Updates to INDOT Load Rating Policy

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Modernization of Policy

Bridge Inspection Manual Part 3

- Published 12/22/17

Number	Memo Date	Effective Date	Subject	Attachments
17-06	12/22/17	Immediately	Revisions to the Part 3 of the INDOT Bridge Inspection Manual	

- Aligns Indiana Load Rating Practices with AASHTO Manual For Bridge Evaluation

- Changes Bridge Posting Evaluation and Requirements
  - Requires evaluation of all Indiana Legal Loads as defined in BrIM Part 3 Figure 3-4.2

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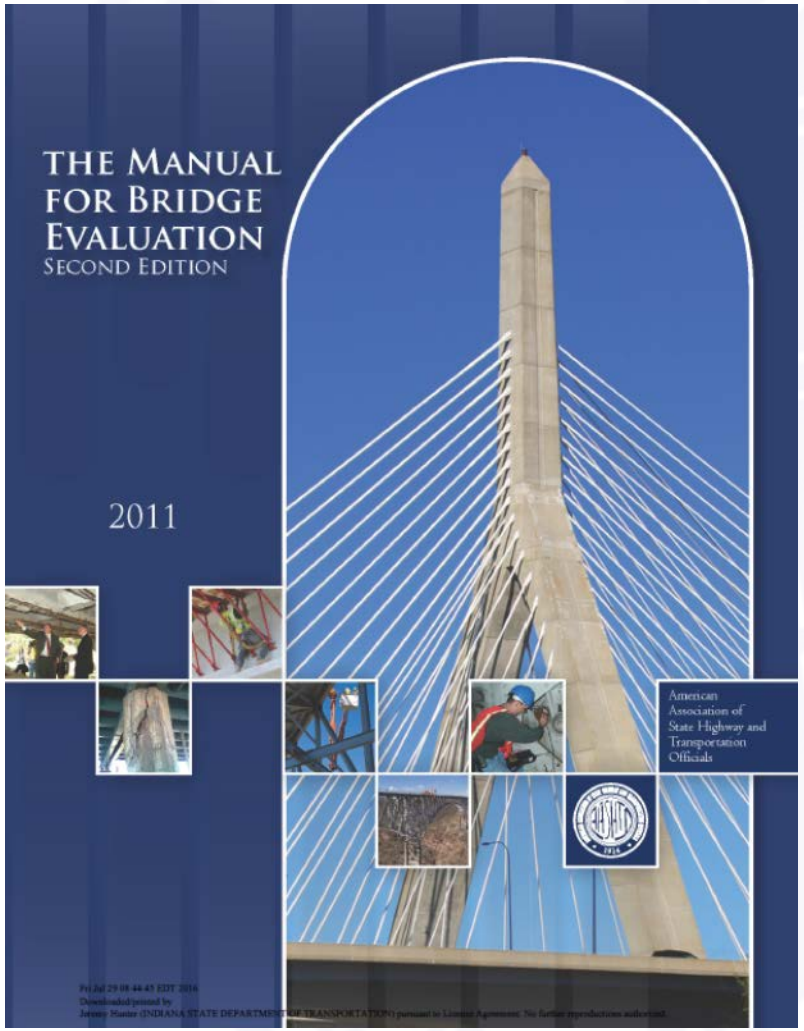
Indiana Bridge Load Rating Requirements

- AASHTO Manual For Bridge Evaluation 2nd Edition



- Defines requirements for:
  - Bridge Records
  - Bridge Management
  - Bridge Inspection
  - Bridge Material Testing
  - Bridge Load Rating

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Manual for Bridge Evaluation: Unknown Materials

- Reinforced Concrete

Table 6A.5.2.1-1—Minimum Compressive Strength of Concrete by Year of Construction

Year of Construction	Compressive Strength, f'_c, ksi
Prior to 1959	2.5
1959 and Later	3.0

Table 6A.5.2.2-1—Yield Strength of Reinforcing Steel

Type of Reinforcing Steel	Yield Strength, f_y, ksi
Unknown steel constructed prior to 1954	33.0
Structural grade	36.0
Billet or intermediate grade, Grade 40, and unknown steel constructed during or after 1954	40.0
Rail or hard grade, Grade 50	50.0
Grade 60	60.0

Table 6A.5.2.3-1—Tensile Strength of Prestressing Strand

Year of Construction	Tensile Strength, f_{pu}, ksi
Prior to 1963	232.0
1963 and Later	250.0

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Manual for Bridge Evaluation: Unknown Materials

- Structural Steel and Rivets

Table 6A.6.2.1-1—Minimum Mechanical Properties of Structural Steel by Year of Construction

Year of Construction	Minimum Yield Point or Minimum Yield Strength, F_y, ksi	Minimum Tensile Strength, F_u, ksi
Prior to 1905	26	52
1905 to 1936	30	60
1936 to 1963	33	66
After 1963	36	66

Table 6A.6.12.5.1-1—Factored Shear Strength of Rivets: φF

Rivet Type or Year of Construction	φF, ksi
Constructed prior to 1936 or of unknown origin	18
Constructed after 1936 but of unknown origin	21
ASTM A502 Grade I	25
ASTM A502 Grade II	30

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INDOT BrIM: Modernization of Policy

What are the required load rating vehicles?

Design Vehicles

- New structures or rehabilitations
- Listed on the plans of the primary load carrying members

Truck Configuration
HL-93
Fatigue*
H-20
HS-20
HS-25
Alternate Military
Toll Road Loading No. 1
Toll Road Loading No. 2
Special Toll Road Truck
Michigan Train Truck #5
Michigan Train Truck #8

* The Fatigue configuration shall be used for evaluating the Fatigue Limit State per MBE Table 6A.4.2.2-1 whenever HL-93 is specified on applicable plans

Figure 3-4.1 Potential Design Vehicles

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INDOT BrIM: Modernization of Policy

What are the required load rating vehicles?

Legal Vehicles

- Required by state and/or federal law
- As a group represent typical “legal” truck configurations
- Use for determining the present day capacity of a bridge
- Use for determining load restrictions

Truck Configuration	LRFR Subcategory
H-20	Routine Commercial Traffic
HS-20	Routine Commercial Traffic
Alternate Military	Routine Commercial Traffic
AASHTO Type 3	Routine Commercial Traffic
AASHTO Type 3S2	Routine Commercial Traffic
AASHTO Type 3-3	Routine Commercial Traffic
Lane-Type*	Routine Commercial Traffic
EV2	Routine Commercial Traffic
EV3	Routine Commercial Traffic
NRL**	Specialized Hauling
SU4	Specialized Hauling
SU5	Specialized Hauling
SU6	Specialized Hauling
SU7	Specialized Hauling

* Load and Resistance Factor Rating (LRFR) only

** Not to be used for load posting

Figure 3-4.2 Required Legal Vehicles

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INDOT BrIM: Modernization of Policy

What are the required load rating vehicles?

