Quality Assurance Review

National Bridge Inspection Standards &
Bridge Maintenance Program
Lawrence County
March 28, 2022

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

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.

Agency Reviewed:_____**Lawrence_County**_____

Questionnaire completed by: Patrick D. Leighty P.E.,P.S. County Engineer 03/ 27/ 2022

PART I: Records and Staffing

I. MAINTENANCE, REHABILITATION AND REPLACEMENT PROGRAM

A. NUMBER OF BRIDGES WITH MAINTENANCE RESPONSIBILITY

1. Greater than 20' long (NBIS length 23CFR 650c) **(Metric 22)** **139**

2. Bridges >= 10' and <= 20' long **(Metric 22)** **184**

B. PROCEDURES AND BUDGET

1. Contract repairs and replacement per year
- List typical work items
  Replacements: Number: Culverts:____ Bridges:___1____
  Rehabilitations: Number : Culverts:____ Bridges:_____
  Maint.Contracts Number : Culverts:____ Bridges:_____

  -List approximate annual budget: ____$250,000_____

- Are Fed Funds used? Yes_X__ No ___
- Are Credit Bridge funds used? Yes_X__ No ___

2. In-house repairs and replacements
  Replacements: Number: Culverts:____ Bridges:___4____
  Rehabilitations: Number: Culverts:____ Bridges:_____

Maint.Contracts Number: Culverts:____ Bridges:___10____

- List approximate annual budget _____Varies_____

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

__X__ Inspection reports.
_____ Sufficiency rating.
_____ Growth/development.
_____ Other…explain_____

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

__X__ In-house
_____ Consultant
_____ Contractor
_____ Other explain_____

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

__X__ In house
_____ _Contractor
_____ Other explain_____

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

_____ Work orders
__X__ Time Cards
_____ Plans

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

__X__ Engineer?
_____ Sherriff?
_____ Commissioners?

II. INSPECTION PROGRAM

A. NUMBER OF BRIDGES WITH INSPECTION RESPONSIBILITY

1. Greater than 20' long (NBIS length, ORC 5501.47, 5543.20) **(Metric 22)** _____139_____

2. Between 10' and 20' long (ORC 5501.47, 5543.20) **(Metric 22)** ____184_____

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: _____Patrick D. Leighty, PE, PS_____

- Yrs. Inspection related experience: __7___

- List courses attended (& approx. dates) FHWA-NHI-130055-Safety Inspection of In-Service Bridges (09/26/2016-10/07/2016), Bridge Inspection Refresher Training (Online 05/24/2021-06/02/2021)

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

- Name: _____Patrick D. Leighty, PE, PS_____

- Yrs. Inspection related experience: __7___

- List courses attended (& approx. dates) FHWA-NHI-130055-Safety Inspection of In-Service Bridges (09/26/2016-10/07/2016), Bridge Inspection Refresher Training (Online 05/24/2021-06/02/2021)

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

- Name: _____Patrick D. Leighty, PE, PS_____

- Yrs. Inspection related experience: __7___

- List courses attended (& approx. dates) FHWA-NHI-130055-Safety Inspection of In-Service Bridges (09/26/2016-10/07/2016), Bridge Inspection Refresher Training (Online 05/24/2021-06/02/2021)

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

%TIME on inspections:

__33__ Bridge/Culvert inspection	_____ Surveying
__10_ Bridge Design/Plan prep	__42_ Other -
__5__ Bridge Construction	__100_100%
__5__ Bridge Maintenance	
__5__ Overload/Superload	

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

a. List Ohio PE # ___70172____ b. Name _____Patrick D. Leighty, PE, PS_____

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

- Name: _____None Required_____

- Yrs. Inspection related experience: _____

- List courses attended (& approx dates) _____

_____

_____

D. INSPECTION EQUIPMENT

1. Type of vehicle used for inspections

_____ Pickup truck
__X__ 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.

Extension Ladder	__X__ Length 24 FT	First Aid Kit	_X__
6' Folding Rule	__X_	Wire Brush	_X__
100' Fiberglass Tape	_X__	Calipers	_X__
Geologist Hammer	X (Masonry)	Shovel	_X__
Inspection Mirror	_X__	Screw Driver	_X__
Flashlight	_X__	Pliers	_X__
Thermometer	_X__	Wrenches	___
Plumb Bob	_X__	Sounding Chains	___
Camera	_X__	Hip Boots and Waders	_X__
2'-0" Level	_X__	Paint Stick/Crayon	_X__
Brush Hook/Axe	X (Machete)	Scraper	_X__
Boat	___	Probing Rod	_X__
Angle Locator	__	Vertical Clearance Rod	___

Other equipment not listed above.

