

AASHTOWare BrDR 7.5.0

Timber Tutorial

TMBR2 – Timber Deck Rating Example

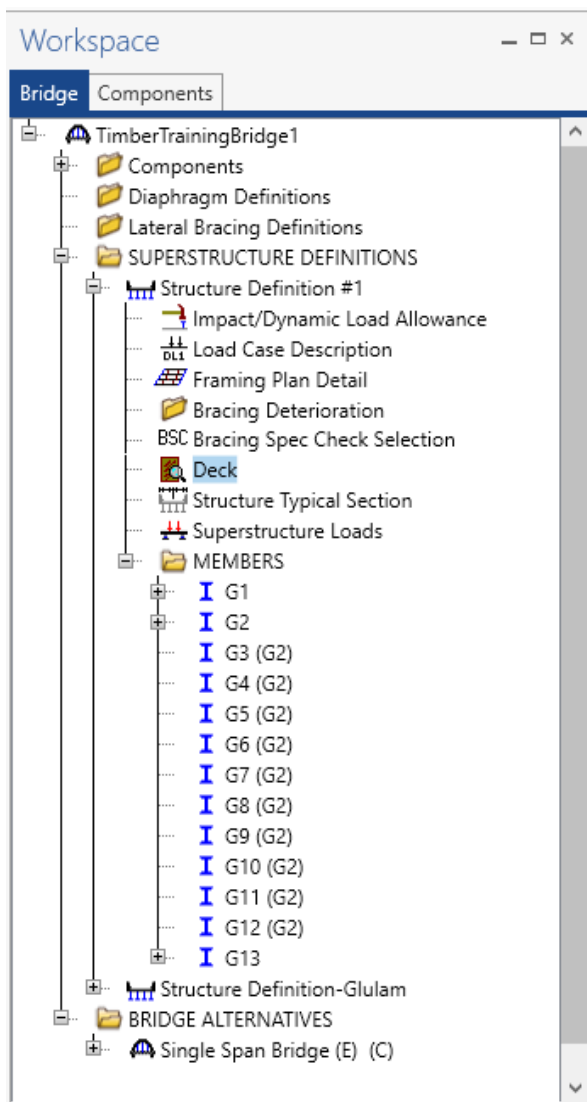
TMBR2 - Timber Deck Rating Example

BrDR Training

TMBR2- Timber Deck Rating Example

This example demonstrates the rating of a timber deck in BrDR using the deck of the superstructure for bridge **BID12** which is delivered in the sample database of BrDR. This same timber superstructure was also entered in the TMBR1-SingleSpanTimberExample problem. Note that timber decks can only be rated using BrDR Version 5.0 and later.

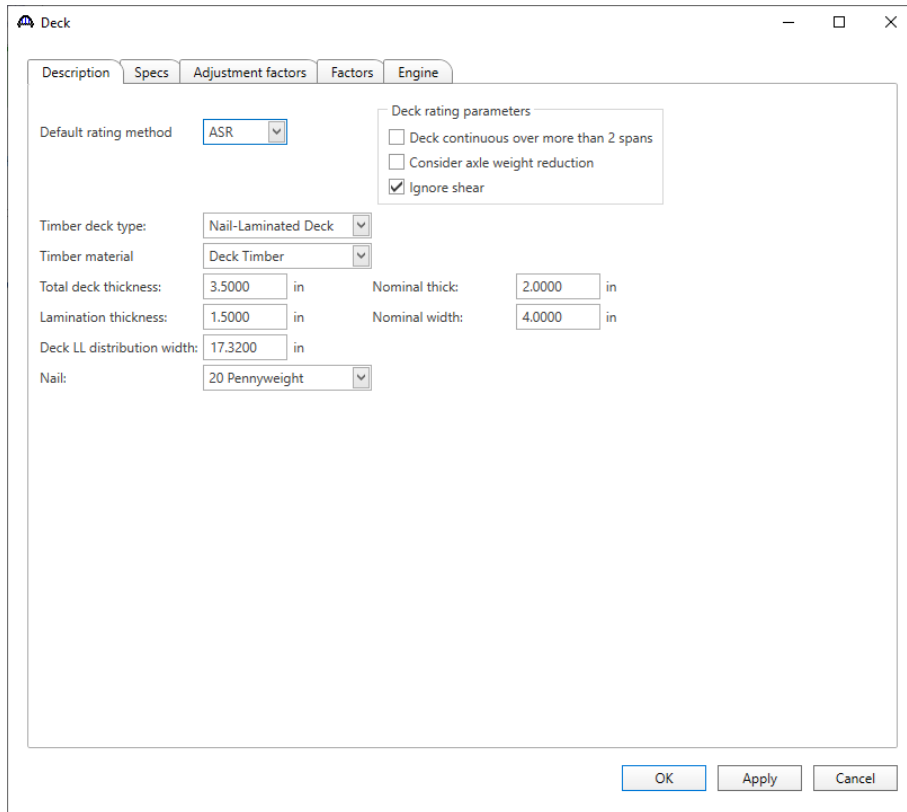
Open the Bridge Workspace for bridge BID12 in the sample database delivered with BrDR. The Bridge workspace tree is shown below.



