

# Delaware Quality Assurance Review 2022 Bridge Inspection Program

Prepared  
by Mark D Sherman P.E.

The scope of this review is to evaluate the agency's bridge inspection program based upon The Ohio Revised Code, the ODOT Manual of Bridge Inspection (MBI), and the National Bridge Inspection Standards (NBIS). This includes the following checklist, interviews with staff members responsible for the inspection program, review of files and documentation, and field inspection of bridges. Note: the inspection program includes inventory, maintenance and load rating in addition to the field inspections.

**Instructions for completing form:** Please fill out checklist prior to scheduled review.  
Brief answers are desired; fill the items out to the best of your ability.

**Agency:** Delaware County

**DATE:** 7/12/2022

**Questionnaire Completed by:** Andrew Fortman P.E.

## ***I. MAINTENANCE, REHABILITATION AND REPLACEMENT PROGRAM***

### **A. NUMBER OF BRIDGES WITH MAINTENANCE RESPONSIBILITY**

1. Greater than 20' long (NBIS length 23CFR 650c) (Metric 22) 170
2. Bridges >= 10' and <= 20' long (Metric 22) 211

### **B. PROCEDURES AND BUDGET**

1. Contract repairs and replacement per year

Replacements:(Enter Number): Culverts : 0 Bridges: 2

Rehabilitations (Enter Number): Culverts : 0 Bridges: 2

Replacements (Enter Number): Culverts : Bridges:

-List approximate annual budget: \$3,000,000

Are Credit Bridge funds used?

Are Fed Funds used?

2. In-house repairs and replacements

Replacements:(Enter Number): Culverts : 2 Bridges: 2  
Rehabilitations (Enter Number): Culverts : 0 Bridges: 0  
Replacements (Enter Number): Culverts : Bridges:  
List approximate annual budget: \$750,000

3. How are projects identified and selected? Check all that apply.

- Inspection reports.
- Sufficiency rating.
- Growth/development.
- Other...explain

4. How are plans developed for emergency repairs? Check all that apply.

- In-house
- Consultant
- Contractor
- Other explain

5. Who does the work of emergency repairs? Check all that apply.

- In house
- Contractor
- Other explain

6. How is repair work documented? (i.e. work record, time card, plans?)

- Work orders
- Time Cards
- Plans

7. Who is empowered to order emergency road closures and how is it done?

- Engineer?
- Sherriff?
- Commissioners?

County Operations Manager is contacted (24-hour contact by Cell phone). He would then order appropriate crews in for closure, barricades, police/EMS notifications, etc.

## II. INSPECTION PROGRAM

### A. NUMBER OF BRIDGES WITH INSPECTION RESPONSIBILITY

1. Greater than 20' long (NBIS length, ORC 5501.47, 5543.20) (Metric 22) 170
2. Between 10' and 20' long (ORC 5501.47, 5543.20) (Metric 22) 211

### B. STAFFING

1. Name of individual who is the **Program Manager** (makes FINAL DECISION). List qualifications/yrs. experience (bridge inspection experience) (Metric 1&2)

Name: Andrew Fortman P.E.

- Yrs. Inspection related experience: 14

- List courses attended (& approx. dates) ODOT Bridge Inspection Training (2008), ODOT Load Rating Hand Calculating Training (2009), CEAO Bridge Conferences (2010-2022), ODOT Load Rating RC Frames and Arches Training (2012), ODOT SMS Training (2013), ODOT Bridge Inspection Training - Element Level (2015), Ohio DOT Refresher (2020, Online)

2. Name of individual in charge of bridge inspection unit (**Reviewer**). List qualifications/yrs. experience (bridge inspection experience) (Metric 1)

Name: Andrew Fortman P.E.

- Yrs. Inspection related experience: 14

- List courses attended (& approx. dates) See Above.

3. **Team Leader** - individual in charge of bridge inspection team (INSPECTED BY). List qualifications/yrs. experience (bridge inspection experience) (Metric 1&3)

Name: Roy Conley

- Yrs. Inspection related experience: 12

- List courses attended (& approx. dates) ODOT Bridge Inspection Training (2010), ODOT SMS Training (2013), ODOT Bridge Inspection Refresher Training - Element Level (2015), Ohio DOT Refresher (2022, Online)

Indicate the percentage of time spent on the listed duties in the previous year

%TIME on inspections:

15 % Bridge/Culvert inspection

    % Bridge Design/Plan prep

    % Bridge Construction

    % Bridge Maintenance

- \_\_\_% Overload/Superloads
- \_\_\_% Surveying
- 85 % Other – Construction Field Inspection
- \_\_\_% 100% on Bridges only

**4. Load Rating Engineer** – Name of individual responsible for load ratings (must be PE)  
(Metric 4)

a. List Ohio PE # 76395 b. Name: Andrew Fortman P.E.

