Montana Department of Transportation

Bridge Load Rating Summary

Insert Consultant Logo Here

Rating prepared by:

General Bridge Information

MDT Bridge ID	**02641**	MDT District	GLENDIVE	Year Built	1975
NBI Bridge ID	L11119000+00001	County	DAWSON	Design Load	M 13.5 (H 15)
Feature Intersected	IRRIGATION CANAL 045	Location	19M SW GLENDIVE	Deck Type	Wood or Timber
Facility Carried	COUNTY ROAD 119	Inspection Date	12/1/2017	Wearing Surface	Gravel…
Route Number	11119	Accumulated Miles	0.015	Depth of Cover (inches)	1
Structure Length (feet)	46	Bridge Owner	County Hwy Agency	Maintenance Responsibility	County Hwy Agency

Span Data

Main Span(s)		Approach Span(s)	
Number of Spans	1	Number of Spans	0
Material Type	Steel	Material Type	Not Applicable
Superstructure Type	Stringer|Multi-beam or Girder	Superstructure Type	Not Applicable

EXAMPLE
Steel Girder/Timber Deck - Girders (LRFR) control rating

Load Rating Information

Load Rating Method Used	LRFR	Load Rating Program Used	BrR
Load Rating Status	Final	Version	6.8.3.3001

Truck / Load Type	Vehicle Weight *(Tons)*	Rating Factor	Controlling Load†	Controlling Member	Controlling Location‡	Limit State	Safe Load Capacity *(Tons)*	Calculated Safe Posting Load* *(Tons)*
HL-93 Inventory	36	0.508	1	Interior Girder (G2)	1.50	Strength-I Steel Flexure Stress	18	
HL-93 Operating	36	0.659	1	Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	24	
Type 3	25	0.881		Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	22	**21**
Type 3S2	36	0.956		Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	34	**34**
Type 3-3	40	1.064		Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	43	**NA**
SU4	27	0.758		Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	20	**18**
SU5	31	0.709		Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	22	**18**
SU6	34.75	0.638		Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	22	**17**
SU7	38.75	0.594		Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	23	**16**
EV2	28.75	0.759	Single Lane	Interior Girder (G2)	1.40	Service-II Steel Flexure Stress	22	**REFER TO LOAD POSTING FORM**
EV3	43	0.496	Single Lane	Interior Girder (G2)	1.50	Service-II Steel Flexure Stress	21	**REFER TO LOAD POSTING FORM**

†1 -
2 -
3 -
EV

** Recommended values based on MBE Equation 6A.8.3-1. If posting is required, refer to supplemental Load Posting Form for final determination on load posting values.*
***If RF < 0.3, vehicle type should not be allowed on span (MBE 6A.8.3)*
****Minimum permissible posting load is 3 tons. Refer to Load Posting Form for documentation of engineering judgement if posted at alternate level*

Use summary sheet for controlling methodology, note mixed methodology (see example wording)

Don't need to include overall bridge rating results from Explorer. Instead, please include rating result printouts for each member alternative.
Preference - highlight member at top of each sheet, highlight controlling rating factors

Include Calculations/Additional Assumptions/ Measurements sheets like normal

Include vehicle templates for both rating methods

Posting Required for Legal Vehicles?	**Yes**

Posting is required if Rating Factor is < 1 for any of the A

Posting Required for Emergency Vehicles?	**No**

Posting is required if Rating Factor is < 1 for either EV a
an interstate or within 1 mile from any interstate interch

Load Rating by:	
Date:	
QC by:	

Comments and Assumptions *At*

Include:
Basis for Load Rating (i.e. measurements from xxxx year, as-built plans/shop drawings/construction plans)
References (i.e. MBE edition, AASHTO LRFD edition)
Anything unique about rating (i.e. alternate superstructure was created in BrR for xxx reason, mixed materials)
Anything that needs to be flagged for attention (i.e. reduced capacity for timber members, EV live load factor (if different than de 1.3), removal of optional limit state checks)

The intent of this section is to provide a brief overview/summary; it's encouraged to attach more detailed documentation of engineering judgement and calculations as additional pages. Please include a note referencing any additional comments/assumptions/calculations (i.e. "Additional assumptions and calculations are detailed within the attached load rating re

Example wording:

References:
AASHTO MBE (3rd Ed.)
AASHTO LRFD Bridge Design Specifications (8th Ed.) - steel girders
AASHTO Standard Specifications (17th Ed.) - timber decking

Due to BrR limitations, ASR analysis was used for the timber deck and LRFR analysis was used for steel girders. Controlling values (based on ASR Operating and LRFR rating factors) are reported.