_____

_____

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

Dye penetrant; Magnetic particle; **Ultrasound**; Other **Eddy Current Rebar Locator**

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

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

a. How many bridges need a snooper? ___8_____

b. How many bridges is it used on? _____8____

c. How often? _Every 2 Years___

E. INSPECTION PROCEDURES

1. Approximately how many inspections were made during last calendar year? **(Metric 6)** **256**

2. Approximately how many inspections are scheduled for the current calendar year? **(Metric 6)** **319**

3. Average number of inspections per day **(Metric 6)** **10**

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

a. Beam/Girder: Simple Span: __2____hrs. Multi-span: __2___hrs.

b. Slab bridge: Simple Span: __1____hrs. Multi-span: __1___hrs.

c. Truss (pony): Simple Span: ___4___hrs. Multi-span: __N/A___hrs.

d. Through/deck): Simple Span: __N/A__hrs. Multi-span: __N/A___hrs.

e. Culvert: Single cell __1_____hrs. Multiple Cells: __1__hrs.

5. Are previous inspection reports available at site for review? **(Metric 15)** (Yes _X__ No ___)

Are bridge inspections recorded in field on Paper, or Electronically, or **Both**?

Are photos available for every bridge? (Yes _X_ No __)
Are photos posted in Assetwise? (Yes _X_ No _X__) Many are, but some are not.

Are defects photos taken during inspection? (Yes _X_ No __)

Are Bridge comments recorded in Assetwise? (Yes _X_No __)

Are previous bridge comments brought to the bridge? (Yes _X__No ___)

6a. Are the bridge plans carried to the bridge site for review? **(Metric 15).** (Yes __ No _X_)

6b. Are bridge records available for review in the bridge office? **(Metric 15).** (Yes _X_ No __)

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

Explain: _____County Engineer/Program Manager_____

8. Do you have bridges requiring inspection more frequently than 12 Months? (Yes __ No _X_)

____Number due to **Damage** _____List frequency of inspection. **(Metric 11)**___

____ Number needing **In-depth** _____List frequency of inspection. **(Metric 11)**____

____ Number of **Special insp**. _____List frequency of inspection. **(Metric 11)**

9. Does your inspection team believe it has enough time to do the job? (Yes __ No_X_)

10. List your quality assurance checks made during the inspection process? **(Metric 20)**
Program Manager review of photographs and reports.

County Engineer performs all checks.

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

Yes____ No __X__ (Assetwise check)

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

Yes____ No __X__ (Assetwise check)

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

Initial Inspection? (Yes _X__ No ___)

Routine Annual Inspections? (Yes _X__ No ___)

Special Inspections? (Yes _X__ No ___)

Underwater Inspections? (Yes _X__ No ___)

Fracture Critical Inspections? (Yes _X__ No ___)

F. SCOUR CRITICAL BRIDGES (Guidance in ODOT Manual of Bridge Inspection)

1. No. of bridges considered scour susceptible? (Service over Water) Number __322___.

2. Number of bridges inspected by probing? Number ____0____.

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_X__ No_____ If no, Why? _____

5. How many structures are coded 6 on item 113 Scour Critical? **(Metric 18)** Number __34___.

6. How are scour evaluations performed? **(Metric 18)**
Observed Scour Assessment for Bridges

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

County Engineer/Program Manager if the normal water depth is greater than 5 Feet

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G. INVENTORY

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

Who checks? __County Engineer/Program Manager_____

How Often? With every inspection _X_ Less often than once per year___

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

How Often?...With every inspection_X__ 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
__X__ 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_X__ Number__6___: If, No, Why not? _____ NA___

SFN	Inventory Route	Straight Line Mileage	Feature Intersected	Overal l Length	NBIS	Main Structure Type	Coordinates	Previous General Appraisal	Sufficiency Rating	Township
4434803	C0017	0547	SYMMES CREEK	105	Y	310	N 38 29 09.41 W 82 28 07.30	5P	39	Union
4439481	C0048	0573	JOHNS CREEK	59	Y	310	N 38 41 45.98 W 82 31 17.08	5A	76.1	Symmes
4441192	C0061	0003	SYMMES CREEK	169	Y	302	N 38 31 15.89 W 82 28 22.99	6A	88.6	Windsor
4445082	C0104	0240	SYMMES CREEK	95	Y	310	N 38 27 38.48 W 82 26 03.67	4P	27.2	Union
4455967	T0227	0003	PINE CREEK	38	Y	302	N 38 44 24.91 W 82 39 42.55	6A	73.1	Decatur
4457897	T0254	0013	PINE CREEK	72	Y	310	N 38 39 44.44 W 82 43 15.80	6P	50.5	Elizabeth

b. Bridges requiring underwater inspections.
Number_____ NA__X__

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

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

- **Bridge Files……email a copy of a typical file or have them on hand for inspection.**
- **Scour Critical POA.. email a copy of a typical file or have them on hand for inspection.**
- **Fracture Critical Plan.. email a copy of a typical file or have them on hand for inspection.**
- **UW inspection Procedure.. email a copy of a typical file or have them on hand for inspection.**

