Bridge Inspections Start to Finish: Report Writing

Jake Gould, PE

Bridge Inspection Area Engineer, Indiana Department of Transportation

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Why We do our Job

Bridge Inspection Mission Statement:

The core mission of bridge inspection is to ensure public safety, structural integrity, and the longevity of transportation infrastructure through systematic, regular assessments.

We are part of a bigger team:

- Designers
- FHWA
- State & County Maintenance
- Commissioners & Political Leaders
- News Reporters
- Lawyers

What are Others Looking for?

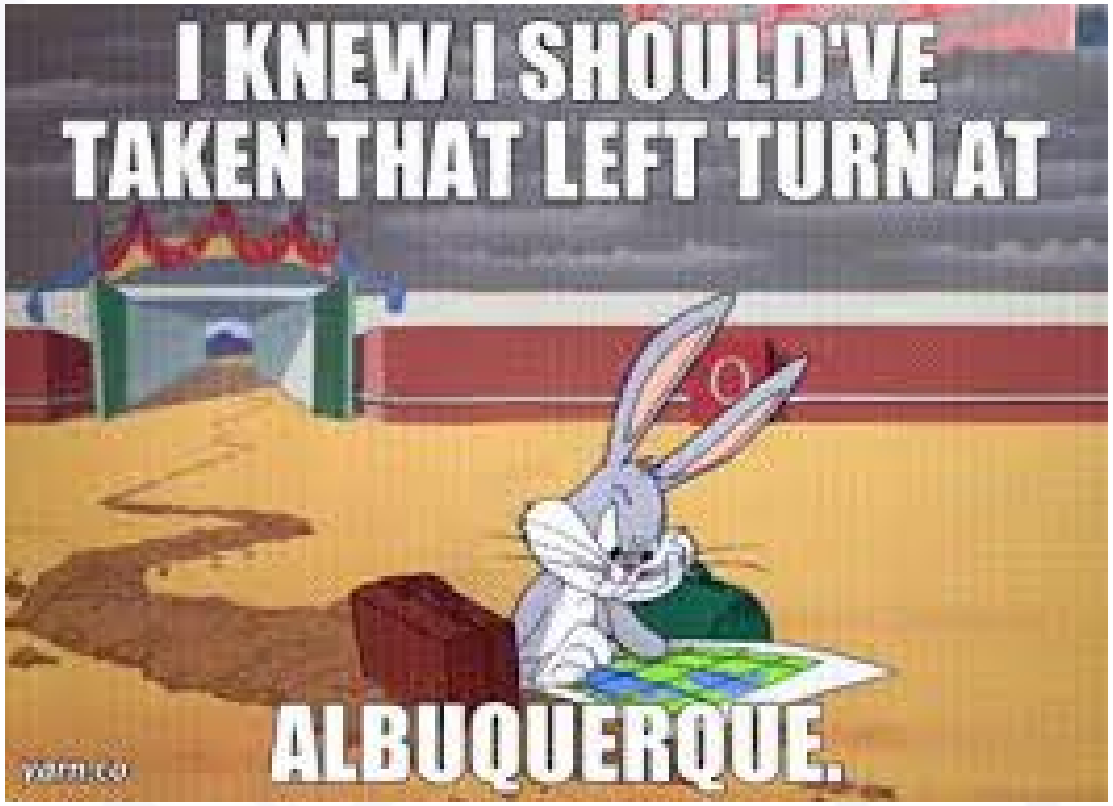
- We gather data for other users
  - These users are relying on us to have accurate and detailed information.
  - If our information is wrong, it can have rippling effects on the rest of the process.

- What others look at
  - PDF
  - Summary
  - Pictures
  - Inspection comments & ratings

Everyone has Different Needs

Writing Comments

- Try to write good enough comments that other sections aren't needed.
- Use these methods when writing throughout the whole report.
  - Component Rating Comments
  - Summaries
  - Maintenance Items
  - Picture Captions
- Things to <u>not</u> do
  - Fluff
  - Possessive writing
  - Excessive abbreviations
  - Lack of direction / structure
  - Lack of clarity



Writing Comments continued…

- Include the following when writing a comment
  - Type – What is it?
  - Size – How big is it?
  - Location – Where is it?

- SNBI Appendix C
  - Provides descriptions of Minor/Moderate for different materials and deficiencies

Table 46. All Materials - defect severity guidance for component condition ratings.

Defect	Minor	Moderate
Distortion	Distortion that has been mitigated or does not require mitigation.	Distortion that requires mitigation but has not been addressed.
Settlement	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits.
Scour	Exists within tolerable limits established for the bridge.	Exceeds tolerable limits, but is less than the critical limits established for the bridge.

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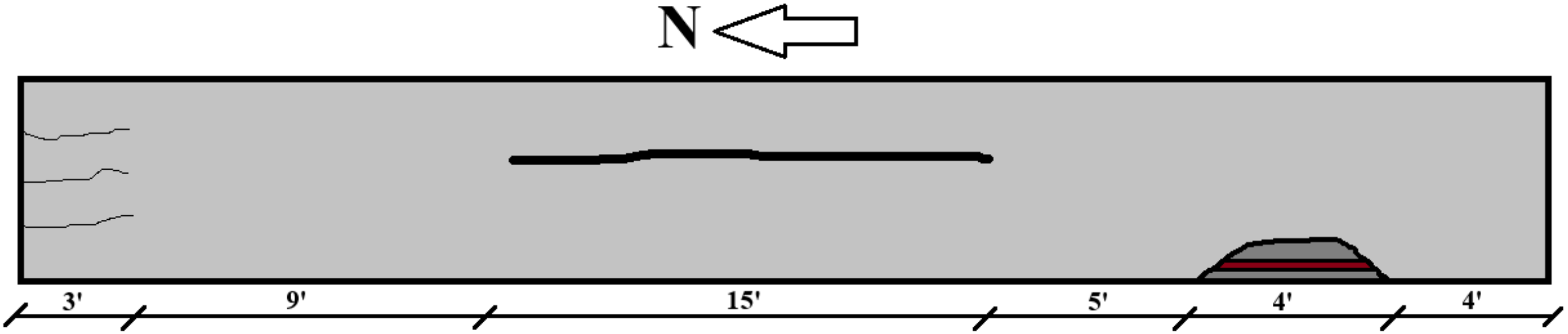
Writing Comments Example

