Chapter 13 Bridge Load Rating — Contents

Chapter 13 Bridge Load Rating

13.1 General

Bridge load rating is a procedure to evaluate the adequacy of various structural components to carry predetermined live loads. The Bridge Load Rating Engineer in the WSDOT Bridge Preservation Office is responsible for the bridge inventory and load rating of existing and new bridges in accordance with the National Bridge Inspection standards (NBIS) and the AASHTO Manual for Bridge Evaluation (MBE), latest edition. Currently, only elements of the superstructure will be rated, however, if conditions warrant, substructure elements may need to be rated. The superstructure shall be defined as all structural elements above the column tops including drop crossbeams.

Load ratings are required for all new, widened, or rehabilitated bridges where the rehabilitation alters the load carrying capacity of the structure. Load ratings shall be done immediately after the design is completed and rating calculations shall be filed separately per Section 13.4 and files shall be forwarded to WSDOT's Load Rating Engineer.

The Bridge Preservation Office is responsible for maintaining an updated bridge load rating throughout the life of the bridge based on the current condition of the bridge. Conditions of existing bridges change over time, resulting in the need for reevaluation of the load rating. Such changes may be caused by damage to structural elements, extensive maintenance or rehabilitative work, or any other deterioration identified by the Bridge Preservation Office through their regular inspection program.

New bridges that have designs completed after October 1, 2010 shall be rated based on the Load and Resistance Factor Rating (LRFR) method per the MBE and this chapter. NBI ratings shall be based on the HL-93 truck and shall be reported as a rating factor. For bridges designed prior to October 1, 2010, partially reconstructed or rehabilitated bridges where part of the existing structure is designed by the Allowable Stress Method (ASR) or by the Load Factor Method (LFR), and other existing structures, NBI ratings can be based on either the LFR or Load Resistance Factor Rating (LRFR) methods. The rating factors shall be based on HS loading and reported in tons when using the LFR method. Verify with WSDOT's Load Rating Engineer regarding which load rating method to use for bridges designed prior to October 1, 2010.

By definition, the adequacy or inadequacy of a structural element to carry a specified truck load will be indicated by the value of its rating factor (RF); that is, whether it is greater or smaller than 1.0.

13.1.1 LRFR Method per the MBE

Rating Equation

$$RF = \frac{(C - \gamma_{DC}\,DC - \gamma_{DW}\,DW \pm \gamma_p\,P)}{\gamma_{LL}\,LL\,(1+IM)} \quad (13.1.1A\text{-}1)$$

Where:

- RF = Rating factor
- C = $\phi c\ \phi s\ \phi n\ R_n$, where $\phi c\ \phi s \geq 0.85$ for strength limit state
- C = f_R for service limit state
- R_n = Nominal Capacity of member
- f_R = Allowable Stress per LRFD specs
- DC = Dead load due to structural components and attachments
- DW = Dead load due to wearing surface and utilities
- P = Permanent loads other than dead loads
- LL = Live load effect
- IM = Dynamic load allowance (Impact)
- γ_{DC} = Dead load factor for structural components and attachments
- γ_{DW} = Dead load factor for wearing surface and utilities
- γ_P = Load factor for permanent load
- γ_{LL} = Live load factor
- ϕ_c = Condition factor
- ϕ_s = System factor
- ϕ_n = Resistance factor based on construction material

When rating the full section of a bridge, like a box girder or 3D truss, or crossbeams, with two or more lanes, the following formula applies when rating overload trucks.

$$RF = \frac{C - \gamma_{DC}\,DC - \gamma_{DW}\,DW \pm \gamma_p\,P - \gamma_{LL}\,LL_{lgl}(1+IM)}{\gamma_{LL}\,LL\,(1+IM)} \quad (13.1.1A\text{-}2)$$

The formula above assumes that there is one overload truck occupying one lane, and one of the legal trucks occupying each of the remaining lanes. Trucks shall be placed in the lanes in a manner that produces the maximum forces. The live load factor for both of the legal truck and permit truck shall be equal and are dependent on the permit truck. The LL_{lgl} shown in the equation above corresponds to the maximum effect of the legal truck(s).

Condition Factor (ϕc_c)

Condition factor is based on the Bridge Management System (BMS) condition state of the element per the most recent inspection report. The engineer should consider the quantity of each element in a fair or poor condition state and the notes describing the condition of an element when determining the appropriate condition factor.