H. PROCEDURES

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

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

__X___Written work order.
_____Electronic Communication.
__X___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.

__X__ County Engineer

_____County bridge Engineer
__X__Bridge Superintendent
_____Sherriff

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

Explain if different than procedure in Assetwise _____

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

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

County Engineer/Program Manager_____

I. LOAD ANALYSIS AND POSTING

1. Number of plans for existing bridges available for NBIS length bridges. ____119_____

2. Number of plans for non-NBIS bridges (>= 10' and <= 20' long) _____49_____

3. Number of bridges analyzed using the *AASHTO Manual for Bridge Evaluation* **(Metric 13)**

By Whom **(Metric 13)**
_____Load Rating Engineer
__X_ County Engineer
_____Bridge Engineer
__X_ Consultant

5. When are bridges load rated, after initial rating. Check all that apply
____ Every 5 years regardless.
__X_ When there is a significant change in condition rating.
__X_ When wearing surface thickness increases more than 1-1/2 inches
__X_ When permit load is requested
__X_ other

6. Methods used **(Metric 13)**
__X_ AAWSHTO BrR
__X_ Hand Calculated
__X_ Engineering Judgement (BR100)
____ BARS or other proprietary software program
____ Other Explain_____

7. Number of NBIS length bridges not load rated **(Metric 13)** Number __1__
Why? __It is a closed bridge (CR67X-0001 4441923)_____

8. List the NBIS length bridges considered "not ratable" including reason for being considered "not ratable" **(Metric 13)**
_____NA_____

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

Number of bridges posted __31__. Number of bridges with posted Signs in the field__31__.

10. List bridges closed due to condition rating (rough check) _____0_____

11. List bridges rated less than 100% Ohio legal load and not physically load posted, and resolution. (Assetwise Check)
_____0_____

12. Number of NBIS bridges with Gusset Plates **(Metric 13)** _____4_____

13. Number of NBIS bridges with Gusset Plates analyzed. **(Metric 13)** _____4_____

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

- Inspection reports, including old inspections:
  _____ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  __X__ All three
  _____ Other

- Design Calculations:
  __X__ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

- Plans:
  __X__ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

- Load analysis calculations:
  __X__ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

- Inventory forms:
  _____ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  __X__ All three
  _____ Other

- Photos and sketches:
  __X__ On paper file in Office
  __X__ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

- Repairs and maintenance history
  __X__ On paper file in Office
  __X__ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

-
- Scour evaluation:
  __X__ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

- Scour POA:
  __X__ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

- Fracture Critical File:
  _____ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  __X__ All three
  _____ Other

- Load Posting/Closing:
  _____ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  __X__ All three
  _____ Other

- Underwater inspections:
  _____ On paper file in Office
  _____ Electronically
  _____ In Assetwise
  _____ All three
  _____ Other

- Special inspection eqpt. or procedures:
  __X__ 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
  __X__ 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.

15. What is the FC bridge inspection frequency? **(Metric 16)** Every __24___ Months

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

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

18. What is the underwater inspection frequency? **(Metric 17)** ___Every __N/A__ Months_____

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

20. List any complex bridges: **(Metric 19)**

21. Do the complex bridges require specialized inspection procedures and additional inspector training? **(Metric 19)** (Yes ___ No __X_)

Describe:

Part II: Field Review

Inspection Reports (metric 12)

As part of this review, seven 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:

LAW-C0017-0547 _(4434803) Steel Pony Truss

Item 58 Deck…….. 5 Agreed

Item 59 Superstructure……5 *Inspection comments are thorough, but damage appears to be superficial. Slightly bent gusset appears to be as erected and not due to over-stressing. Same with other defects observed. I would give it a 6 in spite of the observed deformities, and based on Manual guidance. But the county is within the one-point acceptability, so 5 it is.* Agreed

Item 60 Substructure……5 Agreed Stones need Tuck-pointed at some point in the future. No movement detected.