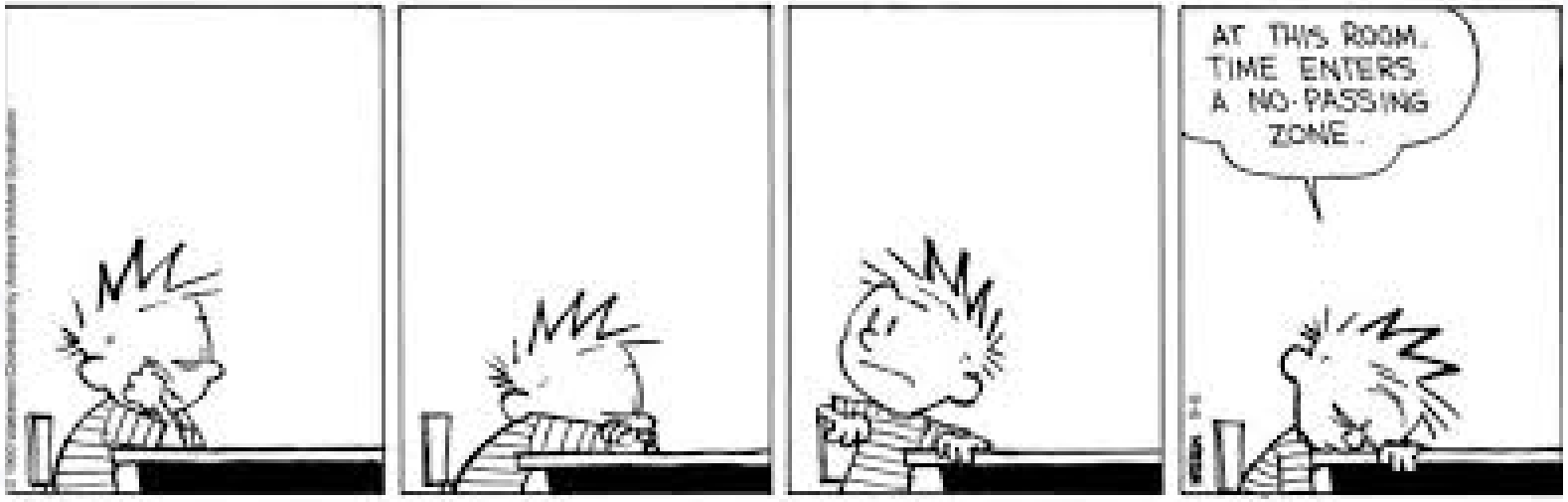
- What comments would you put for the beam below?

The beam has three hairline, longitudinal cracks at the north end that are ~3’ long. There is a large spall (~4’) exposing one strand 4’ from the south end. The strand has minor section loss. There is a large longitudinal crack at approximately midspan and is 15’ long.



Pictures

- Try to have the pictures & comments tell the whole story.
- Requirements for pictures for each inspection type in Part 2 of the BIM.
  - Alignment with All Posting Signage
  - Wearing Surface, Approach Slabs & Joints
  - Deck, Superstructure, Substructure, and Culvert
  - Channel, Protection, and Scour
  - Deterioration and all components rated 4 (Poor) or less
- Use pictures of deterioration to track changes over time



Pictures Examples

Pictures Examples

Pictures Examples

Pictures Examples

Inspection Summary

- Most read section by other users
  - Write as if a non-bridge inspector is reading
  - Will be redundant to the rest of the report

- Details to include
  - History and completed work/maintenance
  - Posting signage if applicable
  - Overall condition of the bridge
  - Highlights of the deficiencies
    - Scour critical, major deterioration, etc.
  - Recommendations & upcoming work
  - Notes to future inspectors
    - Access recommendations, other inspection type considerations, etc.

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Inspection Summary - Example

History

- 01/13/1977: New Bridge under unknown DES #, Contract #2889
- 05/28/2007: Rehab A, Bridge Deck Overlay under DES #9303190, Contract #22876. Work included installing riprap along both abutments, full depth patching, and a thin deck overlay.

Overall Condition Summary

Bridge is posted 5 Tons and One Lane Bridge.

Overall the structure is in poor condition and is considered scour critical. The south abutment has heavy spalling with exposed steel with some section loss at the southeast corner. Beam 4 has a large spall with two severed strands at midspan. Beams 1, 3, & 6 have a hairline crack at midspan. There is undermining of the south abutment up to 6” at the east corner.

It is recommended to replace the structure. The structure is scheduled for replace in 2029.

Until replacement, it is recommended to underpin the south abutment.