**5. Underwater Bridge Inspection Diver** – Name person doing dive inspections (Metric 5)

- Name: N/A (Consultant Task)

- Yrs. Inspection related experience:

- List courses attended (& approx dates )

**C. INSPECTION EQUIPMENT**

**1. Type of vehicle used for inspections**

- Pickup truck
- Van
- SUV
- Custom vehicle

**2. What typical inspection equipment does the inspection team normally carry with them to the inspection site? Check all that apply.**

- |  |  |
|--|--|
| <input type="checkbox"/> Extension Ladder Length ___ | <input checked="" type="checkbox"/> 6' Folding Rule      |
| <input type="checkbox"/> 100' Fiberglass Tape        | <input type="checkbox"/> Scraper                         |
| <input checked="" type="checkbox"/> Geologist Hammer | <input type="checkbox"/> Vertical Clearance Rod          |
| <input type="checkbox"/> Inspection Mirror           | <input checked="" type="checkbox"/> Probing Rod          |
| <input checked="" type="checkbox"/> Flashlight       | <input checked="" type="checkbox"/> Paint Stick/Crayon   |
| <input type="checkbox"/> Thermometer                 | <input checked="" type="checkbox"/> Hip Boots and Waders |
| <input type="checkbox"/> Plumb Bob                   | <input type="checkbox"/> Sounding Chains                 |
| <input checked="" type="checkbox"/> Camera           | <input type="checkbox"/> Wrenches                        |
| <input type="checkbox"/> 2'-0" Level                 | <input type="checkbox"/> Pliers                          |
| <input checked="" type="checkbox"/> Brush Hook/Axe   | <input type="checkbox"/> Screw Driver                    |
| <input type="checkbox"/> Boat                        | <input checked="" type="checkbox"/> Shovel               |

- First Aid Kit
- Wire Brush

Calipers

Other equipment not listed above:

**3. List types of NDT methods used? Circle all that apply.**

- Dye penetrant;     Magnetic particle;     Ultrasound;

Other None

**5. What equipment does your team have available for "hands on" access to FCM bridge members? (Metric 16)**

Extension ladders

**6. Use of equipment (Metric 16)**

- a. How many bridges need a snooper? 1
- b. How many bridges is it used on? 1
- c. How often? Every 2 years

**D. INSPECTION PROCEDURES**

**1. Approximately how many inspections were made during last calendar year? (Metric6)**

**381**

**2. Approximately how many inspections are scheduled for the current calendar year? (Metric 6)**

**381**

**3. Average number of inspections per day (Metric 6) **20****

**4. Approximately how long (hours) does it take to inspect average sized structures**

- a. Beam/Girder: Simple Span: 0.5 hrs.      Multi-span: 0.75 hrs.
- b. Slab bridge: Simple Span: 0.25 hrs.      Multi-span: 0.50 hrs.
- c. Truss (pony): Simple Span: 1 hrs.      Multi-span: 1.5 hrs.
- d. Through/deck): Simple Span: 1 hrs.      Multi-span: 1.5 hrs.
- e. Culvert:      Single cell 0.2 hrs.      Multiple Cells: 0.2 hrs.

5. Are previous inspection reports available at site for review? (Metric 15) Yes  No
6. Are bridge inspections recorded in field on  Paper  Electronically
7. Are photos available for every bridge? Yes  No  (If no, you need to start.)
8. Are photos posted in Assetwise? Yes  No  (If no, you need to start, and be selective.)
9. Are defects photos taken during inspection? Yes  No  (If no, you need to start.)
10. Are Bridge comments recorded in Assetwise? Yes  No  (If no, you need to start.)
11. Are previous bridge comments brought to the bridge? Yes  No  (If no, why not)
12. Are the bridge plans carried to the bridge site for review? (Metric 15). Yes  No
13. Are bridge records available for review in the bridge office? (Metric 15) Yes  No

7. Who determines the need for a routine inspection frequency greater than once Annually, and what criteria is used? (Metric 6)

**Explain:** Bridge Program Manager. Considerations would include GA  $\leq 4$ , evidence of rapid progression of deterioration between annual inspections, or other special circumstances.

8. Do you have bridges requiring insp. more frequently than 12 MO Yes  No

\_\_\_ Number due to **Damage** Choose an item. List frequency of inspection. (Metric 11)\_\_\_

\_\_\_ Number needing **In-depth** Choose an item. List frequency of inspection. (Metric 11)\_\_\_

\_\_\_ Number of **Special insp** Choose an item. List frequency of inspection. (Metric 11)

9. Does your inspection team believe it has enough time to do the job?

Yes  No

10. List your quality assurance checks made during the inspection process? (Metric 20)

Inspections are generally performed by a two-man team, using an iPad with Cellular connection, logged into Assetwise while onsite. Accordingly, the previous year's inspection report(s) and photos can be viewed as the current inspection is being

conducted. Any changes to ratings are verbally discussed by both team members, confirmed, and noted on-site in the new Assetwise inspection using the iPad at the bridge site. Bridge Program Manager reviews all inspections, including defect photos, and verifies changes from previous year in Assetwise. Built-in error checking in Assetwise is also reviewed.