Structural Condition of Member	ϕ_c
Good or Satisfactory, BMS Condition 1 or 2	1.00
Fair, BMS Condition 3	0.90
Poor, BMS Condition 4	0.85

System Factor (ϕ_s)

The system factor shown in the table below applies to flexure and all axial forces; use a system factor of 1.00 when rating shear.

Super Structure Type	ϕ_s
Welded Members in Two Girder/Truss/Arch Bridges	0.85
Riveted Members in Two Girder/Truss/Arch Bridges	0.90
Multiple Eyebar Members in Truss Bridges	0.90
Three-Girder Bridges with Girder Spacing 6′	0.85
Four Girder Bridges with Girder Spacing ≤ 4′	0.95
All Other Girder and Slab Bridges	1.00
Floorbeams with Spacing >12′ and Noncontinuous Stringers	0.85
Redundant Stringer Subsystems Between Floorbeams	1.00

Dead and Live Load Factors

Bridge Type	Limit State	γ_{DC}	γ_{DW}	γ_p	Inventory HL-93	Operating HL-93	Legal & NRL Loads	Permit
Reinforced Concrete	Strength I	1.25	1.50	--	1.75	1.35	Table 13.1-1	--
	Strength II	1.25	1.50	1.0	--	--	--	Table 13.1-1
Prestressed Concrete	Strength I	1.25	1.50	1.0	1.75	1.35	Table 13.1-1	--
	Strength II	1.25	1.50	1.0	--	--	--	Table 13.1-1
	Service III	1.00	1.00	1.0	1.00	--	1.0	1.0
	Service I	1.00	1.00	1.0	--	--	--	1.0
Steel	Strength I	1.25	1.50	1.0	1.75	1.35	Table 13.1-1	--
	Strength II	1.25	1.50	1.0	--	--	--	Table 13.1-1
	Service II	1.00	1.00	1.0	1.3	1.0	1.30	1.0

Live Load Factors for Legal and Permit Loads

Truck	Live load Factor	≤ 1000	>1000	Unknown
Legal & NRL	γ_{LL}	1.30	1.45	1.45
Permit*	γ_{LL}	1.20	1.20	1.20

*Distribution factors shall be based on one lane when evaluating permit trucks, and the built in multiple presence factor shall be divided out.

Table 13.1-1

Number of Lanes	Multiple Presence Factor
1 Lane	= 1.2
2 Lanes	= 1.0
3 Lanes	= 0.85
> 3 Lanes	= 0.65

For cases where a permit truck is combined with a legal truck, the multiple presence factor for the total number of lanes loaded in each case shall be applied to all loads.

In cases where RF for legal loads is less than 1, which would require the bridge to be posted, live load factors may be reduced (interpolated based on ADTT), per Section 6A.4.4.2.3 of the MBE.

Dynamic Load Allowance (Impact)

Dynamic load allowance is dependent on the approach onto the bridge and condition of the deck and joints based on the latest inspection report.

Truck	IM	NBI Element 1681	BMS Flag 322
HL 93 (All Span Lengths):			
Inventory	33%	N/A	N/A
Operating	33%	N/A	N/A
Legal & Permit Trucks:			
Spans 40′ or less	33%	N/A	N/A
Legal & Permit Trucks, Spans greater than 40′			
Smooth Riding Surface Along Approach onto the Bridge, Bridge Deck and Expansion Joints	10%	8	1, 2 or none
Minor Surface Deviations and Depressions	20%	6	3
Severe Impact to the Bridge	30%	3	4

Verify the conditions of the deck and joints to identify any deficiencies in the deck that would cause impact to the structure. For potholes less than 1″ deep use 20 % impact, and use 30% impact for depths greater than 1″. For multi span bridges, take into consideration the type and location of the deficiency and whether Impact would be applicable to the entire structure or not. If the Inspection report has no NBI Code 1681 or BMS Flag 322, then assume Smooth approaches.

Live Loads

The moving loads shall be the HL-93 loading, the AASHTO legal loads (including three AASHTO trucks and notional rating load), and the two WSDOT overload vehicles (See Figures 13.1-1 and 13.1-3 thru 13.1-9). Inventory and operating ratings shall be calculated for the HL-93 truck. In cases where the rating factor for the Notational Rating Load (NRL) is below 1.00, then the single unit vehicles (SUV) shall be evaluated for posting, see MBE for SUV configurations.