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Work Done to a Structure

- When recommending work to be done, consider if…
  - Staff has capability to complete work
  - Priority compared to the rest of the inventory
  - Funds are available

- Replacement & Rehabilitation
  - Consider the condition of the entire structure

- Maintenance
  - Only report if you think it's going to be done
    - Beaver dams / Debris & trees in channel
    - Replacing bridge or approach railing

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Supporting Documentation

Asset

- Scour Memos
- Scour POA & Monitoring
- Bridge Plans & Contracts

Permanent Information to Asset

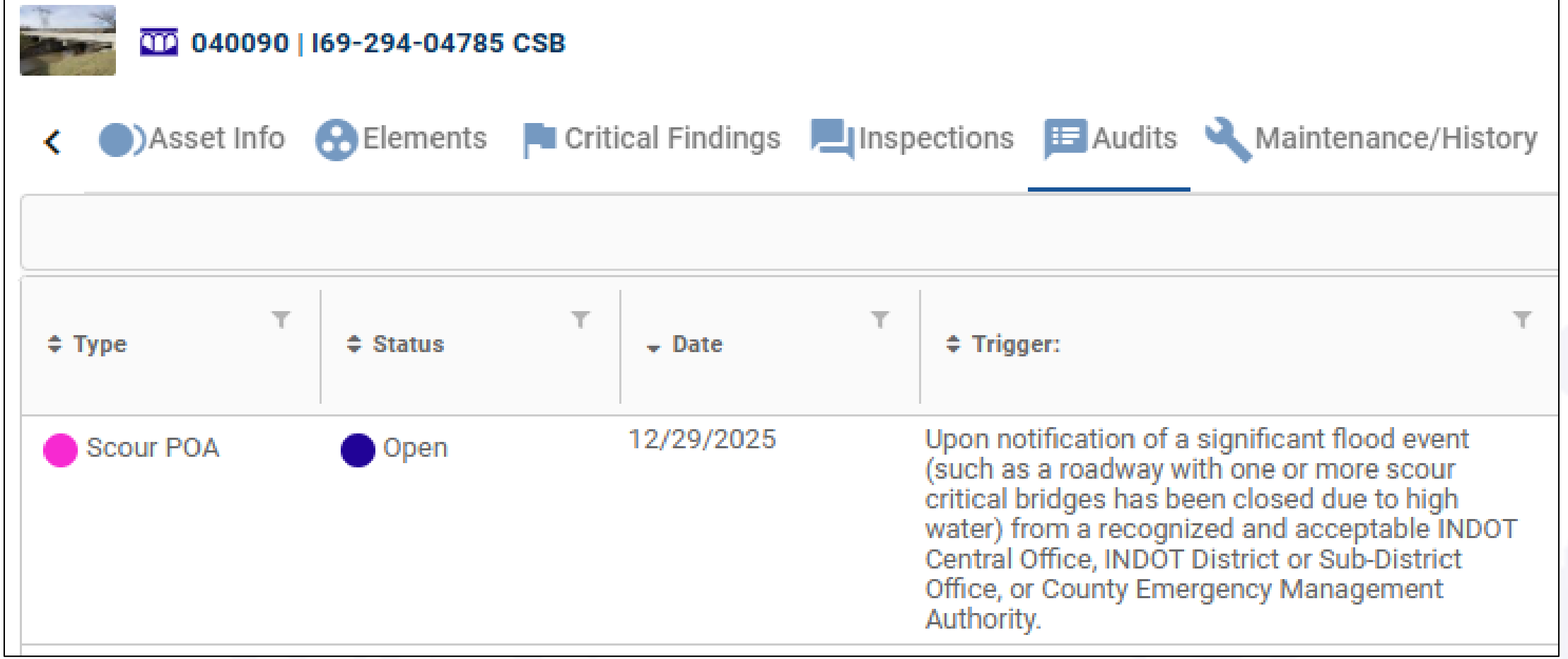
Inspection

- Channel Profile
- Sketches
- Jobs tab

Information specific to the inspection

Scour POA and Monitoring

- These editable forms live in the Audit section of an asset
- Need to be reviewed and updated at each inspection



Scour POA and Monitoring

040090 | I69-294-04785 CSB ▸ Audit (Scour POA)

Task Info

Number

From * 12/29/2025

Asset
I69-294-04785 CSB - 040090

Type
Scour POA

Status
Open

Comments

Initial Scour Inspection

Monitoring Plan

Countermeasure Information and Recommendations

Emergency Traffic Information and Recommendations

Closure Plan:
Personnel from the Bluffton Unit will close the road when notified by bridge inspection personnel.

Re-opening Procedures:
The bridge can reopened once the water level recedes to normal flow (or pool) levels and inspectors can verify that no scour damage occurred.

Channel Profiles

- Graphing tool in the inspection of each inspection.

Channel Profile - Fixed objects

Measurement location	Depth height to top	Depth height to bottom
0	0	10
160	0	10

Channel Profile - Points

Measurement location	Depth height measured
0	6.7
25	12.7
50	17.9
80	27.2
110	18.2
135	13.4
160	6.8