OR

Timber deck analysis was performed using ASR methodology and references the provisions of the AASHTO MBE (3rd ed.) and AASHTO Standard Specifications (17th ed.) The results of deck analysis do not control the rating.

Steel Girder analysis was performed using LRFR methodology and references the provisions of the AASHTO MBE (3rd ed.) and AASHTO LRFD Bridge Design Specifications (8th ed.) The Legacy AASHTO LRFR analysis module was selected to account for timber deck loads (BrR bug workaround).

Rating Results Summary Report

Name:
Struct-Def: 44' Steel Girder Span

Bridge ID: 02641
Member: Deck

Deck results don't include indication of member - please add

NBI: L11119000+00001

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating	Rating Factor	Location	Limit State	Impact	Lane
EV2	Axle Load	ASD	Inventory	43.52	1.514		Flexure - One-lane	As Requested	As Requested
EV2	Axle Load	ASD	Operating	57.94	2.015		Flexure - One-lane	As Requested	As Requested
EV3	Axle Load	ASD	Inventory	70.33	1.636		Flexure - One-lane	As Requested	As Requested
EV3	Axle Load	ASD	Operating	93.65	2.178		Flexure - One-lane	As Requested	As Requested
HS 20-44	Axle Load	ASD	Inventory	57.04	1.585		Flexure - One-lane	As Requested	As Requested
HS 20-44	Axle Load	ASD	Operating	75.95	2.110		Flexure - One-lane	As Requested	As Requested
SU4	Axle Load	ASD	Inventory	67.26	2.491		Flexure - One-lane	As Requested	As Requested
SU4	Axle Load	ASD	Operating	89.56	3.317		Flexure - One-lane	As Requested	As Requested
SU5	Axle Load	ASD	Inventory	77.22	2.491		Flexure - One-lane	As Requested	As Requested
SU5	Axle Load	ASD	Operating	102.82	3.317		Flexure - One-lane	As Requested	As Requested
SU6	Axle Load	ASD	Inventory	86.56	2.491		Flexure - One-lane	As Requested	As Requested
SU6	Axle Load	ASD	Operating	115.26	3.317		Flexure - One-lane	As Requested	As Requested
SU7	Axle Load	ASD	Inventory	96.53	2.491		Flexure - One-lane	As Requested	As Requested
SU7	Axle Load	ASD	Operating	128.53	3.317		Flexure - One-lane	As Requested	As Requested
Type 3	Axle Load	ASD	Inventory	66.93	2.677		Flexure - One-lane	As Requested	As Requested
Type 3	Axle Load	ASD	Operating	89.11	3.565		Flexure - One-lane	As Requested	As Requested
Type 3-3	Axle Load	ASD	Inventory	112.85	2.821		Flexure - One-lane	As Requested	As Requested
Type 3-3	Axle Load	ASD	Operating	150.26	3.756		Flexure - One-lane	As Requested	As Requested
Type 3S2	Axle Load	ASD	Inventory	104.40	2.900		Flexure - One-lane	As Requested	As Requested
Type 3S2	Axle Load	ASD	Operating	139.02	3.862		Flexure - One-lane	As Requested	As Requested