13.1.2 Load Factor Method (LFR)

The load factor method can be applied to structures designed prior to October 2010. Ratings shall be performed per the MBE. Capacities, resistance factors, and distribution factors shall be based on the AASHTO *Standard Specifications* 17th edition.

Ultimate Method (LFR)

Rating Equation

$$RF = \frac{\Phi C - \gamma_{DL} D \pm S}{\gamma_{LL} LL (1+IM)} \qquad (13.1.2\text{-}1)$$

Where:

- RF = Rating factor
- C = Nominal member resistance
- Φ = Resistance factor based on construction material
- D = Unfactored dead loads
- LL = Unfactored live loads
- S = Unfactored prestress secondary moment or shear
- IM = Impact
- γ_{DL} = Dead load factor for structural components and attachments
- γ_{LL} = Live load factor

Dead and Live Load Factors

Dead load factor = 1.30
Live load factor = 2.17 (Inventory)
= 1.30 (Operating)

Impact (IM)

Truck	IM	NBI Element 1681	BMS Flag 322
Design and Legal loads (Inventory & Operating)	Span	N/A	N/A
Permit Loads:			
Smooth Riding Surface Along Approach onto the Bridge, Bridge Deck and Expansion Joints	10%	8	1, 2, or none
Minor Surface Deviations and Depressions	20%	6	3
Severe Impact to the Bridge	30%	3	4

If the inspection report has no NBI Code 1681 or BMS Flag 322, then assume smooth approaches.

Impact (*IM*) for design and legal loads is span dependent:

$$IM = \frac{50}{(125+L)} \qquad (13.1.2\text{-}2)$$

Where:
L is equal to span length

When rating the full section of a bridge, like a box girder or 3D truss, or crossbeams, which have two or more lanes, the following formula applies when rating overload trucks.

$$RF = \frac{C - \gamma_{DL} D \pm S - \gamma_{LL} LL_{lgl}(1+IM)}{\gamma_{LL} LL(1+IM)} \qquad (13.1.2\text{-}3)$$

The formula above assumes that there is one overload truck occupying one lane, and one of the legal trucks occupying each of the remaining lanes. Trucks shall be placed in the lanes in a manner that produces the maximum forces. The LL_{lgl} shown in the equation above corresponds to the maximum effect of the legal trucks(s). The γ_{LL} corresponds to the live load factor for the overload truck and is the same for both legal and overload trucks. The same multiple presence factor for the total number of lanes loaded should be applied to all loads.

Resistance Factors (LFR) Method

The resistance factors for NBI ratings shall be per the latest AASHTO *Standard Specifications*. Following are the NBI resistance factors assuming the member is in good condition:

Steel members:	1.00 (Flexure)
	1.00 (Shear)
Prestressed concrete	1.00 (Flexure, positive moment)
	0.90 (Shear)
Post-tensioned, cast-in-place:	0.95 (Flexure, positive moment)
	0.90 (Shear)
Reinforced concrete:	0.90 (Flexure)
	0.85 (Shear)

For prestressed and post-tensioned members, where mild reinforcing steel is used to resist negative moment, the resistance factors for reinforced concrete section shall be used in the ratings.

In cases where there is deterioration in a member, the cross section shall be reduced based on the inspection report. For cases where deterioration in members is described in general terms, reduce resistance factors of member by 0.10 for BMS Condition State of 3, and reduce resistance factors by 0.20 for BMS Condition State of 4. The engineer should consider the quantity of each element in a fair or poor condition state and the notes describing the condition of an element when determining the appropriate resistance factor.

Service Method (LFR) Method

Prestressed and post-tensioned members in positive moment regions, and where post-tensioning is continuous over the supports, shall also be rated based on allowable stresses at service loads. The lowest rating factor between service and ultimate methods shall be the governing inventory rating.

