prone details are also Risk factors and are included in the FC checklist in BIM Appendix E).

Gusset Plate calculations were satisfactory for SFN 5835135.

## Underwater Inspections and Scour

SFN 5825712 requires UW inspections. It was last performed in 2018. The UW Report recommends repairs on Pier 1 or 36 month measurements. The county has not done repairs and will do an UW inspection in summer of 2021.

## QA/QC

The QA/QC section of the 2014 Bridge Inspection Manual meets the FHWA requirement. The Inventory items are checked and updated during annual inspections. There are no quality assurance checks made during the inspection process other than spot checks performed by the County Engineer.

## Critical Findings

The county does have a Critical Findings Procedure in place located in the SMS. Inspectors inform and relay the information directly to the field superintendent and the county engineer. This is done both through written and oral communication. If a bridge requires emergency repairs, it is documented on a separate document. The Program Manager, Team Leader is who checks proper placement of signs. The field Superintendent also regularly checks for missing signage on daily road inspections.

## Bridge Maintenance

The County does contract bridge work as funding allows. The work includes painting, pile driving, specialized engineering needs, specialized concrete cutting. Contract replacement would include any project with an estimated cost greater than $100,000. The approximate annual budget is $400,000 to $500,000. Fed Funds are used for bridge replacement through the CEAO Program and Credit Bridge Funds are used for bridge replacement or rehab projects.

The county does force account bridge work and uses in-house staff that consists of typically a crew of 4 to 8, but anyone in the staff as needed. Typical work items include placement of scour protection, replacement or repairs of bridge decking or beams, guardrail repairs, replacement of the wearing surface. The approximate budget is $150,000 to $200,000.

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. 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 | improve comments to show LES when rating <=5 |
| 16 | Supply FC Insp Procedure and FPD for each FC bridge |