

AASHTOWare BrR 7.3

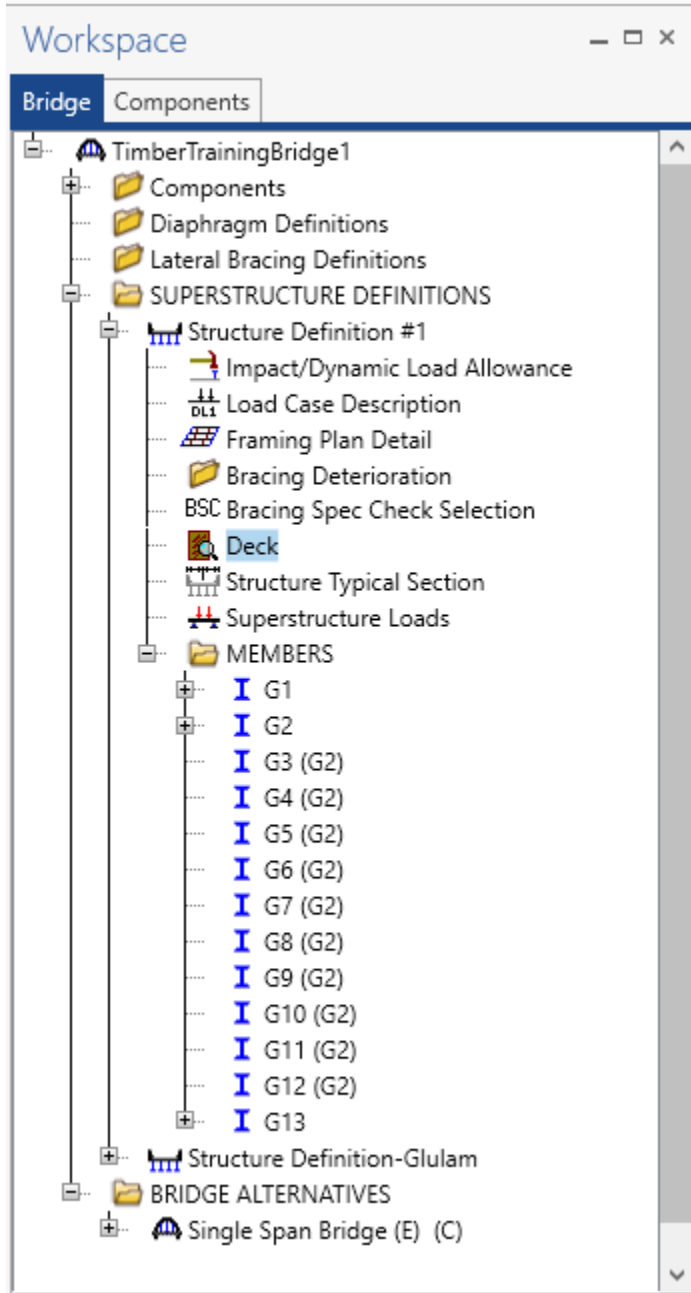
Timber Tutorial

TMBR2 – Timber Deck Rating Example

TMBR2 - Timber Deck Rating Example

This example demonstrates rating a timber deck in BrR. This example rates the deck of the superstructure for bridge BID12 in the sample database delivered with BrR. This example superstructure was also entered in the TMBR1-SingleSpanTimberExample problem. Only timber decks can be rated by BrR Version 5.0 and later.

Open the Bridge Workspace for bridge BID12 in the sample database delivered with BrR. The BWS tree is shown below.



TMBR2 - Timber Deck Rating Example

The timber deck now has its own tree item. The deck window is shown below. Most of the data on the Description tab appeared on the Structure Typical Section: Deck (Cont'd) tab in versions of BrR prior to Version 5.0.

The screenshot shows the 'Deck' dialog box with the following settings:

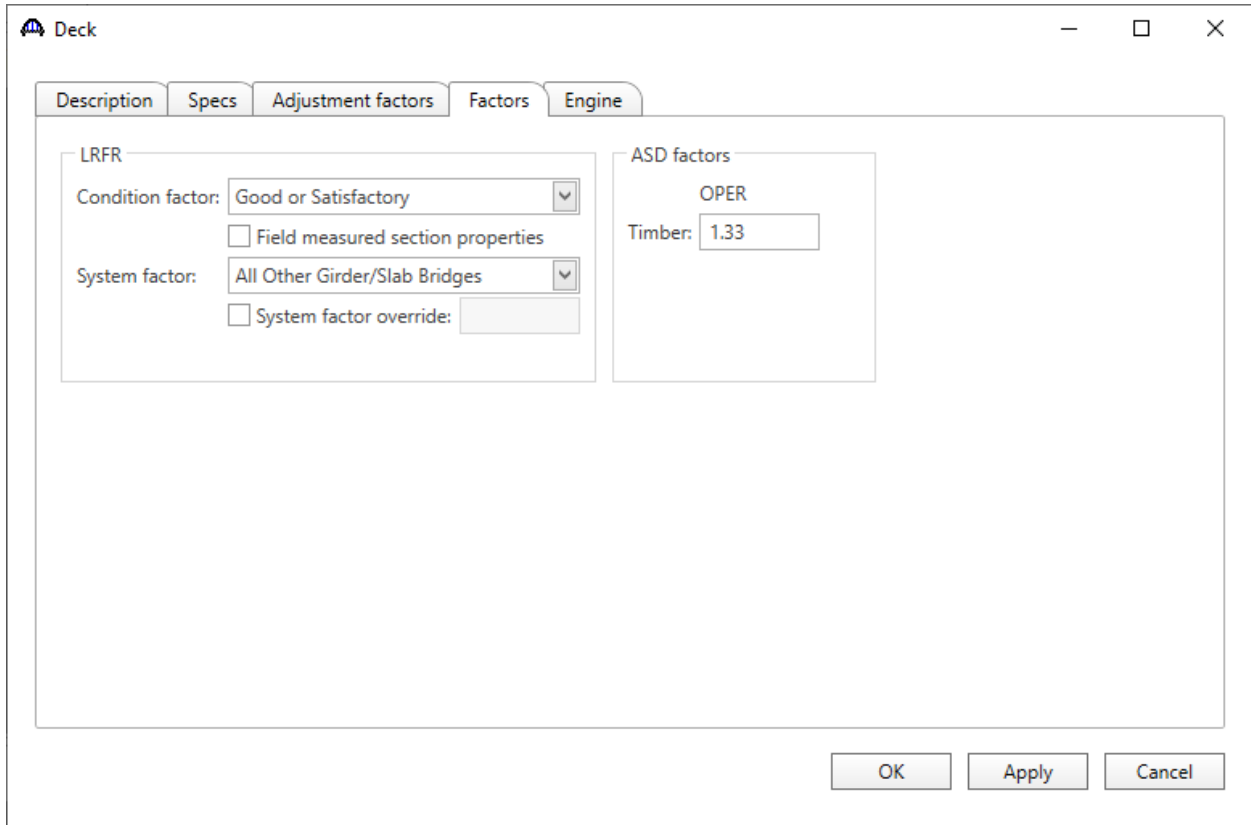
- Default rating method: ASD
- Deck rating parameters:
 - Deck continuous over more than 2 spans:
 - Consider axle weight reduction:
 - Ignore shear:
- Timber deck type: Nail-Laminated Deck
- Timber material: Deck Timber
- Total deck thickness: 3.5000 in
- Nominal thick: 2.0000 in
- Lamination thickness: 1.5000 in
- Nominal width: 4.0000 in
- Deck LL distribution width: 17.3200 in
- Nail: 20 Pennyweight

Timber deck can be rated using ASD and LRFR methods of rating.

You can indicate if the deck is continuous over more than 2 spans in this window. If the deck is continuous over more than 2 spans, the maximum bending moment is computed in accordance with the AASHTO Standard Specifications for Highway Bridges, Article 3.25. If the deck is not continuous over more than 2 spans, the maximum bending moment is that obtained for a simple span.

TMBR2 - Timber Deck Rating Example

The Factors tab of the Deck window allows you to enter the LRFR and ASD factors to be used for the deck.



The screenshot shows the 'Deck' window with the 'Factors' tab selected. The window has a title bar with a minimize, maximize, and close button. Below the title bar are five tabs: 'Description', 'Specs', 'Adjustment factors', 'Factors', and 'Engine'. The 'Factors' tab is active and contains two main sections: 'LRFR' and 'ASD factors'.
In the 'LRFR' section, there are four items:

- 'Condition factor:' with a dropdown menu set to 'Good or Satisfactory'.
- An unchecked checkbox labeled 'Field measured section properties'.
- 'System factor:' with a dropdown menu set to 'All Other Girder/Slab Bridges'.
- An unchecked checkbox labeled 'System factor override:' followed by an empty text input field.

In the 'ASD factors' section, there are two items:

- 'OPER' with a text input field.
- 'Timber:' with a text input field containing the value '1.33'.

At the bottom right of the window are three buttons: 'OK', 'Apply', and 'Cancel'.

TMBR2 - Timber Deck Rating Example

The Adjustment factors tab of the Deck window allows you to modify the ASD tabulated design values and LRFD reference design values entered on the Bridge Materials – Timber – Sawn window. Use the compute button to compute the adjusted factors for the deck timber material based on Wet usage conditions.