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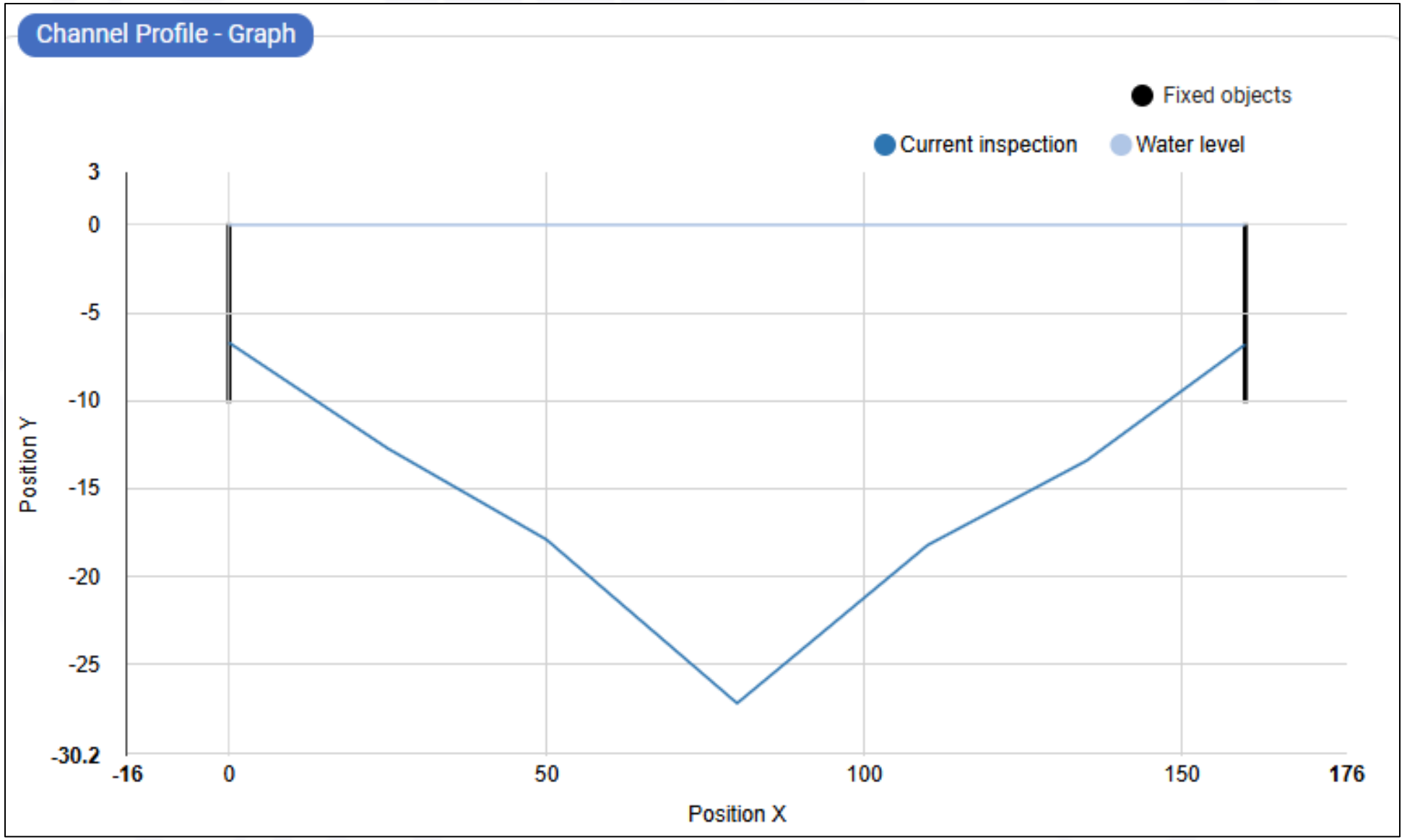
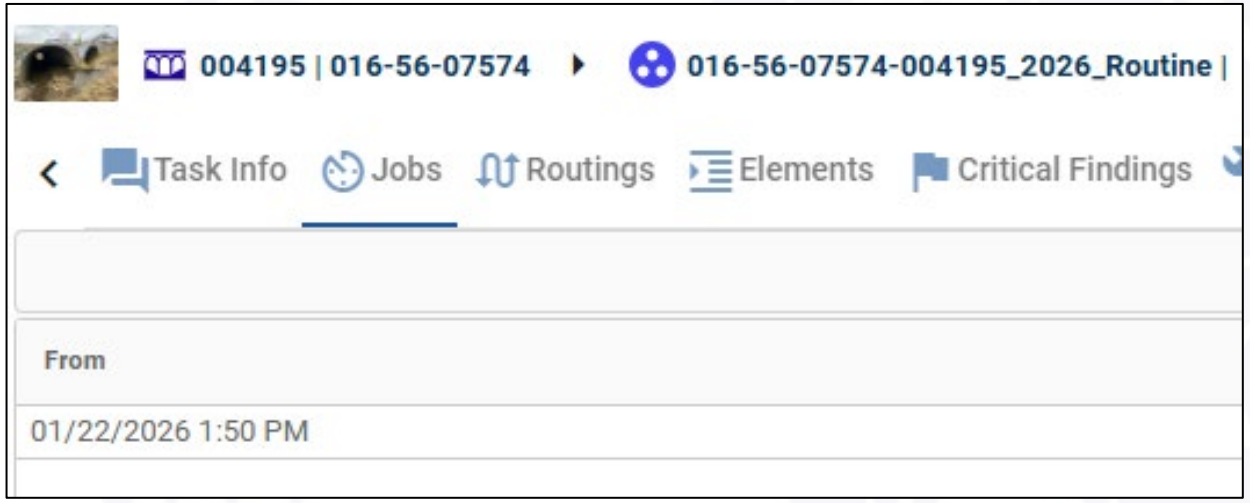
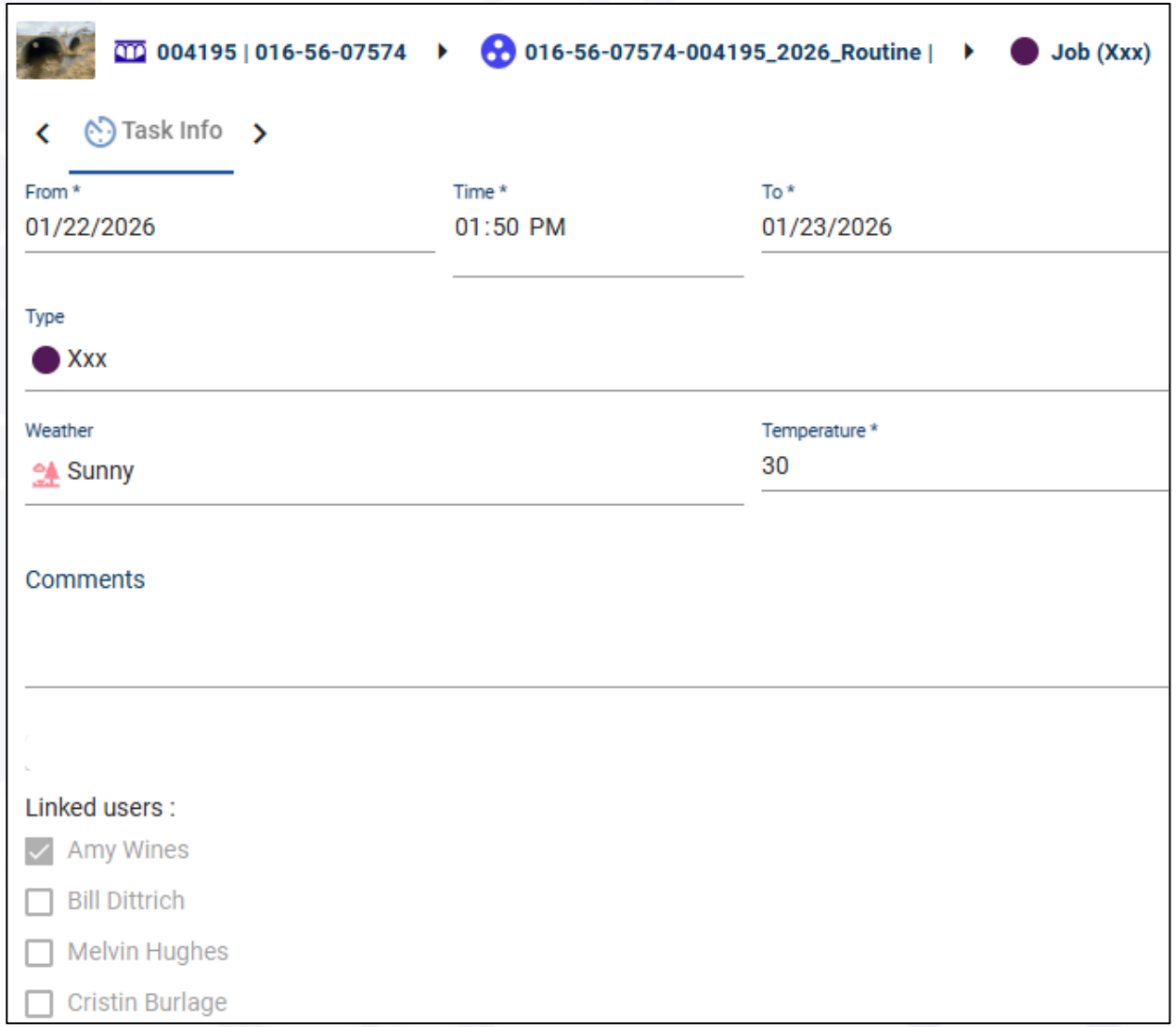
Channel Profiles continued…