**11. Do you have any bridges that need underwater inspections in less than 60-month intervals?** (Metric 8)

Yes  No  (Assetwise check)

**12. Do any bridges have fracture critical inspections performed more frequently than 24-month intervals?** (Metric 10)

Yes  No  (Assetwise check)

**13. Is a Team Leader at the bridge at all times during the following inspections?** (Metric 12)

Initial Inspection? Yes  No

Routine Annual Inspections? Yes  No

Special Inspections? Yes  No

Underwater Inspections? Yes  No

Fracture Critical Inspections? Yes  No

## **E. SCOUR CRITICAL BRIDGES (Guidance in ODOT Manual of Bridge Inspection)**

**1. No. of bridges considered scour susceptible? (Service over Water) Number 366**

**2. Number of bridges inspected by probing? Number Varies 5-50. There are ~5 bridges that are probed annually. Others may be probed during a particular annual inspection due to fluctuating water levels at time of inspection.**

**3. Number of Scour Critical bridges (item 113 - 3, 2, 1 or 0)? (Metric 18) Number 0.**

**4. Are Plans of Action (POA) complete and implemented for all bridges coded**

**“Scour Critical”?** (Metric 18) Yes  No  If no, Why? N/A

**5. How many structures are coded 6 on item 113 Scour Critical? (Metric 18) Number 0.**

**6. How are scour evaluations performed?** (Metric 18)

Inspection team will utilize a few methods depending on site characteristics and water depth. Many County structures can be assessed visually (above water or minimal flow), some will be probed (by rod or using inspector’s boots along the abutment wall/foundation. In the event of the inspector finds a condition of concern, a photo will be taken and it will be compared with detailed historical channel photos of the bridge to note limits and degree of channel meander or scour.

**7. Who determines the need for diving inspections and by what criteria?**

Bridge Program Manager. Dive necessity is based on historical knowledge of bridge site characteristics, foundation types, etc. The County currently has 7 bridges that require typical Underwater Dive inspections due to consistent depth of water (over or on the periphery of reservoirs) due to an established history of submerged foundations.

**F. INVENTORY**

**1. What kinds of inventory quality assurance checks are performed?** (Metric 22)

Who checks? **Reviewer**

How Often?...  With every inspection       Less often than once per year

**2. How often is the inventory checked for needed updates?** (Metric 22)

How Often?...  With every inspection       Less often than once per year

**3. How is the inventory data input into Assetwise?**

- Electronically, Direct into Assetwise from collector App. as bridge is inspected
- All at once at the end of the year from a paper copy into Assetwise
- As each inspection is complete from paper to computer to Assetwise.

**4. When is the updated/new inventory data forwarded to ODOT?** (Metric 23)

Changes discovered during inspection?    Yes     No

Changes from new construction or rehab? Yes     No

**5. NBIS requires that the inspecting organization maintain master lists of the following:**  
(Metric 16,17,11)

a. Bridges that contain fracture critical members, including the location and description of such members on the bridge and the inspection procedures of such members (Each individual FCM member on each FCM bridge must be clearly identified in the bridge file) (Where a FCM Identification Plan exists then look for remaining fatigue life). Master List?



Yes  Number 5: If, No, Why not? \_\_\_\_\_ NA

b. Bridges requiring underwater inspections.

Number 7 NA

c. Bridges with unique or special features (i.e., pin & hanger, draw, suspension)

Number \_\_\_\_\_ NA

**Note: An examination of the files will be performed during the review.**

Options: For the files listed below you can email a copy of a typical file or have them on hand for inspection.

- Bridge Files
- Scour Critical POA.
- Fracture Critical Plan.
- UW inspection Procedure

## G. PROCEDURES

1. Are new maintenance problems identified during bridge inspection? (Metric 15)

Yes  No

2. How do the inspectors inform maintenance personnel of routine bridge maintenance problems ( written, oral, other)? (Metric 15)

- Written work order.
- Electronic Communication.
- Oral direction.
- Other. Explain

3. Who do the inspectors notify when emergency repairs, or critical findings are necessary (action required within 1 week)? (Metric 21)

Check all that apply.