Deck

Description Specs Adjustment factors Factors Engine

Moisture condition for shear/flexure: Wet

Moisture condition for bearing: Wet

Moisture condition for modulus: Wet

Compute

ASD

Wet service (flexure) (C_M):	0.85
Wet service (shear) (C_M):	0.97
Wet service (bearing) (C_M):	0.67
Wet service (modulus) (C_M):	0.90
Shear (C_H):	
Flat use (C_{fu}):	1.00
Repetitive use (C_r):	1.15
Load duration (C_D):	1.15
Size (C_F):	1.00

LRFD

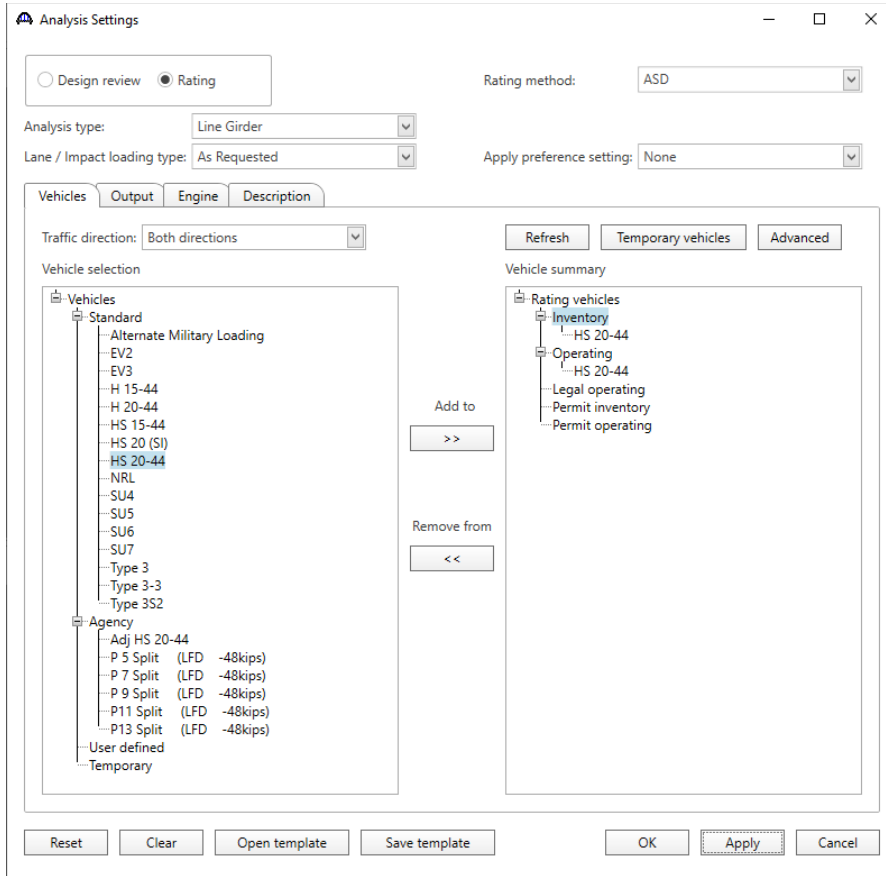
Wet service (flexure) (C_M):	0.850
Wet service (shear) (C_M):	0.970
Wet service (bearing) (C_M):	0.670
Wet service (modulus) (C_M):	0.900
Format conversion (C_{KF}):	
Format conversion (bearing) (C_{KF}):	
Size (flexure) (C_F):	1.000
Size (modulus) (C_F):	1.000
Flat use (C_{fu}):	1.000
Incising (flexure, shear) (C_i):	0.800
Incising (bearing) (C_i):	1.000
Incising (modulus) (C_i):	0.950
Deck (C_d):	1.150
Time effect (STRENGTH-I) (C_s):	0.800
Time effect (STRENGTH-II) (C_s):	1.000