Inventory Rating

Concrete Tension:

$$RF = \frac{6\sqrt{f'_c} - (F_d + F_p + F_s)}{F_l\,(1+IM)} \qquad (13.1.2\text{-}4)$$

Concrete Compression:

$$RF = \frac{0.60 f'_c - (F_d + F_p + F_s)}{F_l\,(1+IM)} \qquad (13.1.2\text{-}5)$$

$$RF = \frac{0.40 f'_c - {}^1\!/_2\,(F_d + F_p + F_s)}{F_l\,(1+IM)} \qquad (13.1.2\text{-}6)$$

Prestressing Steel Tension:

$$RF = \frac{0.80 f_y^* - (F_d + F_p + F_s)}{F_l\,(1+IM)} \qquad (13.1.2\text{-}7)$$

Operating Rating

Prestressing Steel Tension:

$$RF = \frac{0.90 f_y^* - \left(F_d + F_p + F_s\right)}{F_l\,(1+IM)} \qquad (13.1.2\text{-}8)$$

Where:

RF = Rating factor
f'_c = Compressive strength of concrete
F_d = Dead load stress
F_p = Prestressing stress
F_s = Stress due to secondary prestress forces
F_l = Live load stress
IM = Dynamic load allowance (Impact)
f_y^* = Prestressing steel yield stress

Allowable concrete stress shall be increased by 15 percent for overload vehicles. Impact is calculated same as ultimate method.

13.1.3 Allowable Stress Method (ASD)

The allowable stress method is applicable to only timber structures. Impact is not applied to timber structures.

Rating Equation:

$$RF = \frac{(F_a + F_d)}{F_l} \qquad (13.1.3\text{-}1)$$

Where:

RF = Rating factor
$^*F_a$ = Allowable stress
F_d = Dead load stress
F_l = Live load stress

*F_a, for inventory rating, shall be per AASHTO *Standard Specifications*. For operating rating, F_A shall be increased by 33%

13.1.4 Live Loads

Live loads shall consist of:

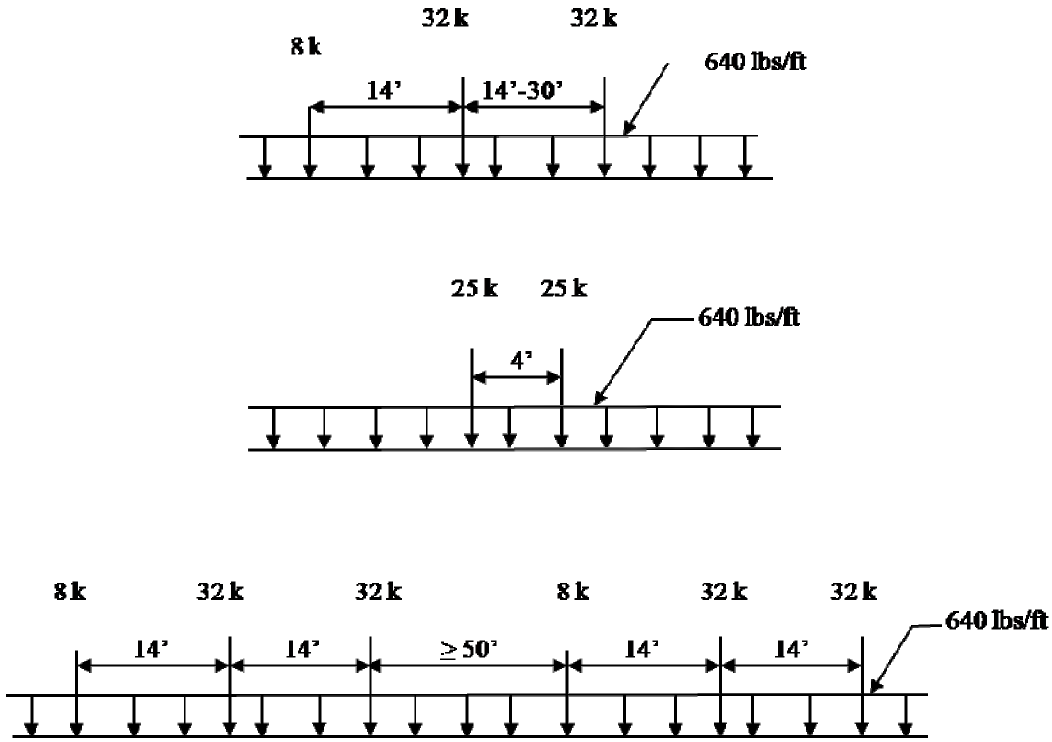
HS20, Type 3, Type 3S2, Type 3-3, NRL, Legal Lane, OL1 and OL2 (See figures 13.1-2 thru 13.1-9). The inventory and operating rating factors shall be calculated for all of the rated trucks. In cases where the operating rating factor for the NRL load is below 1, then the single unit vehicles (SUV) shall be evaluated for posting, see MBE for SUV configurations.