TMBR2 - Timber Deck Rating Example

Deck

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



The screenshot shows the 'Deck' window with the 'Description' tab selected. The window contains the following fields and options:

- Default rating method: ASR (dropdown)
- Deck rating parameters:
 - Deck continuous over more than 2 spans
 - Consider axle weight reduction
 - Ignore shear
- Timber deck type: Nail-Laminated Deck (dropdown)
- Timber material: Deck Timber (dropdown)
- 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 (dropdown)

Buttons at the bottom: OK, Apply, Cancel

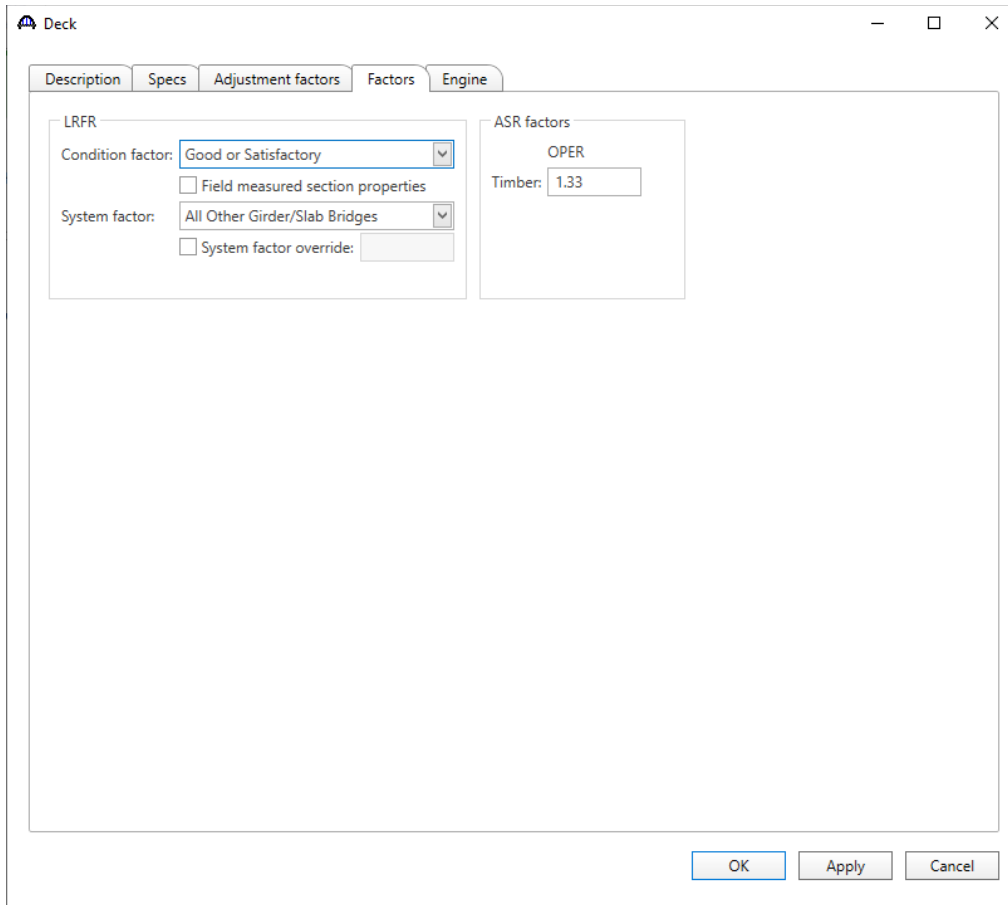
Timber decks can be rated using ASR and LRFR methods of rating.