Routine	Special
Toll Road Loading No. 1	Superload – 11 Axles
Toll Road Loading No. 2	Superload – 13 Axles
Special Toll Road Truck	Superload – 14 Axles
Michigan Train Truck #5	Superload – 19 Axles (305K)
Michigan Train Truck #8	Superload – 19 Axles (480.09K)

Figure 3-4.3 Potential Permit Vehicles

Permit Vehicles

- Use to consider passage for vehicles that exceed legal requirements
- Broken into two subcategories
  - Routine
    - Typically multi-trip annual permits
    - Use for determining the present day capacity of a bridge for applicable routes
    - Use for determining load restrictions for applicable routes
  - Special
    - Single trip or non-routine permit analysis

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Load Rating Example

DESIGN LOADS

(future wearing suface ==> 35 psf)

Applicable Design Vehicle	Vehicle Configuration	Inventory Rating Factors
☑	HL-93	0.400
☑	Fatigue	1.310
☑	H-20	0.842
☑	HS-20	0.842
☐	~~*HS-25*~~	
☐	~~*Alternate Military*~~	
☐	~~*Toll Road Loading NO. 2*~~	
☐	~~*Toll Road Loading NO. 1*~~	
☐	~~*Special Toll Road Truck*~~	
☐	~~*Michigan Train Truck NO. 5*~~	
☐	~~*Michigan Train Truck NO. 8*~~	

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Load Rating Example

LEGAL & ROUTINE PERMIT LOADS

(future wearing surface NOT included)

# of Axles	Vehicle Configuration	Rating Factors	Load Capacity (tons)	Safe Posting Load (tons)
2	EV2	0.834	23.98	
3	EV3	0.581	24.98	
			Single Axle	13.97
			Tandem	18.01
			Gross	23.98

Applicable Routine Permit	# of Axles	Vehicle Configuration	Rating Factors	Load Capacity (tons)	Safe Posting Load (tons)
	varies	NRL	0.945		
	2	H20-44	1.106	22.12	22.12
	2	Alternate Military	0.982	23.57	23.38
	3	HS20-44	0.671	24.16	19.08
	3	AASHTO Type 3	1.510	37.75	37.75
	4	SU4	1.380	37.26	37.26
☐	~~4~~	~~Toll Road Loading NO. 2~~			
	5	AASHTO Type 3S2	1.177	42.37	42.37
	5	SU5	1.215	37.67	37.67
☐	~~5~~	~~Toll Road Loading NO. 1~~			
	6	AASHTO Type 3-3	1.150	46.00	46.00
	6	Lane-Type	0.763	30.52	26.46
	6	SU6	1.088	37.81	37.81
☐	~~7~~	~~Special Toll Road Truck~~			
	7 / 8	SU7	0.982	38.05	37.75
☑	8	Michigan Train Truck NO. 5	0.646	43.28	33.12
☑	11	Michigan Train Truck NO. 8	0.627	42.07	31.35

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Additional Resources

- All recent load rating presentations are being added to the INDOT Bridge Design Website http://www.in.gov/indot/3669.htm

- Examples, Software, Guidance will be added to the website as well.

Bridge Rating Application Database of Indiana

- What is BRADIN?
- Why a new database?
- Policy Implications
- Requesting Access
- Navigation
- Mass Data Import Instructions
- Questions

Bridge Rating Application Database of Indiana

What is BRADIN?

Bridge **R**ating **A**pplication **D**atabase of **IN**diana

Inspection Memo 18-01

Effective June 1, 2018 – The authoritative source for all load rating data

Number	Memo Date	Effective Date	Subject	Attachments
18-01	01/29/2018 Rev. 01/30/2018	June 1, 2018	Bridge File Documents	BRADIN Import Instructions BRADIN Import Template Bridge Inspection Manual, Part 3 Revisions
18-02	2/1/2018	February 6, 2018	Bridge Inspection Extended Frequency Policy	

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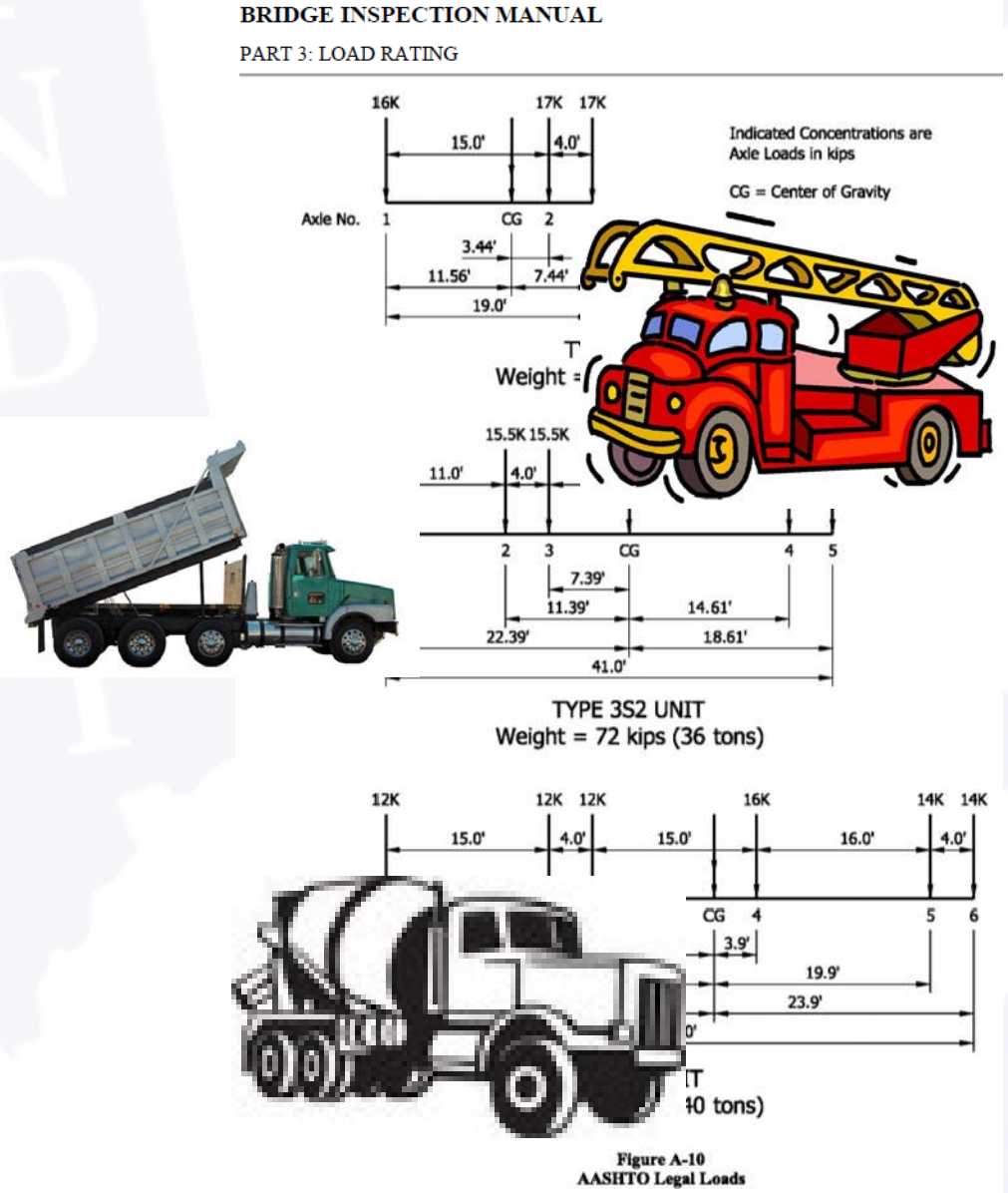
Bridge Rating Application Database of Indiana