Live load reduction factors (LFR Method).

Number of Lanes	Reduction Factor
1 Lane	= 1.0
2 Lanes	= 1.0
3 Lanes	= 0.90
>3 Lanes	= 0.75

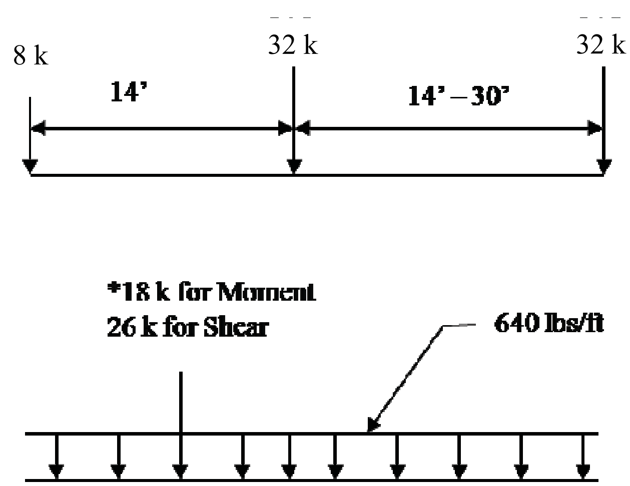
13.1.5 Rating Trucks

Design Trucks



For negative moment and interior reaction (Reduce all loads to 90%).

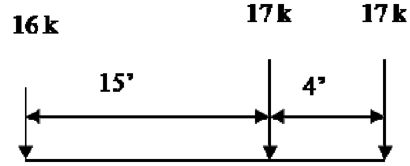
HL-93 Load (LRFR Method)
Figure 13.1-1



*In negative moment regions of continuous spans, place an equivalent load in the other spans to produce maximum effect.

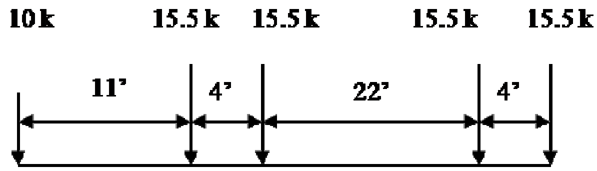
HS-20 Load (LFR Method)
Figure 13.1-2

Legal Trucks



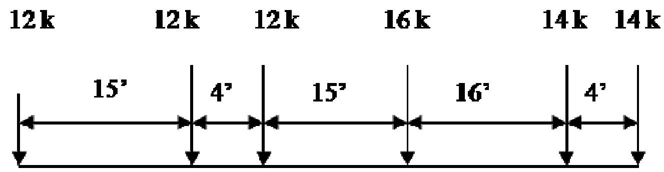
Type 3 (LRFR & LFR Methods)

Figure 13.1-3



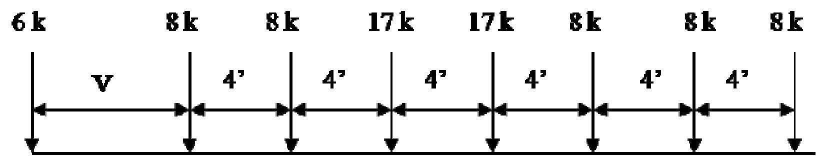
Type 3S2 (LRFR & LFR Methods)

Figure 13.1-4



Type 3-3 (LRFR & LFR Methods)

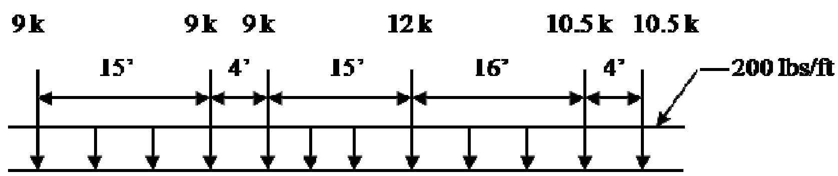
Figure 13.1-5



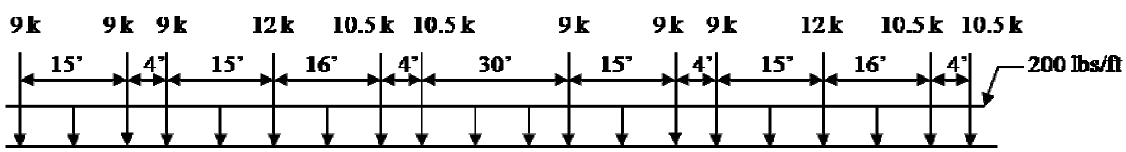
V varies from 6′-0″ to 14′-0″

Notional Rating Load (NRL) (LRFR & LFR Methods)