Item 61 Channel……6 Agreed

Item 61.01 Scour……7 Agreed

Item 62 Culvert……N

Item 36 Railing…….. 0 0 0 0 Agreed

Item 72 Approach Alignment …….. 6 Agreed

Comments: Excellent Comments in Assetwise.
Defect Photos: One Photo in Assetwise, but office files contain good photos.
Channel Photos: Photos not in Assetwise, but office files contain good photos. The county is slowly uploading Photos into Assetwise as time permits.

LAW-C0069-0240 _(4442024) Prestressed Beam/stringers Tees

Item 58 Deck…….. 5 Agreed
Item 59 Superstructure……5 Agreed Over all the beams look to be in good condition. There is some efflorescence and minor delamination, but no exposed rebar. With 9 rows of beams spaced at about 3 feet, there is plenty of redundancy. The lower flanges sounded solid when struck with my sounding rod. The only spalling is on the facia beam, lower flange. I would rate this superstructure closer to a 6 or better.

Item 60 Substructure…….5 Agreed Some stone joints in the abutments need tuck-pointed.
Item 61 Channel……..7 Agreed
Item 61.01 Scour……..7 Agreed
Item 62 Culvert……N
Item 36 Railing…….. 0 0 0 0 Agreed
Item 72 Approach Alignment …….. 4 Agreed
Comments: Excellent comments.
Defect Photos: No defect photos in Assetwise, they exist in office bridge files.
Channel Photos: Good Channel Photos in Assetwise

LAW-C0104-0001 _(4445031) Prestressed Box-beams Continuous
Item 58 Deck…….. 5 Agreed (See Superstructure comment)
Item 59 Superstructure……5 Agreed *While there were some strands exposed at the abutments and near midspan, the areas are few and isolated. Based of the criteria in the manual, I would have to rate this one at least a 6. However, the beams are too high to sound and require a snooper for arms-length inspection. I am basing my evaluation on a distant visual, but it is hard to argue with the level of detail presented in the report and the previous snooper evaluation findings. Therefore, I can only defer to the County Engineer's judgement on this one. Snooper will be scheduled for 2023 inspection.*

Prestressed Concrete – *Condition Rating Definitions*

1-4 Span	9-0 Sum	General Deficiencies	Longitudinal Joints	Strand Exposure in worst transverse plane of a **Non Composite Box Beam***
1-Good	9-Ex	No notable deficiencies		
	8-VGood	Minor deficiencies	Isolated leaking	**Up to 1%** of strands
	7-Good	**Up to 1%,** exposed strand in fascia or spalling along edge	Leaking up to 10% of span with light efflorescence	**2- 10%** with *neighboring beam* in similar condition or better.
2-Fair	6-Satis factory	**Up to 5%,** minor exposed strands, efflorescence, spalling	Leaking at joints with no efflorescence	**11-15%** with *neighboring beam* in good condition or in similar condition
	5-Fair	**Up to 10%**, no transverse cracks in bottom of beams	Leaking at joints with light efflorescence and isolated rust stains	**16-25%** with *neighboring beam* in satisfactory condition or in similar condition
3-Poor	4-Poor	**More than 10%**	Leaking at joints with heavy efflorescence and rust staining	**26-40%** with *neighboring beam* in fair condition or in similar condition. Fascia beam(s) are saturated
	3-Serious	Open flexure cracks, sagging or loss of camber	Broken or missing transverse tendons	**41-50%** with *neighboring beam* in poor condition or in similar condition
4-Critical	2-Critical	3-Serious. . . *And* Unless closely monitored it **may be necessary to close the bridge or lane(s)** until corrective action is taken		
	1-Imm F	2-Critical. . . *And* Major deterioration is affecting stability. **Bridge or lane(s) shall be closed** to traffic but corrective action may put bridge back into light service		
	0-Failed	. . . *And* Out of service - beyond corrective action		

Table 38 - Condition Rating Material: Prestressed Concrete

*This seems to be the most common deficiency for PSBB Noncomposite bridges. Beams carrying a sidewalk should not control the condition rating. Beam ratings shall consider beams immediately adjacent.

General Deficiencies – includes imperfection in the concrete (i.e. spalls, cracking, mottled area, efflorescence, honeycombing, water in beams, damaged concrete around railing connection) and general beam alignment (i.e. loss of upward camber, twists)

Longitudinal Joints –staining or wetted areas from runoff infiltration.

Strand Exposure – discount all strands visible and those strands not visible located:

1) Above a longitudinal cracks located in the bottom flange
2) Above a delamination
3) Above a spall with unsound or mottled concrete.
4) Consideration should also be given to those strands neighboring and above a corroded stirrup.