- County Engineer
- Bridge Superintendent
- County bridge Engineer
- Sherriff

How is this emergency action documented? (Must be entered and tracked in Assetwise)

Explain if different than procedure in Assetwise **N/A**

4. If a bridge requires emergency repairs, is this noted as part of the inspection report or as a separate document? (Metric 21)

A comment would generally be included on the applicable item of the Inspection form, but also communicated to the Bridge Program Manager verbally or by email.

**5. Who checks proper placement of signs (load posting, clearance, speed restriction, narrow bridge etc.)?** (Metric 15)

County Sign Crew leader. Signs would also be reviewed by the Bridge Inspection Team during annual inspection.

**H. LOAD ANALYSIS AND POSTING**

**1. Number of plans for existing bridges available for NBIS length bridges.** 117

**2. Number of plans for non-NBIS bridges (>= 10' and <= 20' long)** 202

**3. Number of bridges analyzed using the AASHTO Bridge Evaluation** (Metric 13) 134  
(NBIS) (remaining NBIS bridges are Precast or CIP structures w/o plans)

**By Whom** (Metric 13)

- Load Rating Engineer
- County Engineer
- Bridge Engineer
- Consultant

**4. When are bridges load rated, after initial rating. Check all that apply**

- Every 5 years regardless.
- When there is a significant change in condition rating.
- When wearing surface thickness increases more than 1-1/2 inches
- When permit load is requested
- other

**5. Methods used** (Metric 13)

- AAWSHTO BrR
- Hand Calculated
- Engineering Judgement (BR100)
- BARS or other proprietary software program
- Other Explain \_\_\_\_\_

**6. Number of NBIS length bridges “not ratable” at all due to lack of data and may have to be field tested.** (Metric 13) *(These are bridges that have a coding of 5, not 0 in the method of analysis Item.)*

Number 0 Plan of action for load rating these?

**7. Number of NBIS length bridges load posted** (Metric 14) **(Assetwise Check)**

Number of bridges posted 4. Number of bridges with posted Signs in the field 4.

8. List bridges closed due to condition rating (rough check) **None**

9. List bridges rated less than 100% Ohio legal load and not physically load posted, and resolution. (Assetwise Check)

**None**

10. Number of NBIS bridges with Gusset Plates (Metric 13) 5

11. Number of NBIS bridges with Gusset Plates analyzed. (Metric 13) 5

12. Describe filing system (where files are kept): (Metric 15)

- Inspection reports, including old inspections:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Design Calculations:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Plans:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Load analysis calculations:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Inventory forms:

- On paper file in Office
- Electronically
- In Assetwise

- All three
- Other

- Photos and sketches:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Repairs and maintenance history

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Scour evaluation:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Scour POA:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Fracture Critical File:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Load Posting/Closing:

- On paper file in Office
- Electronically
- In Assetwise
- All three
- Other

- Underwater inspections:
  - On paper file in Office
  - Electronically
  - In Assetwise
  - All three
  - Other
  
- Special inspection eqpt. or procedures:
  - On paper file in Office
  - Electronically
  - In Assetwise
  - All three
  - Other
  
- Flood data, waterway adequacy, channel cross sections:
  - On paper file in Office
  - Electronically
  - In Assetwise
  - All three
  - Other

**Note the NBIS Retention period:** BR-86 report 10 years, All records 3 years after bridge removed, Load rating calculations 3 years after a new rating is done.

13. What is the FC bridge inspection frequency? (Metric 16) **Every 24 Months**

14. Is the FC Plan completed for all FC bridges? (Metric 16) **Yes  No**

15. Are the FCM Identified in the FC Plan? (Metric 16) **Yes  No**

16. What is the underwater inspection frequency? (Metric 17) **Every 60 Months**

17. Are the underwater elements identified and located? (Metric 17) **Yes  No**

18. List any complex bridges: (Metric 19) **None**

19. Do the complex bridges require specialized inspection procedures and additional inspector training? (Metric 19)

Yes  No

Describe:

Other equipment not listed above:

## Part II: Field Review

### Inspection Reports (metric 12)

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 of the field sampled 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.

#### **Field Review:**

#### **DEL-C0024-0344\_(2130599) Concrete Continuous Slab**

Item 58 Deck.....6 Agreed

Item 59 Superstructure.....6 Agreed The fascia deterioration is beginning to encroach into the deck slab beyond the 2 foot rule. It is difficult to determine the % without specific measurements. While the rest of the deck is a 7 or better, I will not argue the rating given by the county.

Item 60 Substructure.....6 Agreed The rear abutment looks worse than it is. Sounding confirmed a 6 on the forward abutment.

Item 61 Channel.....8 Agreed

Item 61.01 Scour.....7 Agreed (This bridge is over a small arm of the reservoir and the flow is every slow regardless of any storm event or depth of water.) The pier bases can be probed when water levels are down.