Figure 13.1-6



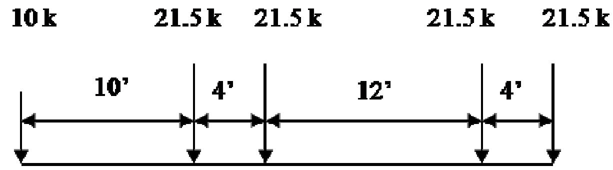
Legal lane is applicable to spans over 200' (LRFR & LFR Methods)



Legal lane for continuous spans and reactions at interior piers (LRFR Method)

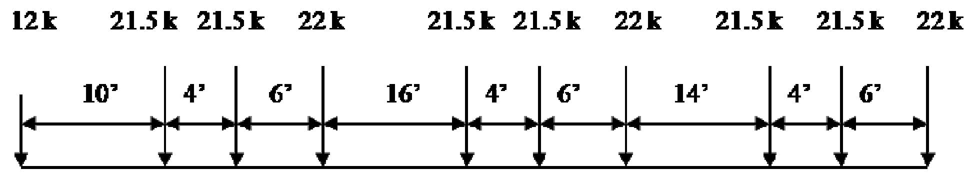
Figure 13.1-7

Overload Trucks



Overload 1* (LRFR & LFR Methods)

Figure 13.1-8



Overload 2* (LRFR & LFR Methods)

Figure 13.1-9

**When using the LRFR method for the overload trucks, for spans greater than 200' and when checking negative moment in continuous spans, apply 0.20 k/ft additional lane load to simulate closely following vehicles. The lane load can be superimposed on top of the permit load.*

13.2 Special Rating Criteria

13.2.1 Dead Loads

Use 155 pcf for weight of the concrete; 140 pcf for weight of ACP/HMA and 150 pcf for concrete overlay. Use 50 pcf for weight of timber.

13.2.2 Live Load Distribution Factors

Live load distribution factors for the LRFR Method shall be per Section 3.9.4, otherwise, use AASHTO Design Specification.

The number of lanes is dependent on the roadway width. For roadway width less than 18′, assume one lane for all trucks/loads. For roadway width between 18′ and 20′, the number of lanes for legal and permit loads shall correspond to the number of striped lanes on the bridge, and for the design trucks/loads use one lane. For roadway width between 20′ and 24′ use two lanes, each is equal to half the roadway width for all trucks/loads. For roadway width greater than 24′, the number of lanes shall be equal to the integer of the ratio of the roadway width divided by 12 for all trucks/loads.

13.2.3 Reinforced Concrete Structures

For conventional reinforced concrete members of existing bridges, the service check shall not be part of the rating evaluation.

Rating for shear shall be performed for all rating trucks.

Shear capacity shall be based on the Modified Compression Field Theory (MCFT) when using the LRFR method, longitudinal reinforcement should be checked for increased tension caused by shear.

13.2.4 Prestressed Concrete Structures

Allowable stresses for concrete shall be per the design specification corresponding to the method used in the rating. Note that for the LRFD method, this manual (Chapter 5) uses “0 ksi” allowable tension, however for rating purposes follow the design specifications.

Rating for shear shall be performed for all rating trucks.

Shear capacity shall be based on the MCFT when using the LRFR method, longitudinal reinforcement should be checked for increased tension caused by shear.

13.2.5 Concrete Decks

Typically bridge decks will not require rating unless the deck is post-tensioned. Bridge decks with NBI condition of 4 or less may be load rated at the discretion of WSDOT’s Load Rating Engineer.

When rating of the deck is required, live load shall include all vehicular loads as specified in Section 13.1.5.