Jobs Tab in an Inspection

- Way to document inspection conditions and personnel





Timeline Requirements

Indiana BIM 2-1.01(01) Timely Inspections and Reporting

- Report must be created no later than 96 hours (4 days) following the actual field inspection start date for every bridge inspection

- Update below items in Subsection 6.2
  - (B.IE.01) Inspection Type
    - Automatically updated
  - (B.IE.02) Inspection Begin Date
  - (B.IE.04) Nationally Certified Bridge Inspector
    - Automatically updated

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Timeline Requirements continued…

All bridge inspection reports need to be…

Submitted for Review no later than 75 calendar days following the completion of the bridge inspection (end date)

Approved no later than 90 days following the completion of the bridge inspection (end date)

Audit Stage & Process

- Purpose of the Audit stage
  - Update Sections 1-5 (Asset information)
  - Cannot update Sections 6-7 (Inspection information)
- Can be done up to two times
- Report can be sent from...
  - Approved → Audit → Audit Approval
  - Can only be in the Audit stage for 5 days until it automatically moves.
- Upon sending to the Audit Approval, the inspector must include the following information
  - Date inspection report was opened for audit (contained within the routing process)
  - Name of the Inspection ATL (contained within the routing process)
  - Reason report was opened / what was changed

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Questions?