Why a new database?

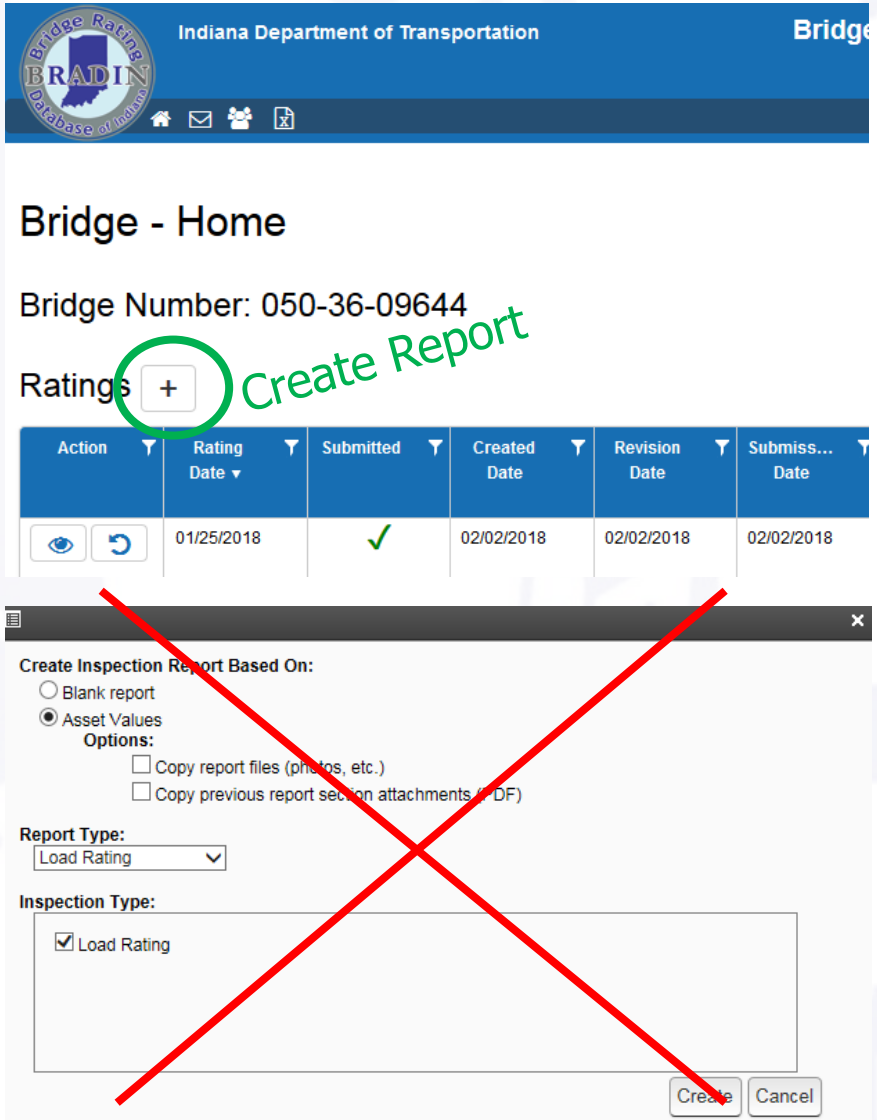
- Minimum of 12 unique vehicle configurations required for posting analysis
- BIAS provides input fields for just 2 configurations (H/HS20-44)
- BIAS is the home for items related to the Structure Inventory and Appraisal reports
  - Ancillary items removed a few years ago
  - Some items have returned but not load rating
- More efficient to have a dedicated Load Rating Database



Bridge Rating Application Database of Indiana

Policy Implications
(Effective June 1, 2018)

- Start creating load rating reports in BRADIN
- Stop creating load rating reports in BIAS
  - Items required for the Structure Inventory and Appraisal reports will prepopulate with data from BRADIN
- No changes to the ERMS Bridge File upload requirements