Item 62 Culvert.....N

Item 36 Railing..... 0 0 0 0

Item 72 Approach Alignment .....8 Agreed

Comments: Good comments, could elaborate a little more on location and severity. (Looking for those magical percentages that give us consistent ratings.)

Defect Photos: Defect photos in Assetwise are really good needed to show the extent. (A picture of the entire slab bottom would be great, like the one below to put the defects in context as to where and how extensive they are.)



Channel Photos: There is one Very Good Channel Photo in Assetwise from downstream. We need another one from upstream looking east toward the bridge to be complete.

**DEL-C0054-0130\_(2130556)**

**Steel Beams w/ timber deck**

Item 58 Deck..... 6 Agreed

Item 59 Superstructure.....5 Agreed Could possibly be a 4. Only section loss measurements can determine the proper rating. See comments and defect photos.

Item 60 Substructure.....7 Agreed

Item 61 Channel.....7 Agreed

Item 61.01 Scour.....N ? There should be a rating here since it is over a stream.

Item 62 Culvert.....N

Item 36 Railing.....0 0 0 0 Agreed

Item 72 Approach Alignment ..... 8 Agreed

Comments: Very brief comments. "Significant surface corrosion and moderate to major delamination."

Given what we looked at in the field, Moderate to Major means it might be serious and measurements should be taken. Granted, the bridge is posted at 150% and due to the oversizing of the beams, it is unlikely there is enough section loss to be concerned. It is still worth the measurement to back up the rating of condition and % legal.

Defect Photos: Defect photos are a little too general. Need a few closeups to get a feel for the section loss and built-up rust should be removed in order to take good measurements. The built-up rust on the lower webs and flanges indicates potential section loss. Since nothing has been removed, you really can't say what is there and what is not. See review photos below.





The upper flange is not much better and is hard to see in the darkened areas.

Channel Photos: **The Channel photos in Assetwise are very good.**



**DEL-T0057-0030\_(2131587)**

**Concrete Tee beams**

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....6 Agreed
- Item 60 Substructure.....6 Agreed
  - Item 61 Channel..... 7 Agreed
    - Item 61.01 Scour..... 6 Agreed

Item 62 Culvert..... N

Item 36 Railing ..... 0 0 0 0 Railing is becoming a safety issue, as more concrete falls away. You may want to run that Deep Beam railing all of the way across the bridge, or use barriers.



Item 72 Approach Alignment .....5 Agreed

Comments: Comments are good! There are measurements and descriptions.

Defect Photos: Good Photos in general, as they are not required for a 6 rating, but good to have on hand.

Channel Photos: Channel Photos are good.

**DEL-T0070-0169\_(2131889)**

**Box Beams**

- Item 58 Deck..... 7 Agreed
- Item 59 Superstructure..... 7 Agreed
- Item 60 Substructure..... 5 Agreed
- Item 61 Channel.....8 Agreed
  - Item 61.01 Scour.....7 Agreed
- Item 62 Culvert.....N Agreed
- Item 36 Railing..... 0 0 0 0 Agreed
- Item 72 Approach Alignment ..... 8 Agreed

Comments: Great Comments!

Defect Photos: Great Defect Photos in Assetwise

Channel Photos: Channel Photos in Assetwise are very good as well!

**DEL-C0163-0431\_(2132680) Steel Truss**

- Item 58 Deck..... 6 Agreed
- Item 59 Superstructure.....6 Agreed
- Item 60 Substructure.....4 Agreed
- Item 61 Channel..... 7 Agreed
  - Item 61.01 Scour..... 7 Agreed
- Item 62 Culvert..... 5 Agreed
- Item 36 Railing..... 0 0 1 0 Agreed
- Item 72 Approach Alignment .....7 Agreed

Comments: [Good Comments in Assetwise.](#)  
 Defect Photos: [Good defect Photos in Assetwise.](#)  
 Channel Photos: [Good Channel Photos on file but not in Assetwise yet.](#)

**DEL-C0165-0102\_(2133938) Prestressed Box beams**

- Item 58 Deck.....7 Agreed
- Item 59 Superstructure.....7 Agreed [The beams look pretty good in spite of some leakage.](#)
- Item 60 Substructure.....4 Agreed
  - Item 61 Channel.....6 Agreed
    - Item 61.01 Scour..... 7 Agreed
- Item 62 Culvert.....N Agreed
- Item 36 Railing..... 0 0 0 0 Agreed
- Item 72 Approach Alignment .....5 Agreed

Comments: [Excellent Comments in Assetwise](#)  
 Defect Photos: [Good Photos in Assetwise](#)  
 Channel Photos: [Great Channel Photos on file but not in Assetwise yet.](#)