OK Apply Cancel

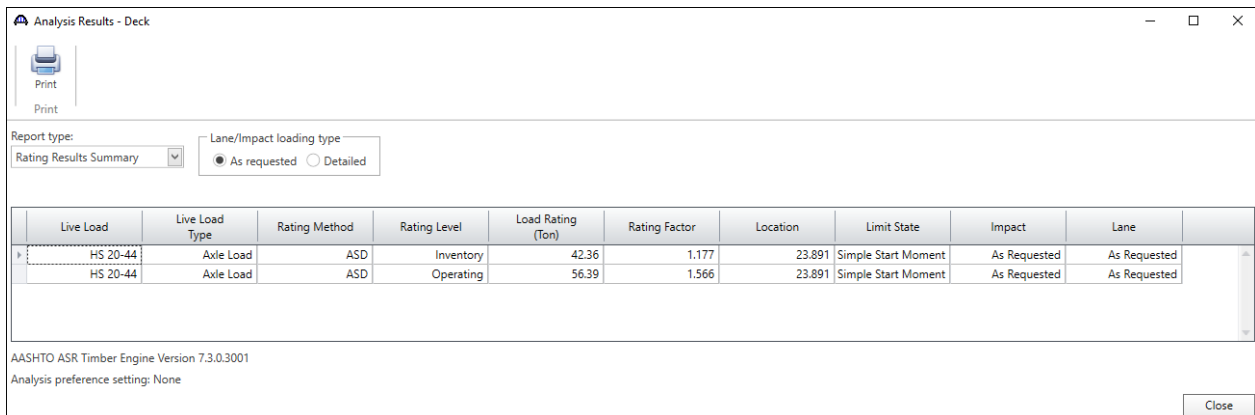
TMBR2 - Timber Deck Rating Example

To perform a rating on the deck of this superstructure, select the Analysis Settings button toolbar to open the window shown below.

To run ASD analysis, select ASD as the Rating Method, add vehicle HS 20-44 in inventory and operating and click OK.

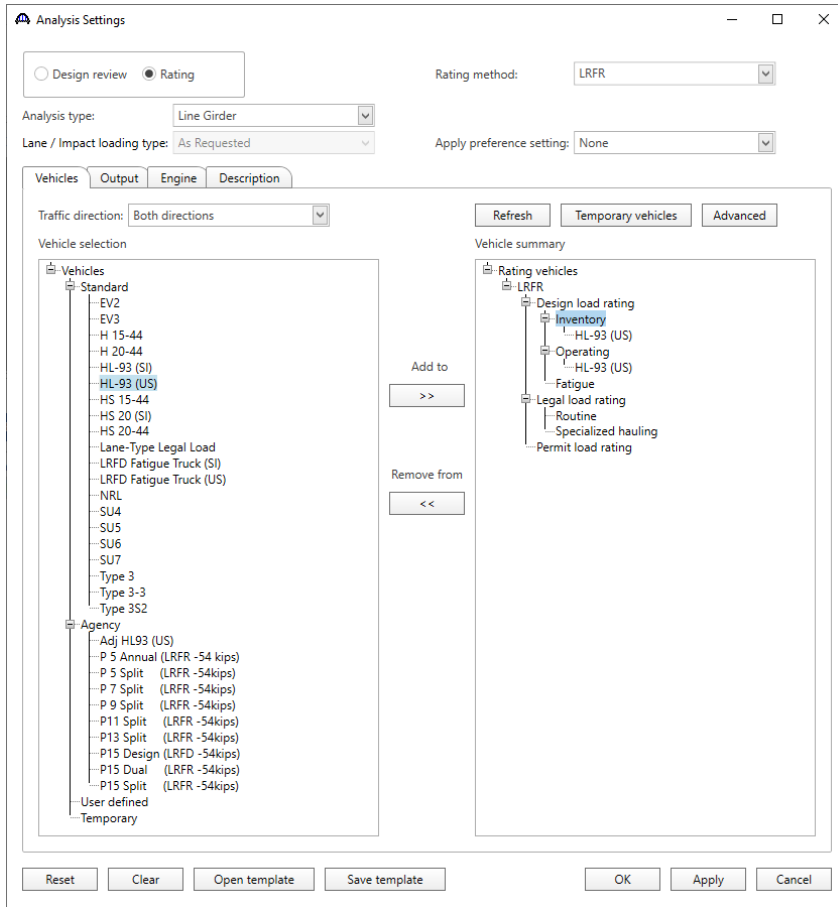


Next click the Analyze button on the toolbar while “Deck” is selected in the BWS tree to perform the rating. When the rating is finished you can review the results by clicking the View Analysis Report button on the toolbar. The window shown below will open.



TMBR2 - Timber Deck Rating Example

To run LRFR analysis, select LRFR as the Rating Method, add vehicle HL-93 (US) in inventory and operating and click OK.



Next click the Analyze button on the toolbar while “Deck” is selected in the BWS tree to perform the rating. When the rating is finished you can review the results by clicking the View Analysis Report button on the toolbar. The window shown below will open.

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location	Limit State	Impact	Lane
HL-93 (US)	Axle Load	LRFR	Inventory	22.58	0.627	15.833	Simple Start STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Axle Load	LRFR	Operating	29.27	0.813	15.833	Simple Start STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Inventory	28.90	0.803	15.833	Simple Start STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Operating	37.46	1.041	15.833	Simple Start STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Axle Load	LRFR	Inventory	37.69	1.047	21.833	Cont. Start STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Axle Load	LRFR	Operating	48.86	1.357	21.833	Cont. Start STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Inventory	48.24	1.340	21.833	Cont. Start STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Operating	62.54	1.737	21.833	Cont. Start STRENGTH-I Moment	As Requested	As Requested

AASHTO LRFR Timber Engine Version 7.3.0.3001
Analysis preference setting: None