13.2.6 Concrete Crossbeams

Live loads can be applied to the crossbeam as moving point loads at any location between the curbs for integral crossbeams, or when it is conservative to do so. Otherwise, live loads shall be applied through the girder.

For integral crossbeams on prestressed girder bridges, the composite section shall be considered for all loads for the rating. The rating equation does not provide a method for considering staged load conditions.

13.2.7 In-Span Hinges

For in-span hinges, rating for shear and bending moment should be performed based on the reduced cross-sections at the hinge seat. Diagonal hairpin bars are part of this rating as they provide primary reinforcement through the shear plane.

13.2.8 Girder Structures

Girders shall be rated on a per member basis.

13.2.9 Box Girder Structures

Bridges with spread box girders shall be rated on a per box basis. Otherwise, the rating shall be for the full bridge cross-section for all applied loads.

13.2.10 Segmental Concrete Bridges

Segmental Concrete Bridges shall be rated per Section 6A.5.13 of the MBE.

13.2.11 Concrete Slab Structures

Rate cast-in-place (CIP) solid slabs on a per foot of width basis. Rate precast panels on a per panel basis. Rate CIP voided slabs based on a width of slab equal to the predominant center-to-center spacing of voids.

When rating flat slabs on concrete piling, assume pin-supports at the slab/pile interface of interior piers and the slab continuous over the supports. If ratings using this assumption are less than 1.0, the piles should be modeled as columns with fixity assumed at 10′ below the ground surface.

13.2.12 Steel Structures

Checking of fatigue shall not be part of the rating evaluation.

For horizontally curved bridges, flange lateral bending, diaphragms and cross frames shall also be rated.

Pin and hanger assemblies shall be rated. Splices of fracture critical girders shall be rated.

13.2.13 Steel Floor Systems

Floorbeams and stringers shall be rated assuming they are pinned at the supports. Assume the distance from outside face to outside face of end connections as the lengths for the analysis. Live loads shall be applied to the floorbeam as moving point loads at any location between curbs, which produce the maximum effect.

Rating of connections is not required unless there is evidence of deterioration.

13.2.14 Steel Truss Structures

Typical steel trusses are rated on a per truss basis assuming all truss members have pinned connections. In some special cases, a 3D analysis may be required or fixed connections may be assumed.

In general, rate chords, diagonals, verticals, end posts, gusset plates, stringers and floorbeams. For state bridges, gusset plates shall be rated based on WSDOT's criteria (contact Load Rating Engineer for criteria) otherwise, use FHWA publication number FHWS-IF-09.014. Structural pins shall be rated; analyze pins for shear, and the side plates for bearing capacity.

Tension members and splices subjected to axial tension shall be investigated for yielding on the gross section and fracture on the net section.

For truss members that have been heat-straightened three or more times, deduct 0.1 from the resistance factor.

13.2.15 Timber Structures

Unless the species and grade is known, assume Douglas fir. Use select structural for members installed prior to 1955 and No. 1 after 1955. The allowable stresses for beams and stringers shall be as listed in the AASHTO Specifications.

The nominal dimensions should be used to calculate dead load, and the net dimensions to calculate section modulus. If the member is charred, it may be assumed that ¼″ of material is lost on all surfaces. Unless the member is notched or otherwise suspect, shear need not be calculated.

13.2.16 Widened or Rehabilitated Structures

For widened bridges, rate crossbeams.

For existing portion of the widened bridge, a load rating shall be performed if the load carrying capacity of the longitudinal members is altered, or the dead and live loads have increased due to the widening.

Longitudinal rating for the widened portion will be required, except in cases where the widened portion has the same capacity of the existing structure or exceeds it. For example, if a slab bridge is widened and the reinforcing in the widened portion matches the existing structure, then no rating will be required. Another example, if a girder bridge is widened using same section as the existing bridge with the same or more reinforcing, and the same or less live and dead loads, then it will not require rating.

For rehabilitated bridges, a load rating shall be required if the load carrying capacity of the structure is altered by the rehabilitation.

13.2.17 Culverts

The distribution of live load thru fill shall be per the corresponding AASHTO Design Specification used for the rating. Structures with fill depth greater than 8 feet and exceeds the span length do not require rating.

Use the load rating equation for box culverts and corresponding factors per the latest MBE and interims.