An option is available to 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

Deck – Factors

The **Factors** tab of the Deck window allows the user to enter the LRFR and ASR 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 button, a maximize button, and a 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 'ASR factors'.
In the 'LRFR' section, there are two dropdown menus: 'Condition factor' set to 'Good or Satisfactory' and 'System factor' set to 'All Other Girder/Slab Bridges'. There are also two checkboxes: 'Field measured section properties' (unchecked) and 'System factor override' (unchecked).
In the 'ASR factors' section, there is a dropdown menu for 'OPER' and a text input field for 'Timber' containing the value '1.33'.
At the bottom right of the window are three buttons: 'OK', 'Apply', and 'Cancel'.

TMBR2 - Timber Deck Rating Example

Deck – Adjustment factors

The **Adjustment factors** tab of the Deck window provides input options 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_s):	
Flat use (C_{fu}):	1.00
Repetitive use (C_r):	1.15
Load duration (C_D):	1.15
Size (C_T):	1.00

LRFD

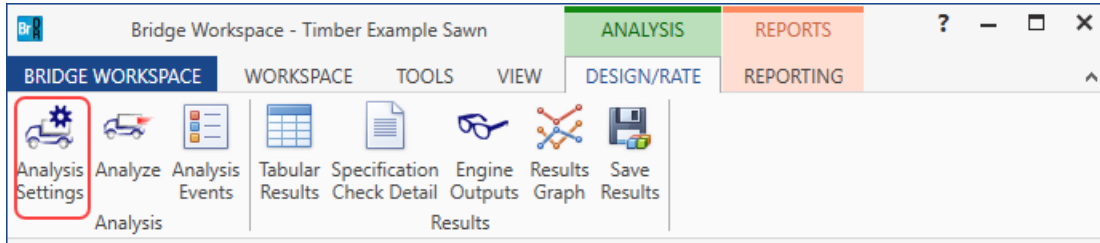
Wet service (flexure) (C_M):	0.850
Wet service (shear) (C_M):	0.970
Wet service (bearing) (C_M):	0.670
Wet service (modulus) (C_M):	0.900
Format conversion (C_{KF}):	
Format conversion (bearing) (C_{KF}):	
Size (flexure) (C_s):	1.000
Size (modulus) (C_T):	1.000
Flat use (C_{fu}):	1.000
Incising (flexure, 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_A):	0.800
Time effect (STRENGTH-II) (C_A):	1.000