**DEL-C0164-0020\_(2135078) Steel culvert**

- Item 58 Deck.....N
- Item 59 Superstructure.....N
- Item 60 Substructure.....N
  - Item 61 Channel.....7 Agreed
    - Item 61.01 Scour.....7 Agreed
- Item 62 Culvert.....5
- Item 36 Railing..... N N N N Agreed
- Item 72 Approach Alignment .... 8 Agreed

Comments: [Good Comments](#)  
 Defect Photos: [Good defect Photos](#)  
 Channel Photos: [Channel Photos are good](#)

**Field Review Summary:**

Overall, the county is doing a good job with their bridge inspection program. Their records are complete and organized. I found their rating to be well within the parameters set by the manual with the +/- 1 point allowance. The condition comments could use a little more elaboration at times and corresponding photos would help. Most of the channel section photos are pretty good, but some need improvement in order to capture both abutments and the channel banks. *(Note: Delaware County has more extensive photos, and complete documentation in their office bridge files than what is posted in Assetwise. They are in the process of uploading more documentation into Assetwise.)*

## **PART III Office file Review**

Fracture critical bridges. **5**

Fracture Critical Member and Fatigue Prone Connection ID Plan. **5**

Bridge Load Rating Report, including Gusset plate analysis. **5**

Office Files sampled and reviewed: **2**

DEL C0172 0004 (2132680)

DEL C0180 0125 (2132753)

Underwater inspections **7**

Office files sampled and reviewed **2**

DEL-C0124 01680 (2134462)

DEL-T0077 00380 N (2135019)

POA for Scour **NA**

Scour susceptible bridges: **366, just about everything over water.**

Critical findings: **None**

All files are complete with all documentation concerning load rating, channel photos and defect photos, along with previous inspection reports. Their files are complete and comprehensive, documenting the history of every bridge through reports, plans and photographs and work orders.

## PART IV Snapshot DATA Summary of Program

<b>DELAWARE County 2022</b>			
<b>INVENTORY, APPRAISAL &amp; INSPECTION SNAPSHOT</b>			
11/10/2022			
<b>Inventory Data - NBIS Bridges Only</b>			
			<b>NBIS COUNT</b>
NBIS Bridges > 20'			170
Bridges 10'-20'			210
All Bridges			380
<b>Item 221 Inspection Responsibility</b>			
		<b>CODE</b>	<b># NBIS # ALL</b>
Data Tab Col BV, BW	County	2	170 380
<b>Item 21 Maintenance responsibility</b>			
		<b>CODE</b>	<b># NBIS # ALL</b>
Data Tab	County	2	165 370
Col D	City or other local	4	1 2
	Railroad	27	2 2
	Private (tohter than RR)	26	2 6
	State Park	11	0 0
	Local Park	23	0 0
	State Agency	1	0 0
	Township	3	0 0
			170 380
<b>Item 42A Type service on bridge</b>			
		<b>CODE</b>	<b># NBIS # ALL</b>
Data Tab	Other	0	0 0
Col Q	Highway	1	164 374
	Railroad	2	2 2
	Ped/Bikeway	3	4 4
	Hwy/RR	4	0 0
	Hwy/Ped	5	0 0
			170 380
<b>Item 42B Type service under bridge</b>			
		<b>CODE</b>	<b># NBIS # ALL</b>
Data Tab	Other	0	0 0
Col R	Hwy w/ or w/o Ped	1	7 7
	Railroad	2	1 1
	Ped/Bkwy	3	0 8
	Hwy w/ RR	4	0 0
	Waterway	5	162 364
	Hwy/Waterway	6	0 0
	RR/Waterway	7	0 0
	Hwy/Waterway/RR	8	0 0
	Relief (for waterways)	9	0 0
			170 380

All data is complete and correct in this section.

ITEMS 43A,B,C Structure Type		Data (Col M,N,O)	CODE	#NBIS	#ALL
Concrete Slab			101	0	4
Concrete Girder			103	1	5
Concrete Tee Beam			104	1	1
Concrete Frame			107	16	73
Concrete Culvert (incl frame culverts)			119	1	1
Concrete Continuous Slab			201	34	124
Concrete Continuous Box Beam/Girder Multiple			205	12	12
Steel Beam or Girder			302	35	49
Steel Thru Truss (includes Pony)			310	1	1
Steel Culvert (incl frame culverts)			319	8	8
Steel Continuous Beam or Girder			402	6	40
Prestressed Concrete Thru Arch			502	14	14
Prestr. Conc. Cont. Box Beam/Girder Multiple			505	6	6
Prestr. Conc. Cont. Box Beam/Girder Multiple			605	30	35
Timber Culvert (incl frame culverts)			719	2	2
Timber Deck Arch			811	2	2
Timber Culvert (incl frame culverts)			819	0	1
Aluminum or Iron Culvert (incl frame culverts)			919	1	2
				<b>170</b>	<b>380</b>
Item 92A Fracture Critical			CODE	#NBIS	#ALL
Data Tab	Requires FC Inspection		Y	5	n/a
Col U,V,Y	Requires FC Inspection		N	165	n/a
				<b>170</b>	<b>n/a</b>
			FC Switch Y/N is Blank	0	n/a
Item 113 Scour				#NBIS	#ALL
Data Tab	Bridge not over waterway		N	8	16
Col AA	unknown foundation		U	0	0
	over tidal waters		T	0	0
	foundations on dry land		9	0	0
	stable above footing		8	30	60
	countermeasures installed		7	0	0
	no scour evaluation made		6	0	0
	stable within footer limits		5	123	289
	stable action needed		4	9	15
	scour critical - unstable		3	0	0
	scour critical - scour present		2	0	0
	scour critical - failure imminent		1	0	0
	scour critical - bridge failed		0	0	0
				<b>170</b>	<b>380</b>

