NEW JERSEY DEPARTMENT OF TRANSPORTATION
MEMORANDUM

TO: All Bridge Inspection Staff

FROM: Gregory T. Renman
Manager, Structural Evaluation and Bridge Management

DATE: **June 26, 2015; Revised January 13, 2017**

PHONE: 609-530-3572

SUBJECT: Fields for Load Rating and Revised LRFR Implementation

---

This memorandum supersedes previous NJDOT memorandum dated December 14, 2016.

NJDOT is continuing the process of Load and Resistance Factor Rating (LRFR) implementation for the bridges located in New Jersey. Please review the items below pertaining to load ratings and documentation.

1. Previously Accepted Changes for NBI Item 31, Item 63, and Item 65:

The following National Bridge Inventory (NBI) Items that pertain to load rating has been accepted and will be incorporated into *Revised NJDOT Recording and Coding Guide 2017*:

1.1 NBI Item 31 – Design Load:

In order to support the progression to LRFR, the following codes have been modified and accepted:

NBI Item 31 - Design Load		
Code	**Metric Description**	**English Description**
0	**Unknown**	**Unknown**
1	*M 9*	*H 10*
2	*M 13.5*	*H 15*
3	*MS 13.5*	*HS 15*
4	*M 18*	*H 20*
5	*MS 18*	*HS 20*
6	*MS 18 + Mod*	*HS 20 + Mod*
7	*Pedestrian*	*Pedestrian*
8	*Railroad*	*Railroad*
9	**MS 22.5 or Greater**	**HS 25 or Greater**
A	**HL 93**	**HL 93**
B	**Greater than HL 93**	**Greater than HL 93**
C	**Other**	**Other**

Code **0** for "**Unknown**" is to be used where the design live load is unidentified due to the absence of plans, design calculations, or other information. Code **C** for "**Other**" has been added for situations which increase the design load but are not based upon AASHTO design

trucks. State specific design trucks that exceed AASHTO loading would be reported as a Code **C**.

Code **A** has been added for use with the HL 93 AASHTO design load.

Code **B** has been added for use with increased design loads which are based on the HL 93 configuration. (Note: NBI Item 63 and Item 65 must be coded 8 in this case.)

Code **9** has been modified from HS 25 to HS 25 or *greater* (or MS 22.5 to MS 22.5 or *greater* for metric) and is to be used for increased design loads which are based on the respected configuration. (Note: NBI Item 63 and Item 65 must be coded 1 in this case.)

If the Design Load is documented as HS-20 or Military Loading in the PLAN sheet, then code SI&A Item 31 as 6 instead of 5.

1.2 NBI Item 63 and Item 65 – Method Used to Determine Operating/Inventory Rating:

The following codes have been modified and accepted for different Load Rating Methods:

NBI Item 63 - Method Used to Determine Operating Rating, and NBI Item 65 - Method Used to Determine Inventory Rating	
Code	**Description**
0	**Field evaluation and documented engineering judgment**
1	*Load Factor (LF)*
2	*Allowable Stress (AS)*
3	*Load and Resistance Factor (LRFR)*
4	*Load Testing*
5	**No rating analysis or evaluation performed**
6	*Load Factor (LF) rating reported by rating factor (RF) method using MS18 loading*
7	*Allowable Stress (AS) rating reported by rating factor (RF) method using MS18 loading*
8	*Load and Resistance Factor Rating (LRFR) reported by rating factor (RF) method using HL 93 loadings*
A	**Assigned rating based on Load Factor Design (LFD) reported in metric tons**
B	**Assigned rating based on Allowable Stress Design (ASD) reported in metric tons**
C	**Assigned rating based on Load and Resistance Factor Design (LRFD) reported in metric tons**
D	**Assigned rating based on Load Factor Design (LFD) reported by rating factor (RF) using MS 18 loading**
E	**Assigned rating based on Allowable Stress Design (ASD) reported by rating factor (RF) using MS 18 loading**
F	**Assigned rating based on Load and Resistance Factor Design (LRFD) reported by rating factor (RF) using MS 18 loading**

Code **0** is used for load ratings determined by engineering judgment, typically performed when no plans are available. Before performing load rating based on engineering judgment, field evaluation must occur for the structure by the NBIS qualified team leader.