Bridge Rating Application Database of Indiana

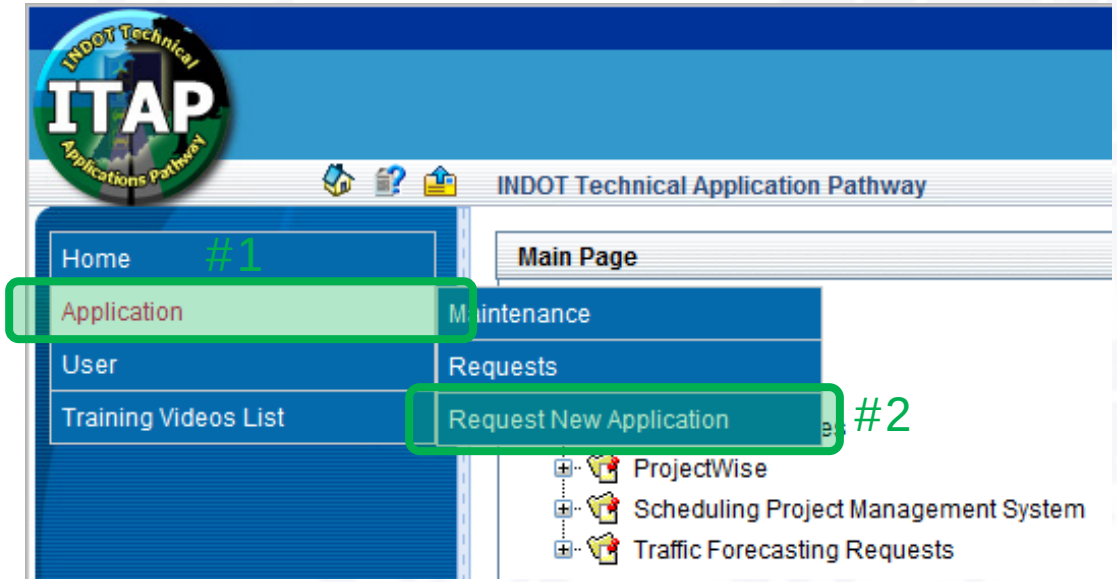
Requesting Access

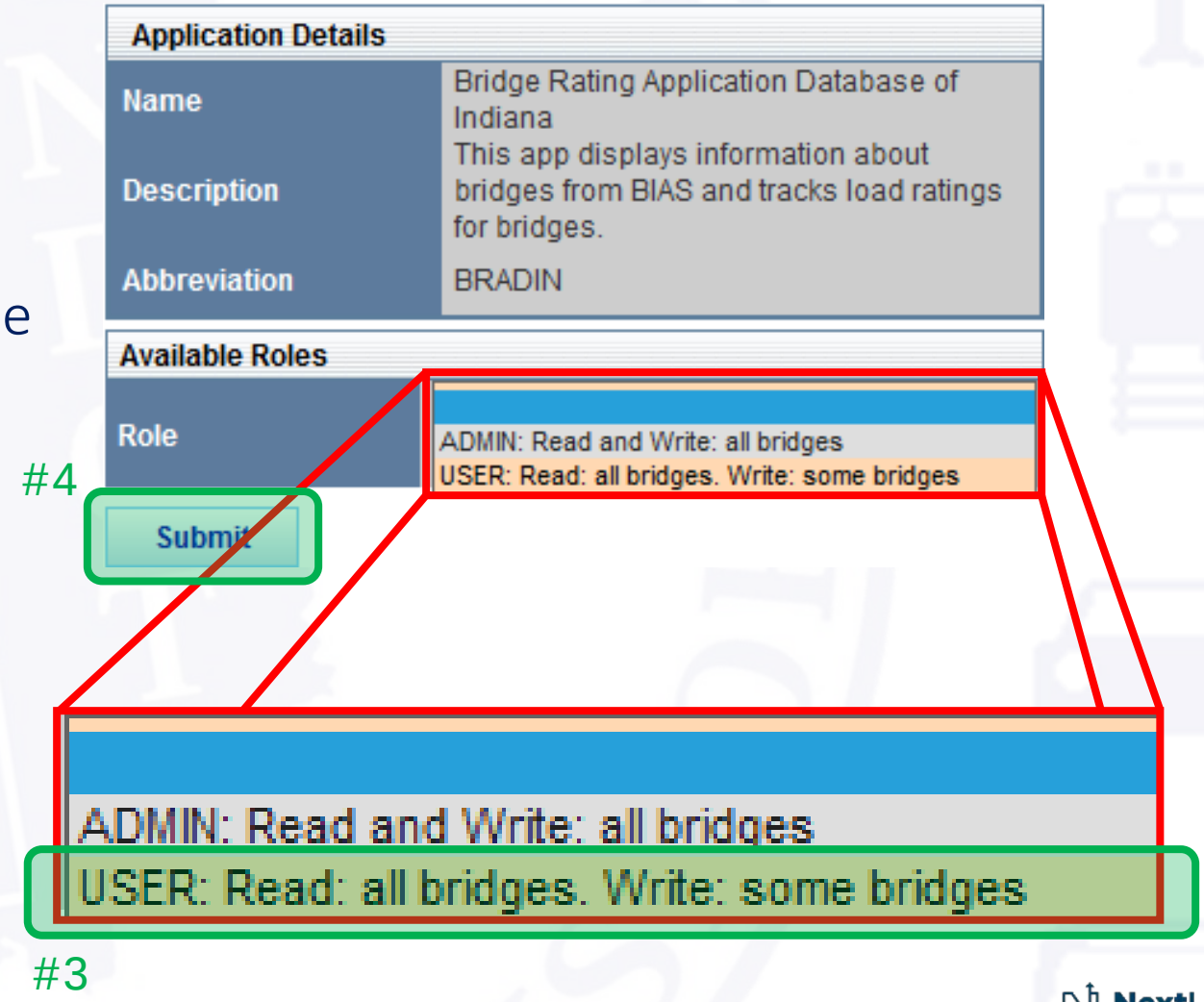
- Application temporarily limited to documented Load Rating Engineers (LREs) and INDOT personnel
  - Anyone requesting access must have credentials complete and up-to-date in BIAS
- Initial approval will be read-only access
- Authorized users will be given write-access prior to the effective date