Only count the same strand exposed once per span. Divide those strands that are exposed over the total number of strands existing per beam (Plans will need to be reviewed for determining the number

Item 60 Substructure…….7 Agreed
Item 61 Channel……..7 Agreed
Item 61.01 Scour……..7 Agreed
Item 62 Culvert……..N
Item 36 Railing…….. 0 0 0 0
Item 72 Approach Alignment …….. 7 Agreed
Comments: Extremely detailed comments.
Defect Photos: No Defect Photos in Assetwise, but very good documentation in the office files.
Channel Photos: Good Channel photos in Assetwise, but only from one side of the bridge.

LAW-C0037-0290 _(4437845) Prestressed Box Beams

Item 58 Deck…….. 4 Deck is structural part upper flange of the Box Beam design.
Item 59 Superstructure……4 See tables for 2010 and 2014 below. *Well documented defects; There is a single beam in the wheel track is going bad. The rest are not nearly that bad. Looks like a bad batch of concrete at the pre-caster's shop.*

Item 60 Substructure…….6 Agreed *Heavy efflorescence coming from end joint is too much to get a good sounding. Could possibly rate Higher than a 5, but I have to go with comments and the engineer's consistency.*

Item 61 Channel……..6 Agreed

Item 61.01 Scour……..7 Agreed

Item 62 Culvert……N

Item 36 Railing …….. 0 0 0 0

Item 72 Approach Alignment …….. 6 The repeated damage at the end of the bridge, on both sides, with a 90-degree curve at the end of the bridge, indicates a real approach alignment issue. Based on the manual guide, I would rate the approaches a **4**.

Comments: Again, great Comments!

Defect Photos: No Defect Photos in Assetwise, but good photos on file in the office.

Channel Photos: Good Channel Photos

LAW-T0273-0010 _(4458567) Timber Beams

Item 58 Deck……..4 Agreed

Item 59 Superstructure……5 Agreed

Item 60 Substructure…….5 Agreed

Item 61 Channel……..4 Agreed

Item 61.01 Scour……..7 Agreed

Item 62 Culvert……N Agreed

Item 36 Railing…… 0 0 0 0 Agreed, no place to attach an effective railing, serves one house.

Item 72 Approach Alignment …….. 5 Agreed, it's a driveway.

Comments: Great Comments

Defect Photos: No Defect Photos in Assetwise, they have good photos on file in the office

Channel Photos: Great Channel Photos in Assetwise

LAW-T0101-0040 _(4444787) Cast in place Concrete Slab

Item 58 Deck…….. 4 Agreed

Item 59 Superstructure……4 Agreed Unusual design, as the main reinforcement rebars are oriented normal to the abutments and not on the nearly 40 degree skew. The 1935 concrete is very

tough, but there are many spalls. The condition has not changed much from year to year.

Item 60 Substructure…….4 Agreed
Item 61 Channel……..5 Agreed
Item 61.01 Scour……..6 It appears that scour has advanced deeper since the previous inspection report. My probe went about 2 feet under abutment apron. I would give this a rating of 5 or 4.

Substructure Scour, Spread or Unknown foundations – "ded" CONDITION RATING

Item - **42. Scour**

Type – **Spread Footing on Soil OR Unknown Foundations**

1-4	9-0	Description*	Exposed Spread or Unknown Foundation*
1-Good	9-Excellent	No Problems noted.	
	8-Very Good	Minor scour holes developing, scour protection placed.	
	7-Good	Some minor problems. Minor scour holes exist; probing indicated soft material in scour hole.	top of footing exposed
2-Fair	6-Satisfactory	Damage to scour countermeasures, probing indicates soft material in scour hole.	Sides of footings exposed less than 6 inches.
	5-Fair	Minor scour, damage to scour countermeasures, probing indicates soft material in scour hole.	Unprotected footings along the vertical sides are exposed less than 12-inches high, corner of footing may have minor undermining.
3-Poor	4-Poor	Advanced scour.	Unprotected vertical side of footing exposed, full height, less than 1/3 the horizontal length of the footing.
	3-Serious	Scour has seriously affected the primary structural components Local failures are possible.	Undermining exposing the underside less than 1/3 the horizontal length of the footing.
4-Critical	2-Critical	Scour may have removed substructure support. Local failures are possible. Any substructure unit with more than 20% of bearing capacity removed.	Underside of footing exposed more than 1/3 the horizontal length of the footing.
	1-Imminent Failure	Obvious vertical or horizontal movement due to scour that is affecting the structure stability. Bridge is closed to traffic but corrective action may put bridge back in to light service.	
	0-Failed	Out of service - beyond corrective action.	