Load Rating Updates

Charley Bernth

Axle Weight Sign

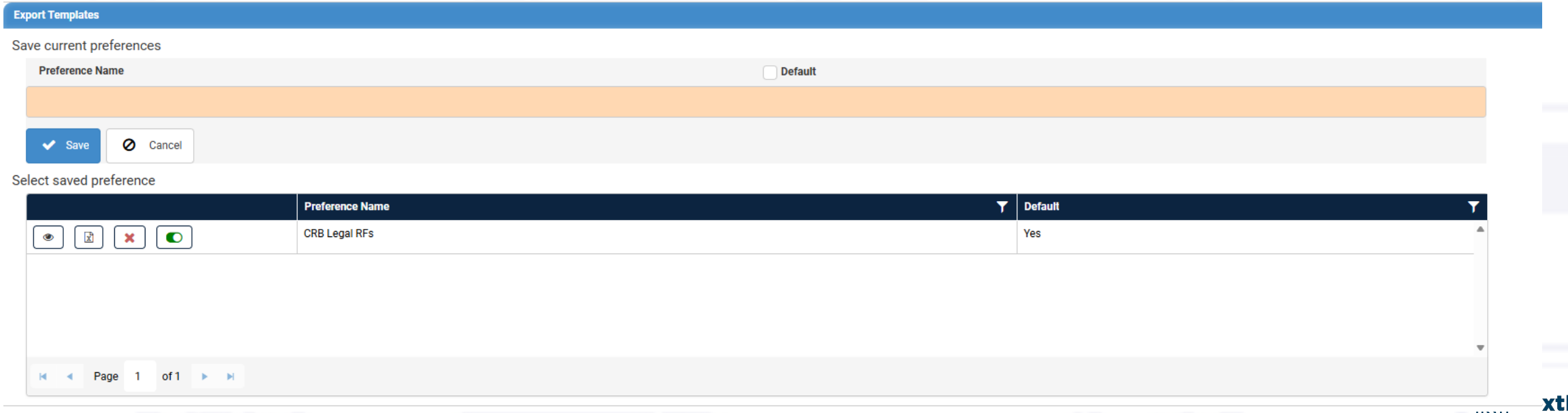
- Considered deficient by FHWA because:
  - No longer supported by the MUTCD
  - “Axle Weight” is ambiguous and could be interpreted as either the individual axle weight or gross vehicle weight for given number of axles
  - Replace with either Gross Vehicle Weight (R12-1) or Silhouette (R12-5) September 2026

BRADIN Update

- Updated to match SNBI
  - Removed legacy coding
- B.LR.08 – Routine Permit Loads now user select from list
  - A, B, C, or N
  - INDOT filled in values for existing bridges (December 2025) based on responses to questions sent to county consultants November 6, 2025
- Legal Vehicle name changes
  - H-20 → IN 20
  - HS-20 → IN 36
- “New” legal load (IN Tandem)
  - System generated from Alt Military rating factor
  - No change to required vehicle inputs
  - If IN Tandem RF < 1.0, posting type must be GVW