Bridge Rating Application Database of Indiana

Requesting Access

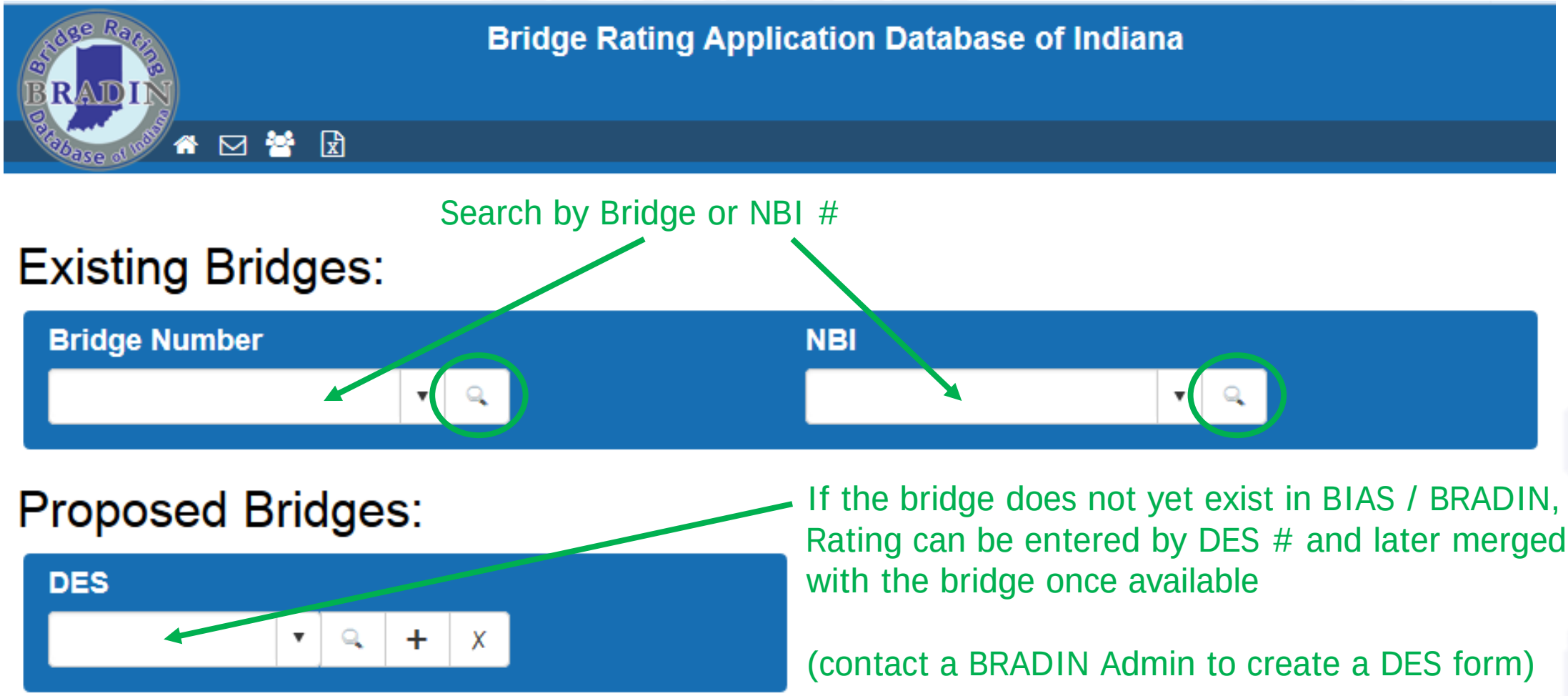
- From ITAP, select “Application” then “Request New Application”
- Select “Bridge Rating Application Database of Indiana”
- Select the “USER” role then “Submit”