Table 51 - Condition Rating: Substructure Shallow Foundations Scour

Item 62 Culvert……N

Item 36 Railing…….. 0 0 0 0 Agreed

Item 72 Approach Alignment …… 5 Could be a 6. Bridge in narrow and raised, but not enough to slow traffic down at all, especially since it is an unpaved road.

Comments: Great Comments
Defect Photos: No Defect Photos in Assetwise, but they have good photos in the office files.
Channel Photos: Good Channel Photos in Assetwise.

LAW-T0225-0004 _(4455762) Steel beams

Item 58 Deck…….. 4 Agreed (Timber) Lots of replaced floor sections and gaps between deck boards.

Item 59 Superstructure……4 Agreed Section loss in beams has been mitigated, but not enough to warrant a higher rating. Plus the angle of the welding at the top of the plate is difficult to determine the effectiveness/integrity of the weld.

Item 60 Substructure…….5 Agreed
Item 61 Channel……..6 Agreed
Item 61.01 Scour……..7 Agreed
Item 62 Culvert……N
Item 36 Railing…….. 0 0 0 0 Agreed
Item 72 Approach Alignment …….. 5 Agreed, but I would go one higher (perhaps a 6), the minor misalignment is not slowing anyone down.

Comments: Excellent Comments in Assetwise.
Defect Photos: No Photos in Assetwise, but office files contain good photos.
Channel Photos: Photos in Assetwise are OK. There is much vegetation obscuring the view from upstream.

Field Review Summary:

Overall, the county is doing a good job with their bridge inspection program. Their records are complete and organized. While I agreed with most of their ratings, some of the ratings tend to be a little low on the superstructures and a little high on the approach alignments, but the ratings are consistent from bridge to bridge. The comments are very complete and detailed for every bridge. In my opinion, the attention to the details of the Severity is tending to overshadow the Extent and Location in many cases, like the Tee Beam bridge and High-Level Box Beam bridge. The defect description makes the condition seem worse at the local level, than at the global level. This tends to lead to a lower condition rating than what the guide manual may indicate. Paying attention to the load path and having detailed defect photos, as well as area photos would help put some of these into perspective.

With respect to the approach alignment ratings, there seems to be a common issue with almost every county trying to follow the manual rating table. This rating improves greatly when only the text description is adhered to, concerning traffic behavior. I recommend using the descriptive text as a guide. As shown in the excerpt below, highlighted in yellow.

NBI #72 – Approach Roadway Alignment Code the rating based on the adequacy of the approach roadway alignment. This item identifies those bridges which do not function properly or adequately due to the alignment of the approaches. It is not intended that the approach roadway alignment be compared to current standards but rather to the existing highway alignment. This concept differs from other appraisal evaluations. The establishment of set criteria to be used at all bridge sites is not appropriate for this item. The basic criteria is how the alignment of the roadway approaches to the bridge relate to the general highway alignment for the section of highway the bridge is on. The individual structure shall be rated in accordance with the general appraisal rating guide described on page 453 in lieu of specific design values.

The approach roadway alignment will be rated intolerable (a code of 3 or less) only if the horizontal or vertical curvature requires a substantial reduction in the vehicle operating speed from that on the highway section.

A very minor speed reduction will be rated a 6, and when a speed reduction is not required, the appraisal code will be an 8. Additional codes may be selected between these general values.

For example, if the highway section requires a substantial speed reduction due to vertical or horizontal alignment, and the roadway approach to the bridge requires only a very minor additional speed reduction at the bridge, the appropriate code would be a 6.

This concept shall be used at each bridge site. Speed reductions necessary because of structure width and not alignment shall not be considered in evaluating this item.

Record the appropriate code from the table below about the condition of the approach alignment. For example, if the highway section requires substantial speed reduction due to vertical or horizontal alignment, and roadway approach to the bridge requires only a very minor additional speed reduction at the bridge, the appropriate code would be 6. This concept shall be used at each bridge site. Speed reductions necessary because of structure width and not alignment shall not be considered in evaluating this item

PART III Office file Review

Fracture Critical Member and Fatigue Prone Connection ID Plan.
LAW-TR 254-0013 (4457897) Steel Truss

Bridge Load Rating Report, including Gusset plate analysis.
LAW-TR 254-0013 (4457897) Steel Truss By Korda in 2018

Fracture Critical Member and Fatigue Prone Connection ID Plan.
LAW-CR 17-0547 (4434803) Steel Truss

Bridge Load Rating Report, including Gusset plate analysis.
LAW-CR 17-0547 (4434803) Steel Truss By Korda in 2018

All files are complete with all documentation concerning load rating, channel photos and Defect photos, along with previous inspection reports.