13.2.18 Overloads

If the rating factor for either of the overloads is less than 1when rating a longitudinal member, provide the Live Load Distribution Factors for both single and multiple lanes in the calculations; for X-beams, analyze it with a single overload truck and report the rating factors for both single and multiple lanes on the Load Rating Summary Sheet.

13.3 Load Rating Software

For the LRFR Method PGSuper shall be used when rating prestressed concrete girders and CSIBridge shall be utilized for the analysis of the reinforced concrete or structural steel members. Bridg shall be used for rating all types of structures using the LFR method. Obtain WSDOT's Load Rating Engineer approval for the use of any other software prior to commencing any work.

For more complex structures such as steel curved girders and arches, different software may be used to analyze the loads after obtaining approval from WSDOT's Load Rating Engineer. Acceptable software currently includes CSiBridge or GT Strudl. Loads and capacities shall be tabulated in a manner that will make it simple for WSDOT to work with the data in the future. Method of tabulation shall be approved by WSDOT's Load Rating Engineer prior to commencing any work. Microsoft Excel shall be used for tabulation, and all cells in the spreadsheets shall be unlocked and any hidden code or functions shall be explained thoroughly in the report. Hand calculations shall be provided to verify all spreadsheets.

The above requirements apply to State owned structures.

13.4 Load Rating Reports

Rating reports shall be organized in such a manner that it is easy to follow and all assumptions are clearly stated. For complex large structures, include a table of contents and number the pages in the report.

The report shall consist of:

1. A Bridge Rating Summary sheet, as shown on Appendix 13.4-A1 (LFR) and 13.4-A2 (LRFR) reflecting the lowest rating factor. The summary sheet shall be stamped, signed and dated by a professional engineer licensed in the state of Washington. The summary sheet with the original signature shall be included in the Load Rating Report.
2. A brief report of any anomalies in the ratings and an explanation of the cause of any rating factor below 1.00.
3. Hard copy of computer output files used for rating, and any other calculations such as, but not limited to dead loads, distribution factors or any required special analysis.
4. A complete set of plans for the bridge (applies to new designed bridges).
5. One compact disk which contains the final versions of all input and output files, and other calculations created in performing the load rating that can be opened and utilized in the appropriate program.
6. A minimum of 30 days is required for the Bridge Preservation Office review of any load rating submitted as part of a Design Build Contract.

All reports shall be bound in Accopress-type binders.

When the load rating calculations are produced as part of a design project (new, widening, or rehabilitation), the load rating report and design calculations shall be bound separately.

13.5 Appendices

BRIDGE RATING SUMMARY

PE Stamp

Bridge Name: ______________________
Bridge Number: ______________________
SID Number: ______________________
Span Types: ______________________
Bridge Length: ______________________
Design Load: ______________________
Rated By: ______________________
Checked By: ______________________
Date: ______________________

Inspection Report Date: ____________ Superstructure Condition [ ]
Overlay Thickness: ____________ Substructure Condition [ ]
Rating Method: ____________ Deck Condition [ ]

Truck	RF (INV)	RF (OP)	Controlling Point
AASHTO 1			
AASHTO 2			
AASHTO 3			
NRL			
OL-1			
OL-2			

NBI Rating	RF	Tons (US)	Controlling Point
Inventory			
Operating			

Remarks:

13.4-A1

Appendix 13.4-A2 LRFR Bridge Rating Summary

BRIDGE RATING SUMMARY

PE Stamp

Bridge Name: ______________________________
Bridge Number: ______________________________
SID Number: ______________________________
Span Types: ______________________________
Bridge Length: ______________________________
Design Load: ______________________________
Rated By: ______________________________
Checked By: ______________________________
Date: ______________________________

Inspection Report Date: ____________ Substructure Condition [ ]
Rating Method: ____________ Deck Condition [ ]
Overlay Thickness: ____________ Superstructure Condition [ ]

Truck	RF	γ	Controlling Point
AASHTO 1			
AASHTO 2			
AASHTO 3			
NRL			
OL-1			
OL-2			

NBI Rating	RF	Controlling Point
Inventory (HL-93)		
Operating (HL-93)		

Remarks:

13.4-A2

13.99 References

1. AASHTO *LRFD Bridge Design Specification*
2. AASHTO S*tandard Specifications for Highway Bridges*, 17^{th} edition
3. AASHTO *Manual For Bridge Evaluation*
4. WSDOT *Bridge Inspection Manual* M 36-64