Bridge Rating Application Database of Indiana

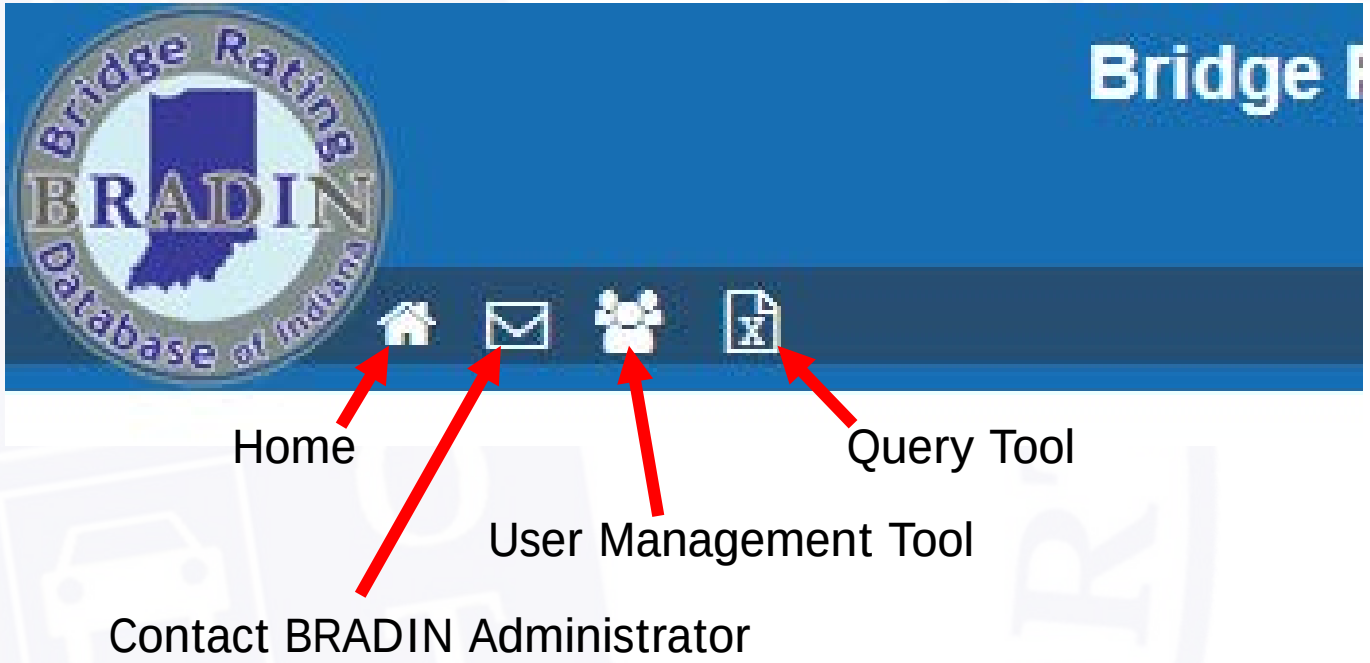
Navigation: Home Page



Bridge Rating Application Database of Indiana

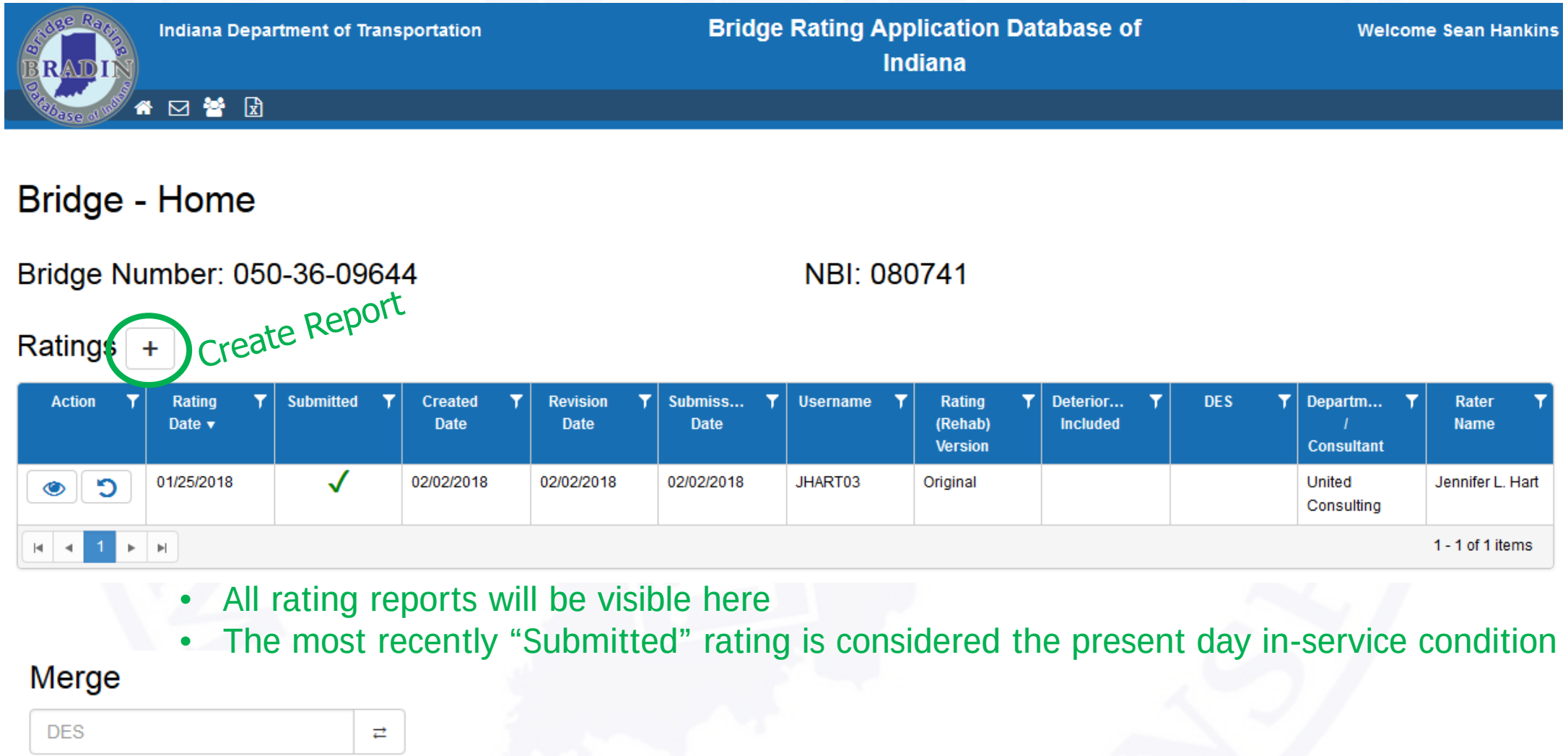
Navigation: Home Page

- Home
  - Return to Home Page
- Contact BRADIN Administrator
  - Email questions or report bugs
- User Management Tool
  - Administrator Only
- Query Tool
  - Query all active load rating reports



Bridge Rating Application Database of Indiana

Navigation: Bridge – Home



- All rating reports will be visible here
- The most recently “Submitted” rating is considered the present day in-service condition

Bridge Rating Application Database of Indiana

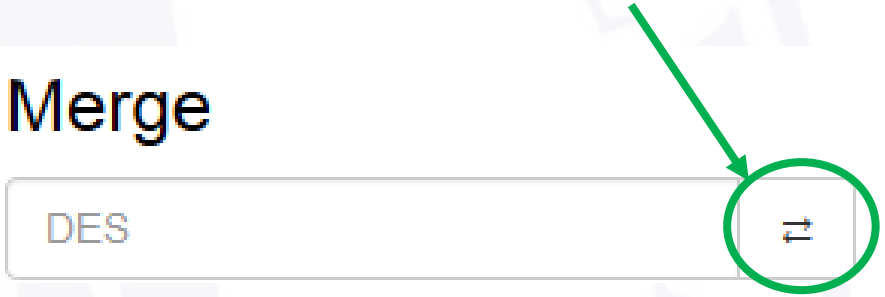
Navigation: Bridge – Home

- Action Buttons
  - View
  - Edit
  - Unsubmit
  - Delete

Must have write access

Only an Administrator can unsubmit a bridge after the day of submission

If rating created by DES #, click the merge button to move the report to the actual bridge once an NBI # is assigned and the bridge is available in BIAS / BRADIN



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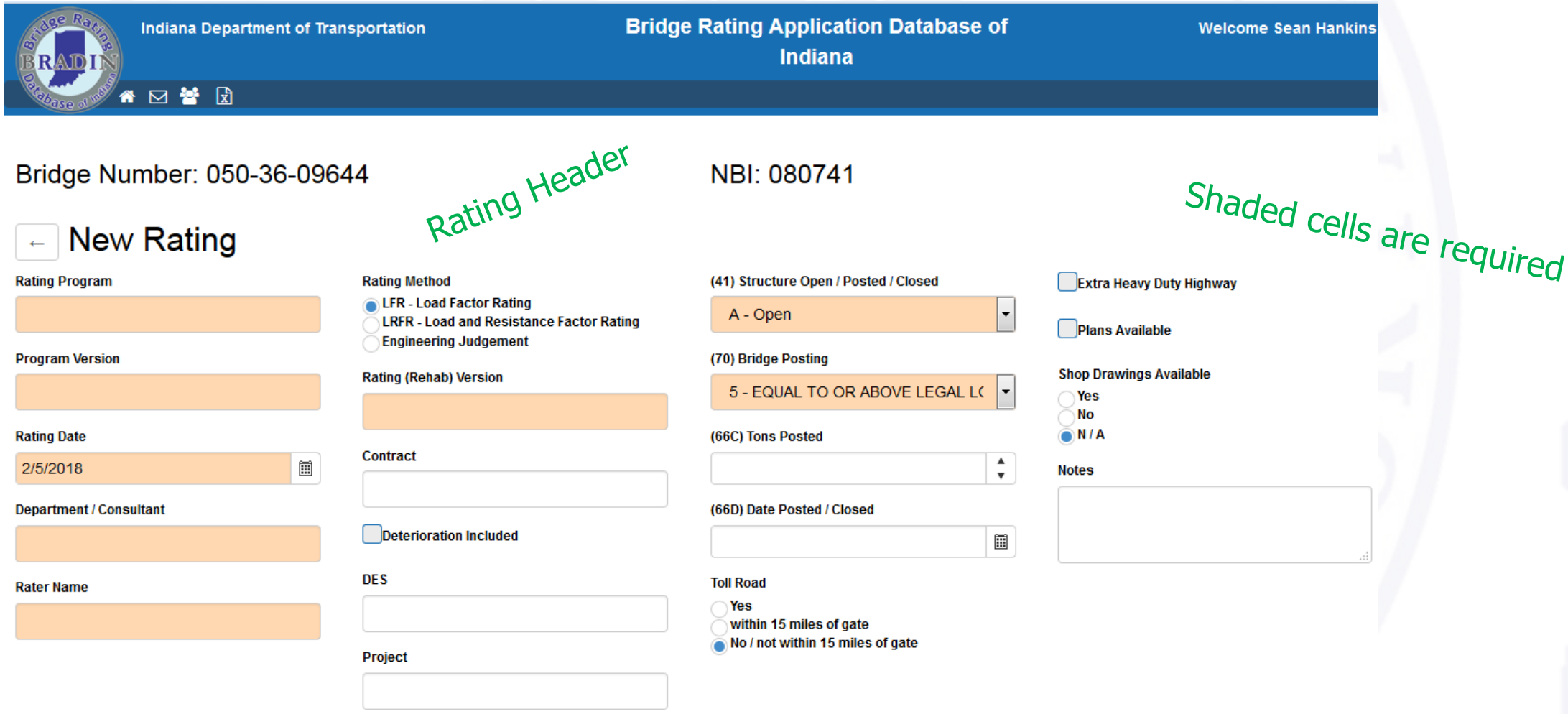
Navigation: New Rating