PART IV Snapshot Summary of Program

LAWRENCE County 2022

INVENTORY, APPRAISAL & INSPECTION SNAPSHOT

3/16/2022

Inventory Data - NBIS Bridges Only

	NBIS COUNT
NBIS Bridges > 20'	139
Bridges 10'-20'	184
All Bridges	323

Item 22 Inspection Responsibility		CODE	# NBIS	# ALL
Data Tab Col BV,BW	County	2	139	323

Item 21 Maintenance responsibility		CODE	# NBIS	# ALL
Data Tab	County	2	139	323
Col D	City or other local	4	0	0
	Railroad	27	0	0
	Private (tohter than RR)	26	0	0
	State Park	11	0	0
	Local Park	23	0	0
	State Agency	1	0	0
	Township	3	0	0
			139	323

Item 42 Type service on bridge		CODE	# NBIS	# ALL
Data Tab	Other	0	0	0
Col Q	Highway	1	138	322
	Railroad	2	0	0
	Ped/Bikeway	3	1	1
	Hwy/RR	4	0	0
	Hwy/Ped	5	0	0
			139	323

Item 42 Type service under bridge		CODE	# NBIS	# ALL
Data Tab	Other	0	0	0
Col R	Hwy w/ or w/o Ped	1	0	0
	Railroad	2	0	0
	Ped/Bkwy	3	0	0
	Hwy w/ RR	4	0	0
	Waterway	5	139	323
	Hwy/Waterway	6	0	0
	RR/Waterway	7	0	0
	Hwy/Waterway/RR	8	0	0
	Relief (for waterways)	9	0	0
			139	323

All data in tables above are complete and all bridge accounted for correct Coding

ITEMS 43A,B,C Structure Type(Col M,N,O)	CODE	# NBIS	# ALL
Other Culvert (incl frame culverts)	019	0	3
Concrete Slab	101	19	66
Concrete Tee Beam	104	23	73
Concrete Frame	107	3	39
Concrete Culvert (incl frame culverts)	119	3	12
Concrete Continuous Slab	201	4	4
Steel Beam or Girder	302	61	75
Steel Thru Truss (inlcudes Pony)	310	4	4
Steel Culvert (incl frame culverts)	319	2	3
Steel Continuous Beam or Girder	402	6	6
Prestressed Concrete Thru Arch	502	1	1
Prestr. Conc. Cont. Box Beam/Girder Multiple	505	6	6
Prestr. Conc. Cont. Box Beam/Girder Multiple	605	5	5
Timber Slab	701	0	1
Timber Thru Arch	702	1	24
Timber Thru Truss (inlcudes Pony)	710	1	1
		139	323

Item 92 Fracture Critical		CODE	# NBIS	# ALL
Data Tab	Requires FC Inspection	Y	**6**	n/a
Col U,V,Y	Requires FC Inspection	N	**133**	n/a
			139	n/a
	FC Switch Y/N is Blank		0	n/a

Item 11: Scour			# NBIS	# ALL
Data Tab	Bridge not over waterway	N	**0**	0
Col AA	unknown foundation	U	**0**	4
	over tidal waters	T	**0**	0
	foundations on dry land	9	**6**	8
	stable above footing	8	**74**	163
	countermeasures installed	7	**4**	6
	no scour evaluation made	6	**0**	34
	stable within footer limits	5	**54**	107
	stable action needed	4	**1**	1
	scour critical - unstable	3	**0**	0
	scour critical - scour present	2	**0**	0
	scour critical - failure immine	1	**0**	0
	scour critical - bridge failed	0	**0**	0
			139	323

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LAW-C0018-0010 _(4433572)

The bridge above has 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. See Column AA in Data TAB of the Snapshot for olive highlights.

Note: (If these measures were taken, then the rating needs changed. If not, then you need a plan for corrective measures. A code of 4 or less should not be in the system for more than a year.)

All data in tables above are complete and all bridge accounted for correct Coding

Item 63	Documented Engineering Judgment		# NBIS	# ALL
	Field Eval & Doc EJ		4	n/a
		BR_100 for these bridges?		