Code **5** is used only when bridges have not been load rated (or load rating documentation does not exist). Bridges that currently have Items 63 and/or 65 coded as **5** must be evaluated to determine whether Code **0** or **5** is appropriate considering the above modifications.

Note:
The new codes for Assigned Load Ratings (**A** through **F**) are not applicable in New Jersey at this time. Additionally, Code **5** will typically not be used, as all bridges at a minimum should have an Engineering Judgment rating (Code **0**).

2. State Fields for NBI Item 64 and Item 66:

The following fields are added to correctly report load ratings to FHWA as either "Rating Factor" (**R.F.**) or "**Ton**":

Type	INV Rating	Units (Format) *Max value*	OPR Rating	Units (Format) *Max value*	Remarks
Existing Federal Fields	*NBI Item 66*	*Ton*	*NBI Item 64*	*Ton*	These federal fields will be locked for users in CombIS, and will be auto-populated based on the selection of NBI Item 63 and Item 65, and the entered values in new State Fields.
New State Fields	**State Item 66T**	Ton (XX.X) Max 99.9	**State Item 64T**	Ton (XX.X) Max 99.9	~~Use this field when NBI Items 63 and 65 are coded '0' thru '5', 'A', 'B', or 'C'.~~ For any design load vehicle this field will be used.
New State Fields	**State Item 66F**	R.F. (X.XX) Max **2.99**	**State Item 64F**	R.F. (X.XX) Max **2.99**	~~Use this field when NBI Items 63 and 65 are coded '6' thru '8', 'D', 'E', or 'F'.~~ For any design load vehicle this field will be used.

Note:

a. ~~When NBI Item 63 and Item 65 are coded as **6, 7, 8, D, E, OR F**, then Item 64F and Item 66F are coded with Rating Factor in the format **X.XX**, and Item 64T and Item 66T will be locked for users (left blank) in CombIS.~~

b. ~~When NBI Item 63 and Item 65 are coded as **0, 1, 2, 3, 4, 5, A, B, OR C**, then Item 64T and Item 66T are coded with Tonnage in the format **XX.X**, and Item 64F and Item 66F will be locked for users (left blank) in CombIS. In case of Item 63 and Item 65 selected as **5**, enter value of **0.0** in Item 64T and Item 66T.~~

3. - State Fields for NJ Legal Trucks and SHVs:

The following is the list of new state fields assigned for different design trucks, NJ legal trucks, and Special Hauling Vehicles (SHVs):

1. (**BQ2**) - H TRUCK/INVENTORY Rating (rating factor)
2. (**BR2**) - HS TRUCK/ INVENTORY Rating (rating factor)
3. (**BV2**) - MILITARY LOADING/ INVENTORY Rating (rating factor)
4. (**CA2**) - H TRUCK/ OPERATING Rating (rating factor)
5. (**CB2**) - HS TRUCK/ OPERATING Rating (rating factor)
6. (**CC2**) - TYPE 3 LOADING/ OPERATING Rating (rating factor)
7. (**CD2**) - TYPE 3S2 LOADING/ OPERATING Rating (rating factor)
8. (**CE2**) - TYPE 3-3 LOADING/ OPERATING Rating (rating factor)
9. (**CF2**) - MILITARY LOADING/ OPERATING Rating (rating factor)
10. (**BW**) TYPE SU4 LOADING/ INVENTORY Rating (tons)
11. (**BX**) TYPE SU5 LOADING/ INVENTORY Rating (tons)
12. (**BY**) TYPE SU6 LOADING/ INVENTORY Rating (tons)
13. (**BZ**) TYPE SU7 LOADING/ INVENTORY Rating (tons)
14. (**CS**) TYPE SU4 LOADING/ OPERATING Rating (tons)
15. (**CS2**) TYPE SU4 LOADING/ OPERATING Rating (rating factor)
16. (**CT**) TYPE SU5 LOADING/ OPERATING Rating (tons)
17. (**CT2**) TYPE SU5 LOADING/ OPERATING Rating (rating factor)
18. (**CU**) TYPE SU6 LOADING/ OPERATING Rating (tons)
19. (**CU2**) TYPE SU6 LOADING/ OPERATING Rating (rating factor)
20. (**CV**) TYPE SU7 LOADING/ OPERATING Rating (tons)
21. (**CV2**) TYPE SU7 LOADING/ OPERATING Rating (rating factor)
22. (**CW**) HL 93 LOADING/ OPERATING Rating (rating factor)
23. (**CX**) HL 93 LOADING/ OPERATING Rating (rating factor)

Note:

a. See **Attachment 1** for layout of Load Rating tab in CombIS.

b. For NJ legal trucks and AASHTO SHVs trucks under LRFR methodology, report the Legal Rating Factors in the column for Operating rating. See **Attachment 2** for detail guidance.