Bridge Rating Application Database of Indiana

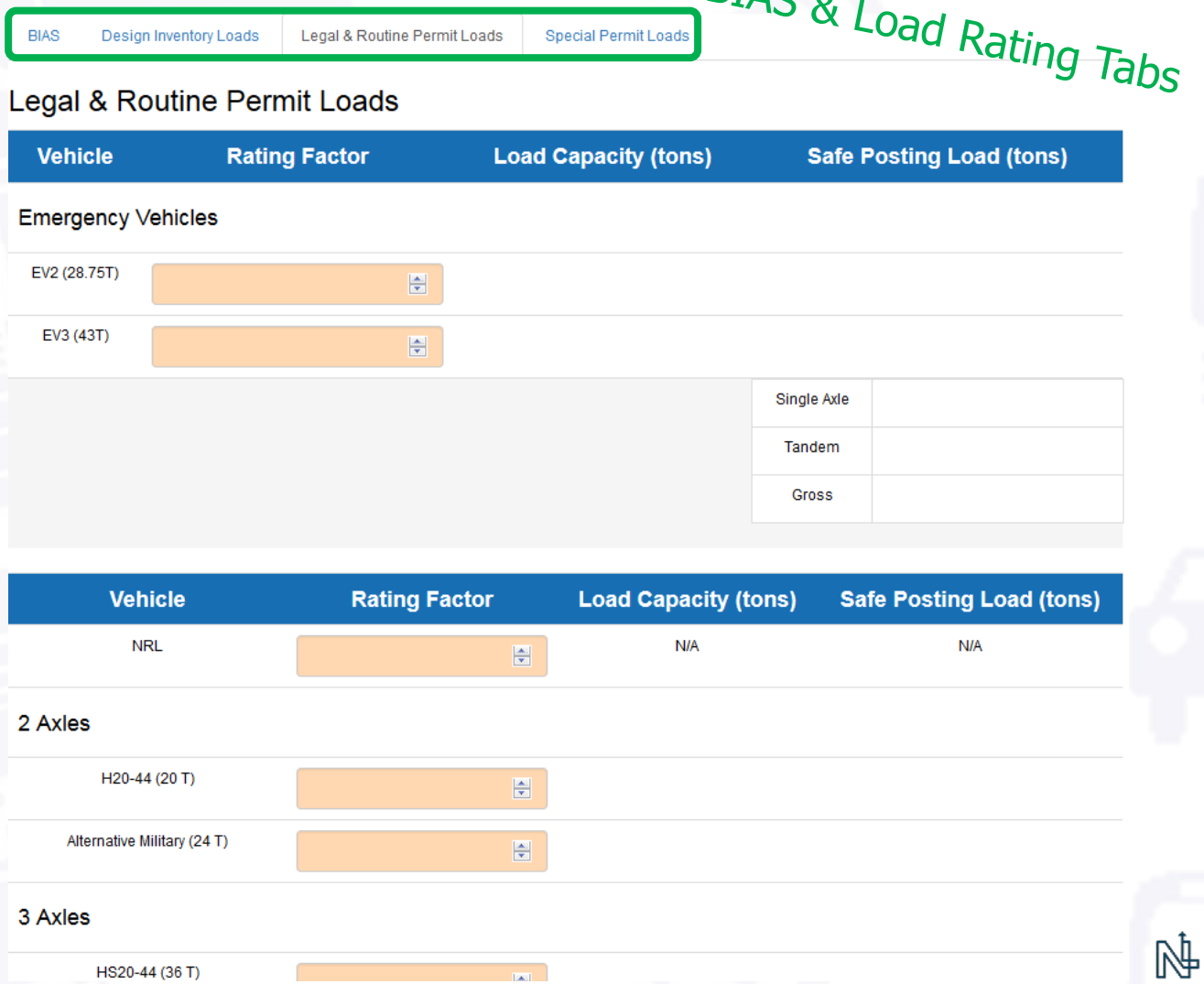
Navigation: New Rating

- BIAS
  - Read-Only information from BIAS
- Design Inventory Loads
- Legal & Routine Permit Loads
- Special Permit Loads