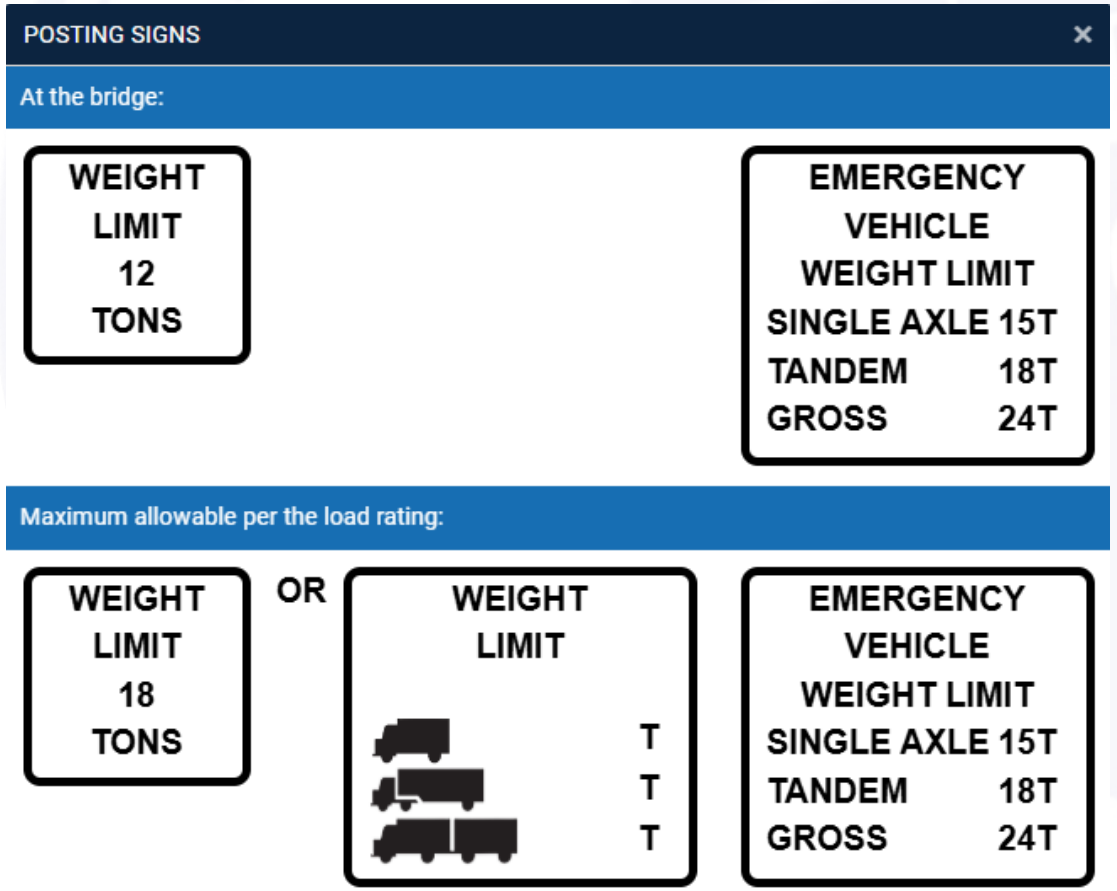
BRADIN Update

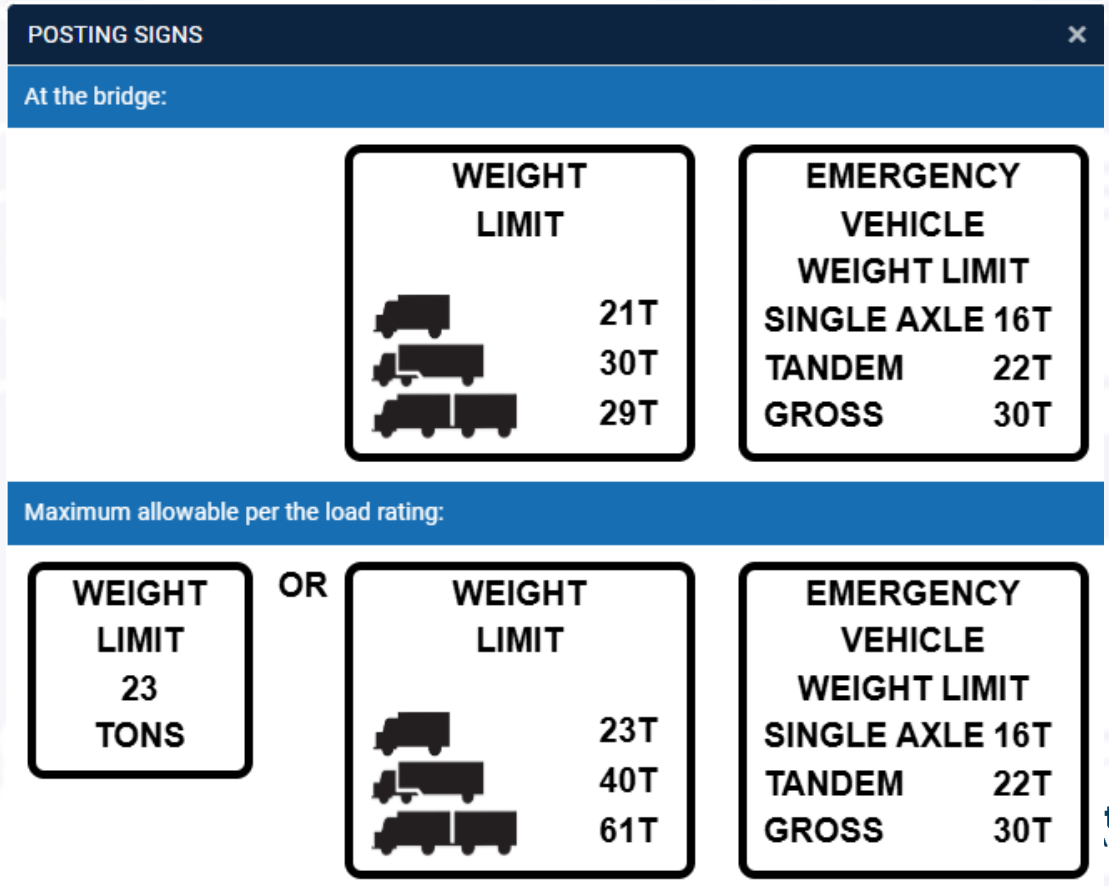
- B.PS.02 – Posting Status Change Date
  - Required for submission even if bridge is not posted
  - INDOT filled all blank fields to 1/1/2025
- Update B.LR.07 – Controlling Legal Load Rating Factor logic to include EVs
- Able to save export template



BRADIN Update

- Update Posting Signs button to include Silhouette (T) sign





BRADIN Update

- Rearrange 5.3 – Load Evaluation & Posting section to match SNBI

5.3 - LOAD EVALUATION & POSTING

B.EP.03 - Posting Type	
B.EP.03a - Commercial Vehicle Posting Type	G
B.EP.03b - Additional Posting Types	
B.EP.03c - Emergency Vehicle Posting Type	G|A|D