DEL-C0018-0153\_(2134187)      DEL-C0018-0502\_(2131366)      DEL-C0019-0287\_(2130467)  
DEL-C0034-0903\_(2133288)      DEL-C0044-0005\_(2133326)      DEL-C0051-0941\_(2135949)  
DEL-C0054-0130\_(2130556)      DEL-C0129-0390\_(2133709)      DEL-C0131-0052\_(2134136)  
DEL-T0012-0066\_(2134691)      DEL-T0063-0187\_(2133652)      DEL-T0069-0095\_(2134047)  
DEL-T0162-0083\_(2134152)      DEL-T0183-0468\_(2133555)      DEL-T0224-0592\_(2133199)

*The bridges above have a non-critical finding scour rating of 4, that requires corrective measures. Once the measures are implemented the scour rating should move to a 7.*

All data is complete and correct in this section.



Item 63	Documented Engineering Judgment			#NBIS	#ALL
		Field Eval & Doc EJ		30	n/a
		BR_100 for these bridges?			
Item 92B	Underwater		CODE	#NBIS	#ALL
Data Tab		requires dive inspection	N	163	n/a
Col W,X,Z		requires dive inspection	Y	7	n/a
				170	
Item 709	Plan Information		CODE	#NBIS	#ALL
Data Tab		plans not avail	0	33	39
Col. AW		plan avail	1	118	319
		field measured	2	13	15
		Field Testing	3	0	0
		not applicable	N	6	7
				170	380
Item 63	Method of Analysis		CODE	#NBIS	#ALL
Data Tab		Field Eval & Doc. Engr Judgment	0	30	36
Col. AV		Work Stress	1	0	0
		LFR	2	0	0
		LRFR	3	0	1
		load test	4	0	0
		No rating done	5	6	92
		LFR	6	88	155
		AS	7	16	27
		LRFR	8	30	66
		Assigned LFR HS20	D	0	2
		Assigned LRFR HL93	F	0	1
		not appl (RR, etc)	X	0	0
				170	380
<b>REMINDER:</b>					
	Load Factor required for bridges built after 1993		(exceptions: timber, etc,)		
	LRFR required for bridges built after 2010				

*Given the changes coming in 2023 and the now required shear analysis, please make sure your load rating documentations are complete and include a BR100 with complete statements of assumptions, measurements and methodologies for anything using engineering judgement.*

All data is complete and correct in this section.

<b>KEY METRICS</b>					
(C)	Compliant	(CC)	Conditionally Compliant		
(SC)	Substantially Compliant	(NC)	Non-Compliant		
		(NC)	(SC) If corrected within 6/12 months		
			Refresher=6 mo, Comprehensive=12 mo		
<b>METRIC 2 - Program Manager Qualification (from files examination)</b>					
<b>From Files review</b>		<b>Missing</b>	<b>#sampled</b>	<b>% PASS</b>	<b>COMPLIANCE</b>
PE /Experience		0	1	100.0%	(C)
Comprehensive		0	1	100.0%	(C)
Refresher		0	1	100.0%	(C)
<b>METRIC 3 - Team Leader Qualification (from files examination)</b>					
<b>From Files review</b>		<b>Missing</b>	<b>#sampled</b>	<b>% PASS</b>	<b>COMPLIANCE</b>
Degree /Experience		0	3	100.0%	(C)
Comprehensive		0	3	100.0%	(C)
Refresher		0	3	100.0%	(C)
<b>METRIC 6 Insp. Frequency Routine</b>					
<b>Bridge Inspections Overdue</b>		<b># OVERDUE</b>		<b>% PASS</b>	<b>COMPLIANCE</b>
Data Tab	NBIS - 24 months	0		100.0%	(C)
Col. AB	ORC - Calendar Year	1		99.4%	(SC)
Col. AB	All Routine insp.	2			
	BIM - 18 months	0		100.0%	(C)

All data is complete and correct in this section.