Rating Results Summary Report

Name:
Struct-Def: 44' Steel Girder Span

Bridge ID: 02641
Member: G1

NBI: L11119000+00001
Member Alt: Exterior

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
HL-93 (US)	Truck + Lane	LRFR	Inventory	21.92	0.609	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
HL-93 (US)	Truck + Lane	LRFR	Operatin	28.41	0.789	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
HL-93 (US)	Tandem + Lan	LRFR	Inventory	22.34	0.621	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
HL-93 (US)	Tandem + Lan	LRFR	Operatin	28.96	0.805	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
Type 3	Axle Load	LRFR	Legal	26.39	1.056	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
Type 3-3	Axle Load	LRFR	Legal	50.97	1.274	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
Type 3S2	Axle Load	LRFR	Legal	41.23	1.145	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
Lane-Type Legal Load	Truck + Lane	LRFR	Legal	3960.00	99.000	0.00	1 - (0.0)	STRENGTH-I Steel Shear	As R	As
SU4	Axle Load	LRFR	Legal	24.53	0.909	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
SU5	Axle Load	LRFR	Legal	26.34	0.850	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
SU6	Axle Load	LRFR	Legal	26.55	0.764	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
SU7	Axle Load	LRFR	Legal	27.59	0.712	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
EV2m (Single Lane)	Axle Load	LRFR	Legal	26.15	0.909	17.60	1 - (40.0)	SERVICE-II Steel Flexure Stress	As R	As
EV3m (Single Lane)	Axle Load	LRFR	Legal	25.53	0.594	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
EV2m (Multi-Lane	Axle Load	LRFR	Permit	38.69	1.346	17.60	1 - (40.0)	STRENGTH-II Steel Flexure Stress	As R	As
EV3m (Multi-Lane	Axle Load	LRFR	Permit	37.75	0.878	22.00	1 - (50.0)	STRENGTH-II Steel Flexure Stress	As R	As

Legacy AASHTO LRFR Engine Version 6.8.3.3001
Analysis Preference Setting: None
Analysis Time: 10/17/2019 12:09:38
Print Time: 10/17/2019 12:11:40

Analyzed By: ops$u5801

Rating Results Summary Report

Name:
Struct-Def: 44' Steel Girder Span

Bridge ID: 02641
Member: G2

NBI: L11119000+00001
Member Alt: Interior

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
HL-93 (US)	Truck + Lane	LRFR	Inventory	18.29	0.508	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
HL-93 (US)	Truck + Lane	LRFR	Operatin	23.71	0.659	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
HL-93 (US)	Tandem + Lan	LRFR	Inventory	18.65	0.518	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
HL-93 (US)	Tandem + Lan	LRFR	Operatin	24.17	0.672	22.00	1 - (50.0)	STRENGTH-I Steel Flexure Stress	As R	As
Type 3	Axle Load	LRFR	Legal	22.02	0.881	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
Type 3-3	Axle Load	LRFR	Legal	42.54	1.064	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
Type 3S2	Axle Load	LRFR	Legal	34.41	0.956	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
Lane-Type Legal Load	Truck + Lane	LRFR	Legal	3960.00	99.000	0.00	1 - (0.0)	STRENGTH-I Steel Shear	As R	As
SU4	Axle Load	LRFR	Legal	20.48	0.758	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
SU5	Axle Load	LRFR	Legal	21.98	0.709	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
SU6	Axle Load	LRFR	Legal	22.16	0.638	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
SU7	Axle Load	LRFR	Legal	23.03	0.594	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
EV2m (Single Lane)	Axle Load	LRFR	Legal	21.82	0.759	17.60	1 - (40.0)	SERVICE-II Steel Flexure Stress	As R	As
EV3m (Single Lane)	Axle Load	LRFR	Legal	21.31	0.496	22.00	1 - (50.0)	SERVICE-II Steel Flexure Stress	As R	As
EV2m (Multi-Lane	Axle Load	LRFR	Permit	32.29	1.123	17.60	1 - (40.0)	STRENGTH-II Steel Flexure Stress	As R	As
EV3m (Multi-Lane	Axle Load	LRFR	Permit	31.51	0.733	22.00	1 - (50.0)	STRENGTH-II Steel Flexure Stress	As R	As

Legacy AASHTO LRFR Engine Version 6.8.3.3001
Analysis Preference Setting: None
Analysis Time: 10/17/2019 12:09:38
Print Time: 10/17/2019 12:11:58

Analyzed By: ops$u5801

Include additional sheets (as needed) for:

- Calculations
    - *Include any calculations not included in the rating program's analysis (i.e. LLDFs, dead loads, section loss, etc.). Include appropriate references to equations and relevant code articles, and format with a level of detail that's easy to follow for checking purposes.*

- Additional Assumptions/Comments
    - Details about unique rating processes/checks
        - *i.e. additional superstructure definition used for alternate rating, check for failed girder condition, etc.*
    - BrR issues that affect model
        - *Include JIRA ticket (if applicable), brief statement of issue and how model/rating is affected, workaround procedure performed*
    - Document all rationale and justification
        - *i.e. reduction of timber member capacity, removal of optional limit state checks, EV live load factor override, etc.*