Enter Rating Factors

everything else will auto calculate when appropriate

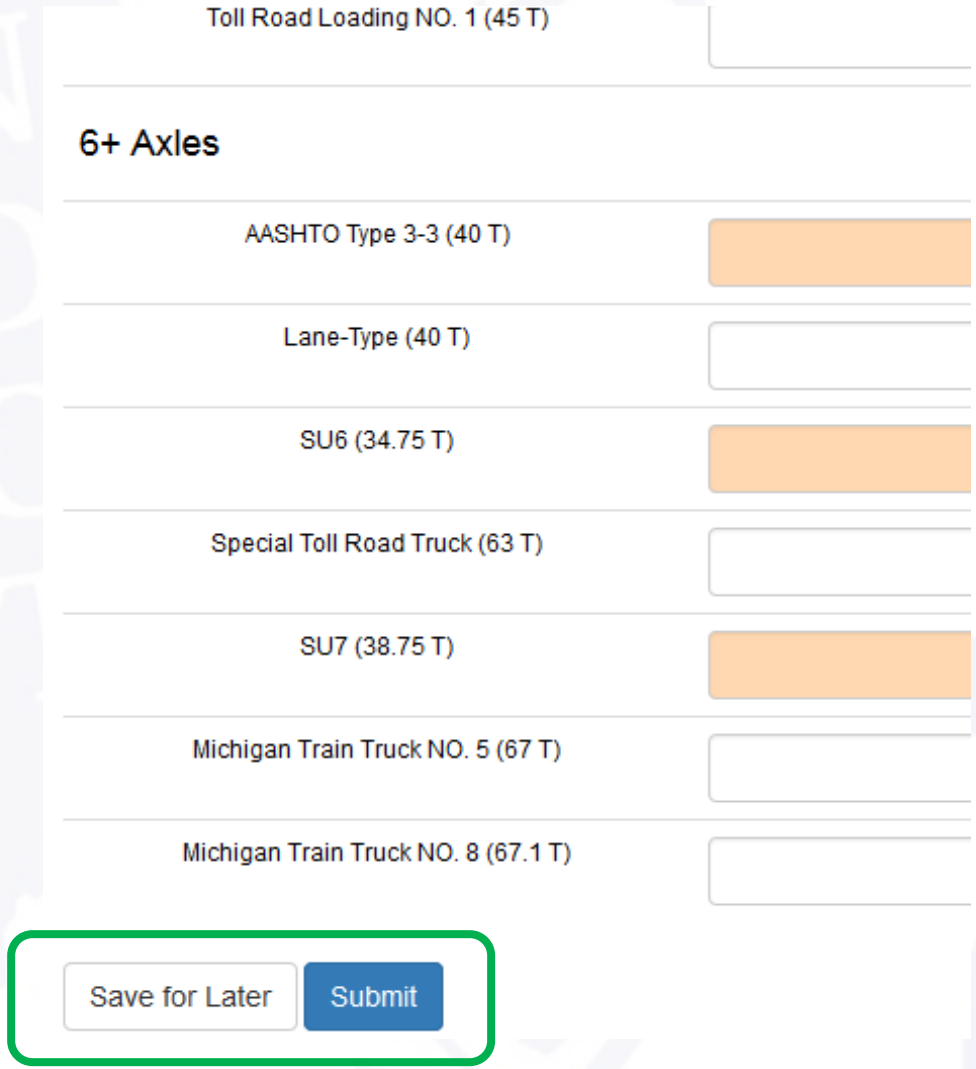
BIAS & Load Rating Tabs



Bridge Rating Application Database of Indiana

Navigation: New Rating

- To save changes, click “Save for Later”
- To save/submit changes, click “Submit”
  - BRADIN will not allow the rating to be submitted until all required fields are completed

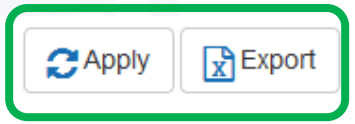


Bridge Rating Application Database of Indiana

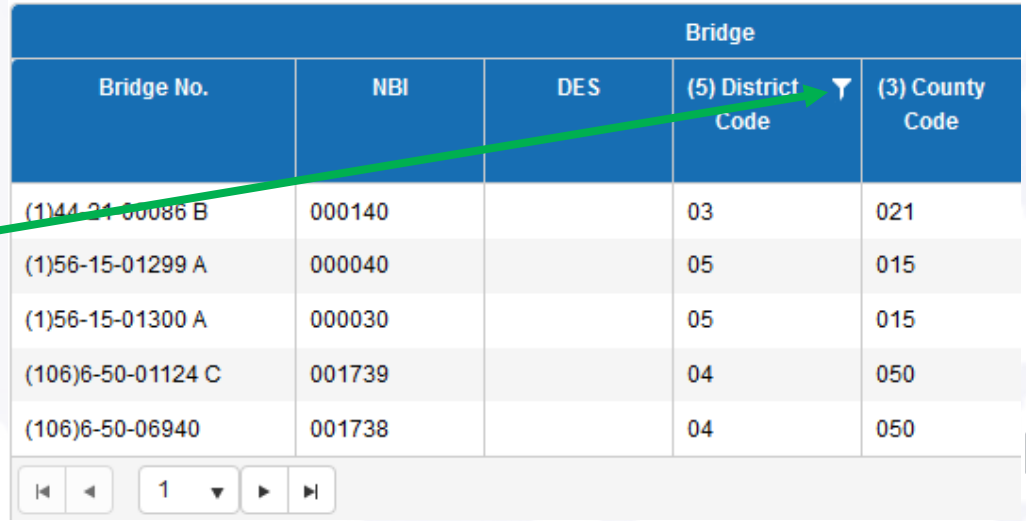
Navigation: Query Tool

- Select fields to include in the query
- Results will include all active reports
  - In-service ratings
  - Previous ratings
  - Proposed ratings

- Apply – include selected fields at bottom
- Export – send query results to Excel
  - DO NOT need to click “Apply” before “Export”



Results filterable by:
- District
- County
- Maintainer
- Owner



Bridge				
Bridge No.	NBI	DES	(5) District Code	(3) County Code
(1)44-21-00086 B	000140		03	021
(1)56-15-01299 A	000040		05	015
(1)56-15-01300 A	000030		05	015
(106)6-50-01124 C	001739		04	050
(106)6-50-06940	001738		04	050

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Bridge Rating Application Database of Indiana

Navigation: Mass Data Import Instructions

- Data must be in Microsoft Excel Comma Delimited format (.csv)
  - Template available on the INDOT Bridge Inspection Website
- Some data requires transformation
  - Instructions provided on INDOT Bridge Inspection Website
- Send data to BRADINSupport@indot.IN.gov
- All mass upload requests must be submitted by September 2019

Number	Memo Date	Effective Date	Subject	Attachments
18-01	01/29/2018 Rev. 01/30/2018	June 1, 2018	Bridge File Documents	BRADIN Import Instructions BRADIN Import Template Bridge Inspection Manual, Part 3 Revisions

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Bridge Rating Application Database of Indiana

Questions?