4. How to Code Federal and State Items for Load Ratings in CombIS?

The proper coding in CombIS requiring either of the two following methods for bridges undergoing load rating:

- Load and Resistance Factor Rating (LRFR)
- Load Factor Rating (LFR) –or– Allowable Stress Rating (ASR)

As per NJDOT Highway Bridge Load Rating Manual, for bridges designed with HL-93 as a design vehicle (using LRFD Specifications), report the LRFR results as the Final Ratings in the SI&A data for NBI Items 64 and 66. For bridges not designed with HL-93, report the LFR results as the Final Ratings in the SI&A data for **NBI Items 64 and 66.**

The results from both methods should be presented on the Load Rating Summary Sheet (LRSS) as part of the Bridge Evaluation Survey Report, **as well as in the SI&A Load Rating tab in CombIS.**

It is our policy to report LFR/ASR results in Ton and LRFR results in R.F. on the LRSS as part of the Bridge Evaluation Survey Report.

Design truck load ratings will have both Inventory and Operating Ratings values.

For LRFR results, there will not be any Inventory Ratings for NJ legal trucks and AASHTO SHVs. These should be left blank in CombIS. The Legal Ratings are entered in the Operating Rating Column.

Note:

a. See **Attachment 2** for detail guidance on coding load rating fields in CombIS.

5. NBI Items 70

For NBI Item 70, Bridge Posting may be computed using LRFR, LFR, or ASR methods. For NJ Legal truck load ratings based on LRFR, this item represents the minimum rating factor of all legal load configurations in the State.

Attachment 1

Layout in CombIS

LOAD RATING AND POSTING

Load Rating Review Recommended:	☐	Load Rating Engineer:	Harjit Bal
41 Posting Status:	A - Open	70 Posting:	5 - Equal to or above legal loads
31 Design Load:	A - HL 93	Rating Date:	12/01/2016
(CG1) Posted Load Type:		(BK) Overstress %:	
(CG2) Posted Load Limit (Tons):		(CH1) Load Rating/Posting Combo:	L: Load Factor Rating
(AI) Speed Limit Posting (mph):		(CH2) Load Rating/Posting Combo:	
		(AN) Plans Available:	Y

65 Inventory Rating Method:	ıethod using HL-93 loadings.	63 Operating Rating Method:	8 - Load and Resistance Fac
66 Inventory Rating:	2.12	*64 Operating Rating:*	2.99
66F Inventory Rating (Factor):	2.12	64F Operating Rating (Factor):	2.99

RATING (TONS)

Type	Inventory		Operating	
HL93:	( )	45	( )	85
H15/H20:	(BQ)		(CA)	
HS20:	(BR)	45	(CB)	85
3:	(BS)	45	(CC)	100
NJ3S2:	(BT)	55	(CD)	101
3-3:	(BU)	65	(CE)	120
Military:	(BV)		(CF)	
SU4:	(BW)	45	(CS)	100
SU5:	(BX)	46	(CT)	101
SU6:	(BY)	47	(CU)	101
SU7:	(BZ)	47	(CV)	102

RATING FACTOR

Code only for LRFR

Type	Inventory		Operating/Legal	
HL93:	(CW)	2.12	(CX)	3.14
H15/H20:	(BQ2)		(CA2)	
HS20:	(BR2)		(CB2)	
3:		-	(CC2)	3.25
NJ3S2:		-	(CD2)	3.75
3-3:		-	(CE2)	3.85
Military:	(BV2)		(CF2)	
SU4:		-	(CS2)	3.20
SU5:		-	(CT2)	3.20
SU6:		-	(CU2)	3.20
SU7:		-	(CV2)	3.20

ALTERNATE LOAD RATINGS

Alt. Design Load:		Alt. Inventory Rating:	-1
Alt. Rating Date:		Alt. Operating Rating:	-1

Type	Inventory		Operating	
HL93:	( )		( )	
H15:	( )		( )	
HS20:	( )		( )	
3:	( )		( )	
NJ3S2:	( )		( )	
3-3:	( )		( )	

POSTING

	Inventory	Operating
Truck 1:	0	0
Truck 2:	0	0
Truck 3:	0	0

Attachment 1 (Contd.)