Vehicle Templates – please include following:

***Only the analysis template that's applicable to rating methodology used needs to be attached. For mixed material/mixed code bridges, please include both.*

- Vehicle Summary (Analysis Template)
- Vehicle Properties (Advanced Settings)
    - *Hint – cannot adjust size of this window; may have to adjust column widths to fit in one screenshot*
    - *Note – this will need to be updated for LRFR if EV live load factor is changed*
- Any non-standard library vehicle definitions
    - For ASR/LFR
        - Use standard definitions for all vehicles
        - No additional screenshots necessary, please note that standard vehicle definitions were used for all vehicles
    - For LRFR
        - Use modified contact area for EVs
        - Include screenshots of agency defined vehicles (i.e. EVs, Adjacent Type 3-3)

Note – please ensure that the attached template is the actual template used in the rating

Example Vehicle Template for LFR/ASR Analysis

Analysis Settings:

Vehicle Summary:

- Rating Vehicles
  - LRFR
  - LFD/ASD
    - Inventory
      - EV2
      - EV3
      - HS 20-44
      - SU4
      - SU5
      - SU6
      - SU7
      - Type 3
      - Type 3-3
      - Type 3S2
    - Operating
      - EV2
      - EV3
      - HS 20-44
      - SU4
      - SU5
      - SU6
      - SU7
      - Type 3
      - Type 3-3
      - Type 3S2
    - Legal Operating
    - Permit Inventory
    - Permit Operating

Advanced Settings:

Vehicle Properties

Vehicle	Tandem Train	Scale Factor	Impact	Single Lane Loade	Lega Pair	Override	Legal Live Load	Frequency	Loading Condition	Override	Permit Live Load
EV2	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
EV3	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
HS 20-44	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
SU4	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
SU5	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
SU6	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
SU7	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
Type 3	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
Type 3-3	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	
Type 3S2	☐	1		☐	☐	☐		Single Trip	Mixed with traffic	☐	

Permit lane load: kip/ft

Adjacent vehicle live load factor:

☐ Exclude permit lane load from permit vehicle location

Standard library definitions used for all vehicles

Example Vehicle Template for LRFR Analysis

Analysis Settings:

Vehicle Summary:

- Rating Vehicles
  - LRFR
    - Design Load Rating
      - Inventory
        - HL-93 (US)
      - Operating
        - HL-93 (US)
      - Fatigue
        - LRFD Fatigue Truck (US)
    - Legal Load Rating
      - Routine
        - Lane-Type Legal Load
        - Type 3
        - Type 3-3
        - Type 3S2
      - Specialized Hauling
        - SU4
        - SU5
        - SU6
        - SU7
        - EV2m (Single Lane)
        - EV3m (Single Lane)
    - Permit Load Rating
      - EV2m (Multi-Lane)
        - Adjacent Vehicle
          - Adjacent Type 3-3
      - EV3m (Multi-Lane)
        - Adjacent Vehicle
          - Adjacent Type 3-3

Advanced Settings:

Vehicle Properties

Vehicle	Tandem Train	Scale Factor	Impact	Single Lane Loade	Lega Pair	Override	Legal Live Load	Frequency	Loading Condition	Override	Permit Live Load
HL-93 (US)	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
Lane-Type Legal Load	☐	1		☐	☑	☐		Single Trip	Mixed with traffi	☐	
LRFD Fatigue Truck (US)	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
SU4	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
SU5	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
SU6	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
SU7	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
Type 3	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
Type 3-3	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
Type 3S2	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☐	
EV2m (Multi-Lane)	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☑	1.3
EV2m (Single Lane)	☐	1		☑	☐	☑	1.3	Single Trip	Mixed with traffi	☐	
EV3m (Multi-Lane)	☐	1		☐	☐	☐		Single Trip	Mixed with traffi	☑	1.3
EV3m (Single Lane)	☐	1		☑	☐	☑	1.3	Single Trip	Mixed with traffi	☐	

Permit lane load: kip/ft

Adjacent vehicle live load factor: 1.300

☐ Exclude permit lane load from permit vehicle location

EVs and Adjacent Type 3-3 are Agency Defined vehicles – see next page

Standard library definitions used for all other vehicles

Example Vehicle Template for LRFR Analysis – Agency Defined Vehicles