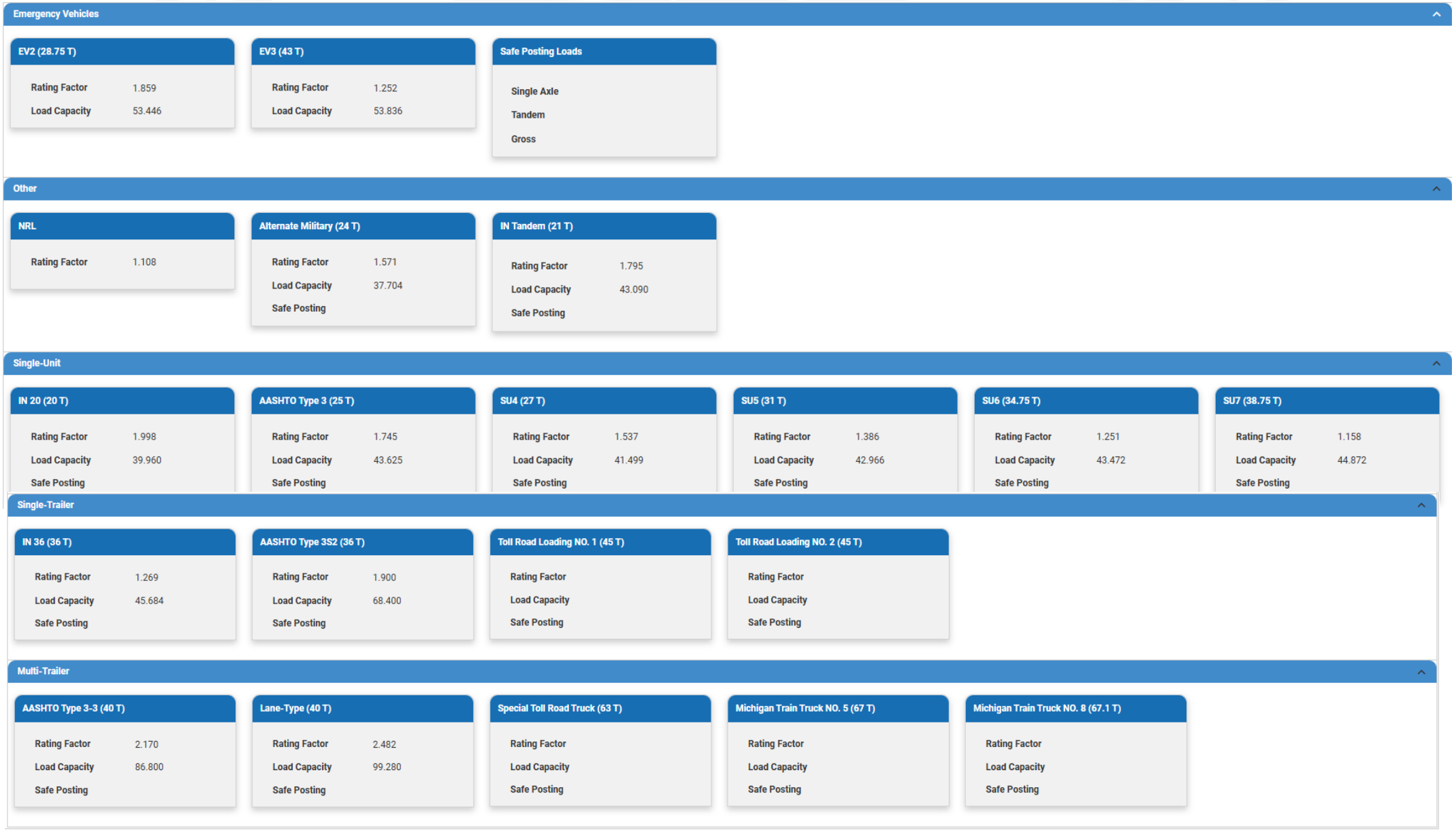
B.EP.04 - Posting Value

G - Gross CV Posting Value	
G - Gross	12

T - Truck Silhouette (R12-5 Sign) CV Posting Values
Single-Unit
Single-Trailer
Multi-Trailer

Emergency Vehicle Posting Values	
EV Posted Tonnage (Single Axle)	15
EV Posted Tonnage (Tandem Axle)	18
EV Posted Tonnage (Gross)	24

BRADIN Update



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Analytical Methods

- LRFR Service II limit state [MBE C6A.6.4.2.2]
  - Posting consideration/safe posting load may be calculated using strength rating factors
  - Guidance including modeling and reporting procedure will be posted on the Bridge Design website
- ASR acceptable only for masonry, timber, and railroad flatcar structures

Engineering Judgment

- May be used when necessary plans or details are not available and physical measurement of the structural members is not possible
- Load rating engineer should consider all available information when determining load rating factors such as:
  - Construction year for common material properties and design vehicle
  - Measurable dimensions
  - Redundancy of load path
  - Deterioration
  - Signs of distress
- Load rating factors shall be determined for all applicable vehicles
  - Consider size/configuration of vehicles that routinely use the bridge

Engineering Judgment

- Load Rating Summary Report must include proper justification for the ratings along with the following note:

> *In accordance with the Manual for Bridge Evaluation, Third Edition, 2017, Section 6.1.4*
>
> > *Necessary details for this bridge are unavailable. A physical inspection of the bridge was performed by a qualified inspector and evaluated by a qualified engineer to establish an approximate load rating based on rational criteria.*

Engineering Judgment

- Example of justification for the ratings on high volume state route—assumptions for design vehicles may be different on low volume routes

NOTES

The inventory rating factors are based on the assumption that the bridge was designed for HS-20 loading. The rating factor for the H-20 vehicle was determined by inspection of the moments produced by this vehicle compared with the assumed HS-20 design vehicle. The structure is not exhibiting signs of shear distress and a comparison based solely on vehicle moments is assumed to be reasonable.

There are no signs of distress or deterioration that would indicate that the current load carrying capacity is less than the design vehicle.

NOTES

The rating factors for the legal loads listed above were determined by comparing moments caused by these vehicles with moments caused by the assumed design vehicle. The resulting rating factors were reviewed and found to be reasonable based on engineering judgement of the structure's ability to carry the routine legal loads that use the bridge.

Critical Findings (BIM 2-3.02)

- If a load rating indicates a bridge needs to be posted or needs a reduced posting value, a critical finding must be reported.
  - B.PS.01 =

(SNBI Table 15)

	No restriction			Posted or restricted				Closed
	New	Open	Needs Action	Weight	Other	Needs Reduction	Missing	
Permanent	N	PO	PA	PP	PR	PD	PM	C
Temporary		TO	TA	TP	TR	TD	TM	C
Supported		SO	SA	SP	SR	SD	SM	C

- If a load rating analysis indicates that gross live load capacity is less than 5 tons, a critical finding must be reported
  - Repair, shoring, lane restrictions, or reduced interval inspections will be required

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Post and Restrict

- Bridges not capable of carrying a minimum legal gross live load of 3 tons must be closed.
- For bridges rated LFR not capable of carrying a minimum design inventory/operating weight of 3 tons (rating factor of 0.1) must be closed [MBE 6B.7.1].
- A bridge may be posted lower than the maximum allowable per the load rating
  - Rating factors reported in BRADIN should not be changed to match the sign values
  - B.LR.04 – Load Rating Method should remain that of the engineering analysis