Load Rating Fields

The following table includes the entire set of state fields assigned for different design trucks, NJ legal trucks, and Special Hauling Vehicles (SHVs):

Vehicle Type	INV Rating	Units	OPR Rating	Units	INV Rating	Units	OPR Rating	Units
HL93:	-	-	-	-	**CW**	R.F.	**CX**	R.F.
H:	*BQ*	Ton	*CA*	Ton	**BQ2**	R.F.	**CA2**	R.F.
HS:	*BR*	Ton	*CB*	Ton	**BR2**	R.F.	**CB2**	R.F.
3:	*BS*	Ton	*CC*	Ton	-	-	**CC2**	R.F.
3S2:	*BT*	Ton	*CD*	Ton	-	-	**CD2**	R.F.
3-3:	*BU*	Ton	*CE*	Ton	-	-	**CE2**	R.F.
Military:	*BV*	Ton	*CF*	Ton	**BV2**	R.F.	**CF2**	R.F.
SU4:	**BW**	Ton	**CS**	Ton	-	-	**CS2**	R.F.
SU5:	**BX**	Ton	**CT**	Ton	-	-	**CT2**	R.F.
SU6:	**BY**	Ton	**CU**	Ton	-	-	**CU2**	R.F.
SU7:	**BZ**	Ton	**CV**	Ton	-	-	**CV2**	R.F.

Note:

1. *Italics* are old existing fields
2. **Bolds in Blue Fonts** are new fields
3. R.F – Rating Factors
4. Ton – English Tonnage
5. "-" represents not applicable

Attachment 2

The load rating tab under SI&A Report format in CombIS is modified to accommodate the Rating Factors (**R.F.**) for LRFR and the English Tonnage (**Tons**) for LFR/ASR methodologies.

Case 1: LRFR Rating Factors Sample

When the NBI Items 63 and 65 are selected as "**8 – Load and Resistance Factor Rating (LRFR) rating report by rating factor (RF) method using HL-93 loadings,**" then enter load rating results in rating factors for the following:

- Code NBI Items 64 and 66 (**X.XX**) with a maximum value of **2.99. For example, if HL-93 (CX) = 3.14, then Item 64F = 2.99**

LOAD RATING AND POSTING

Load Rating Review Recommended:	☐	Load Rating Engineer:	Harjit Bal
41 Posting Status:	A - Open	70 Posting:	5 - Equal to or above legal loads
31 Design Load:	A - HL 93	Rating Date:	12/01/2016
(CG1) Posted Load Type:		(BK) Overstress %:	
(CG2) Posted Load Limit (Tons):		(CH1) Load Rating/Posting Combo:	L: Load Factor Rating
(AI) Speed Limit Posting (mph):		(CH2) Load Rating/Posting Combo:	
		(AN) Plans Available:	Y
65 Inventory Rating Method:	ıethod using HL-93 loadings.	63 Operating Rating Method:	8 - Load and Resistance Fac
66 Inventory Rating:	2.12	*64 Operating Rating:*	2.99
66F Inventory Rating (Factor):	2.12	64F Operating Rating (Factor):	2.99

RATING (TONS)

Type	Inventory		Operating	
HL93:	( )	45	( )	85
H15/H20:	(BQ)		(CA)	
HS20:	(BR)	45	(CB)	85
3:	(BS)	45	(CC)	100
NJ3S2:	(BT)	55	(CD)	101
3-3:	(BU)	65	(CE)	120
Military:	(BV)		(CF)	
SU4:	(BW)	45	(CS)	100
SU5:	(BX)	46	(CT)	101
SU6:	(BY)	47	(CU)	101
SU7:	(BZ)	47	(CV)	102