<b>Inspection Condition Data - NBIS Bridges Only</b>					
<b>Item 41</b>	<b>Operating Status</b>		<b>CODE</b>	<b>#NBIS</b>	<b>#ALL</b>
Data Tab	Open, No restriction		A	165	375
Col AM	Open, posting recommended		B	0	0
	Open, Half width constr.		C	0	0
	Open because of temp. fix		D	0	0
	Open using temp. structure		E	0	0
	New struture not yet open		G	0	0
	closed for load cap. reason		K	0	0
	Posted for load capacity		P	5	5
	Posted for other than load		R	0	0
	Closed for other than load		X	0	0
				<b>170</b>	<b>380</b>
<b>Metric 13 Load Rating Data</b>					
<b>Load Rating Tab</b>				<b># OF ERRORS</b>	
Col. AM	Op RF greater than Inv RF?			0	
Col. AO	Posting and % Legal OK?			0	
Col. AP	"0" used instead of blank			0	
Col. AT	% legal <=> lowest RF			0	
Col. AV	Item 70 correct?			0	
Col. AW	Method of Rating Alike?			0	
Col. AX	Op & Inv RF in Tons as req'd?			1	
Col. AY	Item 575 correct?			0	
Col. AZ	Depth of fill completed?			0	

DEL-C0123-0270\_(2133857) Method used for load rating require oper and Inv loads to be in Tons. See Columns AX and Columns E and F in the load rating TAB

All data is complete and correct in this section.



METRIC 8 - Insp. Frequency Underwater					
Dive Inspections Overdue		# OVERDUE	# UW	% PASS	COMPLIANCE
Data Tab Col. Z	60 months	0	7	100.0%	(C)
METRIC 10 - Insp. Frequency FC Member					
FC Inspections Overdue		# OVERDUE	# FC	% PASS	COMPLIANCE
Data Tab Col. Y	24 months	0	5	100.0%	(C)
METRIC 12 - Routine Inspection (** from field review)					
Field Ratings		# > +/-1	# Ratings	% PASS	COMPLIANCE
	field ratings**	0	24	100.0%	(C)
Comments		Missing	# < 6	% PASS	
Tab	Comments when Rating < 6	2	170	98.8%	(C)
	Adequacy comments **	0	30	100.0%	(C)
		Error	Total Scour	% PASS	
Comments	Rating should be = Scour	2	170	98.8%	within tolerance +/- 1
Tab	Noncompliant Scour Rating Err	3	170	98.2%	(C)

DEL-C0018-0117\_(2134217) DEL-C0072-0451\_(2134241) DEL-C0131-0052\_(2134136)  
Missing comments, or Scour controls rating on these three bridges. See Comments TAB.

METRIC 14 - Posting		Load rating data tab			
From Files review		# errors	#sampled	% PASS	COMPLIANCE
Op RF < 3 tons but not closed		1	170	99.4%	(SC)
Op RF = 0 but not closed		0	170	100.0%	(C)
% Legal < 100 but not posted		0	170	100.0%	(C)
Item 41 = B		0	170	100.0%	(C)

DEL-C0123-0270\_(2133857) For load rating method used, Oper. and Inv. ratings need to be in TONS.

All other data is complete and correct in this section.

METRIC 16 - Fracture Critical Inspection		(from files examination)			
From Files review		Missing	# FC	% PASS	COMPLIANCE
Fract Critical Member ID		0	2	100.0%	(C)
Fatigue Prone Detail		0	2	100.0%	(C)
Gusset Plate Calculations		0	2	100.0%	(C)
FC Inspection Procedure		0	2	100.0%	(C)
METRIC 17 - Underwater Inspection		(from files examination)			
From Files review		Missing	# UW	% PASS	COMPLIANCE
UW Inspection Procedure		0	0	100%	(C)
Location of UW elements		0	0	100%	(C)
UW frequency identified		0	0	100%	(C)

All data is complete and correct in this section.

<b>PRELIMINARY FHWA 23 Metric Matrix</b>						
23 metrics used by FHWA to measure NBIS compliance						
<b>Compliance Codes for the following Metrics:</b>						
	(C)	Compliant				
	(SC)	Substantially Compliant				
	(CC)	Conditionally Compliant (Adhering to approved PCA)				
	(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				
<u>Metric</u>	<u>Action Needed</u>					

**QAR Bridge DATA review Summary:**

Delaware County is generally compliant with all 23 metrics with the exception of a couple of late inspections and one Assetwise code error. All files are complete and accurate. Inspections were in conformance with the inspection manual and the data in Assetwise pretty clean and accurate, with the exception of a few data points coded in error and the coding, where scour controls substructure.