Item 92B	Underwater	CODE	# NBIS	# ALL
Data Tab	requires dive inspection	N	139	n/a
Col W,X,Z	requires dive inspection	Y	0	n/a
			139	

Item 709	Plan Information	CODE	# NBIS	# ALL
Data Tab	plans not avail	0	13	141
Col. AW	plan avail	1	119	168
	field measured	2	6	10
	Field Testing	3	0	0
	not applicable	N	1	1
			139	320

Item 63	Method of Analysis	CODE	# NBIS	# ALL
Data Tab	Field Eval & Doc. Engr Judgm	0	4	131
Col. AV	Work Stress	1	0	0
	LFR	2	1	1
	LRFR	3	0	0
	load test	4	0	0
	No rating done	5	1	6
	LFR	6	72	97
	AS	7	54	60
	LRFR	8	7	28
	Assigned LFR HS20	D	0	0
	Assigned LRFR HL93	F	0	0
	not appl (RR, etc)	X	0	0
			139	323

REMINDER:

Load Factor required for bridges built after 1993 **(exceptions: timber, etc,)**

LRFR required for bridges built after 2010

Note: 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 in tables above are complete and all bridge accounted for correct Coding

Inspection Condition Data - NBIS Bridges Only

Item 41	Operating Status	CODE	# NBIS	# ALL
Data Tab	Open, No restriction	A	**107**	288
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	**1**	1
	Posted for load capacity	P	**31**	34
	Posted for other than load	R	**0**	0
	Closed for other than load	X	**0**	0
			139	323

Metric 13	Load Rating Data	
Load Rating Tab		# OF ERRORS
Col. AN	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	3
Col.A V	Item 70 correct?	0
Col. AW	Method of Rating Alike?	0
Col. AX	Op & Inv RF in Tons as req'd?	0
Col. AY	Item 575 correct?	0
Col. AZ	Depth of fill completed?	0

LAW-C0040-0000_(4438248)
LAW-C0051-0345 (4439783)
LAW-C0144-0300 _(4448774)

All three bridges above have the lowest Load Factor as the EV3 and need to be posted for that vehicle, if you have one working in your county. Otherwise, you are OK posting just for the other vehicles since the EV2 and EV3 are permit vehicles.

KEY METRICS

(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

METRIC 2 - Program Manager Qualificati (from files examination)

From Files review	Missing	#sampled	% PASS	COMPLIANCE
PE /Experience	0	1	100.0%	(C)
Comprehensive	0	1	100.0%	(C)
Refresher	0	1	100.0%	(C)

METRIC 3 - Team Leader Qualification (from files examination)

From Files review	Missing	#sampled	% PASS	COMPLIANCE
Degree /Experience	0	1	100.0%	(C)
Comprehensive	0	1	100.0%	(C)
Refresher	0	1	100.0%	(C)

METRIC 6 Insp. Frequency Routine

Bridge Inspections Overdue			# OVERDUE	% PASS	COMPLIANCE
Data Tab	NBIS -	24 months	6	95.7%	(SC)
Col. AB	ORC -	Calendar Year	18	87.1%	(NC)
Col. AB	All	Routine insp.	59		
	BIM -	18 months	0	100.0%	(C)

Too Many overdue bridge inspections so far this year. The county needs to get a handle on the scheduling of inspections this year in order to get into compliance.

METRIC 8 - Insp. Frequency Underwater

Dive Inspections Overdue		# OVERDUE	# UW	% PASS	COMPLIANCE
Data Tab Col. Z	60 months	0	0	100.0%	(C)

METRIC 10 - Insp. Frequency FC Member

FC Inspections Overdue		# OVERDUE	# FC	% PASS	COMPLIANCE
Data Tab Col. Y	24 months	0	6	100.0%	(C)

METRIC 12 - Routine Inspection (** from field review)

Field Ratings		# > +/-1	# Ratings	% PASS	COMPLIANCE
	field ratings**	2	24	91.7%	(C)
Comments		Missing	# < 6	% PASS	
Tab	Comments when Rating < 6	1	138	99.3%	(C)
	Adequacy comments **	0	30	100.0%	(C)
		Error	Total Scour	% PASS	
Comments	Rating should be = Scour	0	138	100.0%	within tolerance +/- 1
Tab	Noncompliant Scour Rating Er	0	138	100.0%	(C)

Only one bridge missing a comment for deck rating . LAW-C0104-0240 _(4445082)

METRIC 14 - Posting	Load rating data tab			
From Files review	# errors	#sampled	% PASS	COMPLIANCE
Op RF < 3 tons but not closed	0	139	100.0%	(C)
Op RF = 0 but not closed	0	139	100.0%	(C)
% Legal < 100 but not posted	0	139	100.0%	(C)
Item 41 = B	0	139	100.0%	(C)

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	1	100.0%	(C)
Location of UW elements	0	1	100.0%	(C)
UW frequency identified	0	1	100.0%	(C)

You have 19 bridges posted but do not have a sign installation date posted in item 70.01 in Assetwise.

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 (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 Qualificatio				
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

The only improvement that is needed is to get back on track with inspection scheduling.