RATING FACTOR

Code only for LRFR

Type	Inventory		Operating/Legal	
HL93:	(CW)	2.12	(CX)	3.14
H15/H20:	(BQ2)		(CA2)	
HS20:	(BR2)		(CB2)	
3:	-		(CC2)	3.25
NJ3S2:	-		(CD2)	3.75
3-3:	-		(CE2)	3.85
Military:	(BV2)		(CF2)	
SU4:	-		(CS2)	3.20
SU5:	-		(CT2)	3.20
SU6:	-		(CU2)	3.20
SU7:	-		(CV2)	3.20

ALTERNATE LOAD RATINGS

Alt. Design Load:		Alt. Inventory Rating:	-1
Alt. Rating Date:		Alt. Operating Rating:	-1

Type	Inventory		Operating	
HL93:	( )		( )	
H15:	( )		( )	
HS20:	( )		( )	
3:	( )		( )	
NJ3S2:	( )		( )	
3-3:	( )		( )	

POSTING

	Inventory	Operating
Truck 1:	0	0
Truck 2:	0	0
Truck 3:	0	0

Case 2: LFR/ASR Loads in Tonnage Sample

When the NBI Items 63 and 65 are selected as "**0 – Field evaluation and documented engineering judgment,**" OR **"1 – Load Factor (LF),"** OR **"2 – Allowable Stress (AS),"** then enter load rating results in tonnage for the following:

- Code NBI Items 64 and 66 (**XX.X**) with a maximum value of **99.9 tons. For Example if HS-20 (CB = 105), then Item 64T = 99.9 tons.**

LOAD RATING AND POSTING

Load Rating Review Recommended:	☐	Load Rating Engineer:	Harjit Bal
41 Posting Status:	A - Open	70 Posting:	5 - Equal to or above legal loads
31 Design Load:	6 - HS 20+Mod	Rating Date:	12/01/2016
(CG1) Posted Load Type:		(BK) Overstress %:	
(CG2) Posted Load Limit (Tons):		(CH1) Load Rating/Posting Combo:	L: Load Factor Rating
(AI) Speed Limit Posting (mph):		(CH2) Load Rating/Posting Combo:	
		(AN) Plans Available:	Y

65 Inventory Rating Method:	1 - Load Factor (LF)	63 Operating Rating Method:	1 - Load Factor (LF)
66 Inventory Rating:	45	*64 Operating Rating:*	99.9
66T Inventory Rating (Tons):	45	64T Operating Rating (Tons):	99.9

RATING (TONS)

Type	Inventory		Operating	
HL93:	( )	45	( )	85
H15/H20:	(BQ)		(CA)	
HS20:	(BR)	45	(CB)	105
3:	(BS)	45	(CC)	100
NJ3S2:	(BT)	55	(CD)	101
3-3:	(BU)	65	(CE)	120
Military:	(BV)		(CF)	
SU4:	(BW)	45	(CS)	100
SU5:	(BX)	46	(CT)	101
SU6:	(BY)	47	(CU)	101
SU7:	(BZ)	47	(CV)	102

RATING FACTOR

Code only for LRFR

Type	Inventory		Operating/Legal	
HL93:	(CW)	2.12	(CX)	3.14
H15/H20:	(BQ2)		(CA2)	
HS20:	(BR2)		(CB2)	
3:		-	(CC2)	3.25
NJ3S2:		-	(CD2)	3.75
3-3:		-	(CE2)	3.85
Military:	(BV2)		(CF2)	
SU4:		-	(CS2)	3.20
SU5:		-	(CT2)	3.20
SU6:		-	(CU2)	3.20
SU7:		-	(CV2)	3.20

ALTERNATE LOAD RATINGS

Alt. Design Load:		Alt. Inventory Rating:	-1
Alt. Rating Date:		Alt. Operating Rating:	-1

Type	Inventory		Operating	
HL93:	( )		( )	
H15:	( )		( )	
HS20:	( )		( )	
3:	( )		( )	
NJ3S2:	( )		( )	
3-3:	( )		( )	

POSTING

	Inventory	Operating
Truck 1:	0	0
Truck 2:	0	0
Truck 3:	0	0

Note: As per our policy, the LFR and LRFR ratings needs to be reported in SI&A & LRSS along with SUVs for any design load vehicle.