OK Apply Cancel

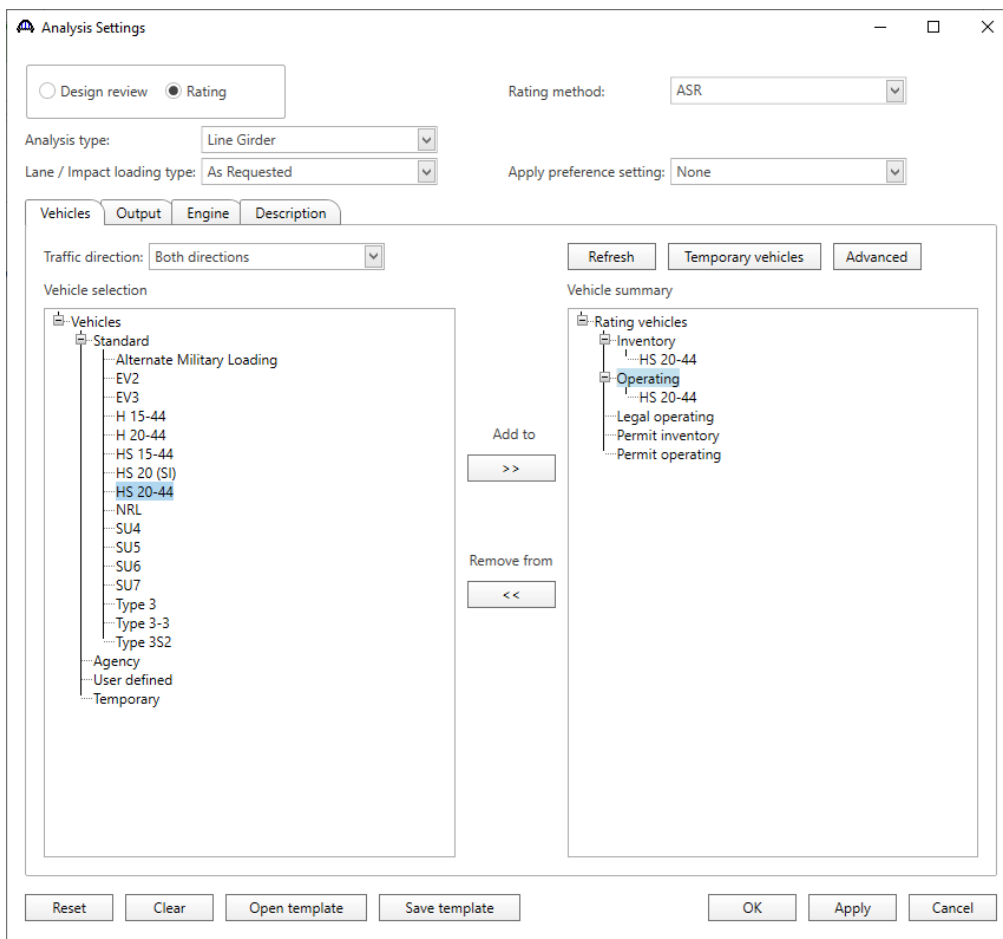
TMBR2 - Timber Deck Rating Example

ASR Rating

To perform a rating on the deck of this superstructure, select the **Analysis Settings** button on the Analysis group of the **DESIGN/RATE** ribbon to open the window shown below.



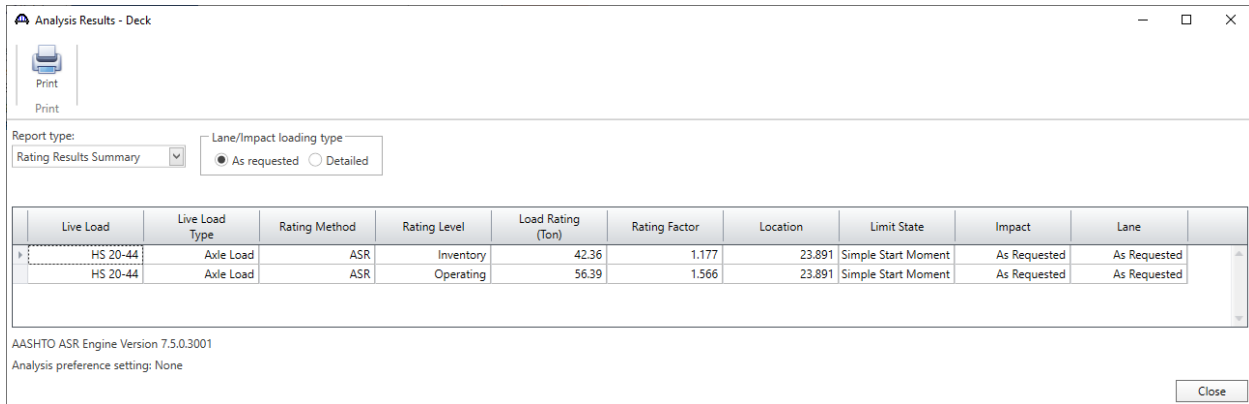
To run **ASR** analysis, select **ASR** as the Rating Method, add vehicle **HS 20-44** in **Inventory** and **Operating** and click **OK**.



TMBR2 - Timber Deck Rating Example

Tabular Results

Next click the **Analyze** button on the Analysis group of the **DESIGN/RATE** ribbon while **Deck** is selected in the BWS tree to perform the rating. When the rating is finished the results can be reviewed by clicking the **Tabular Results** button on the ribbon. The window shown below will open.



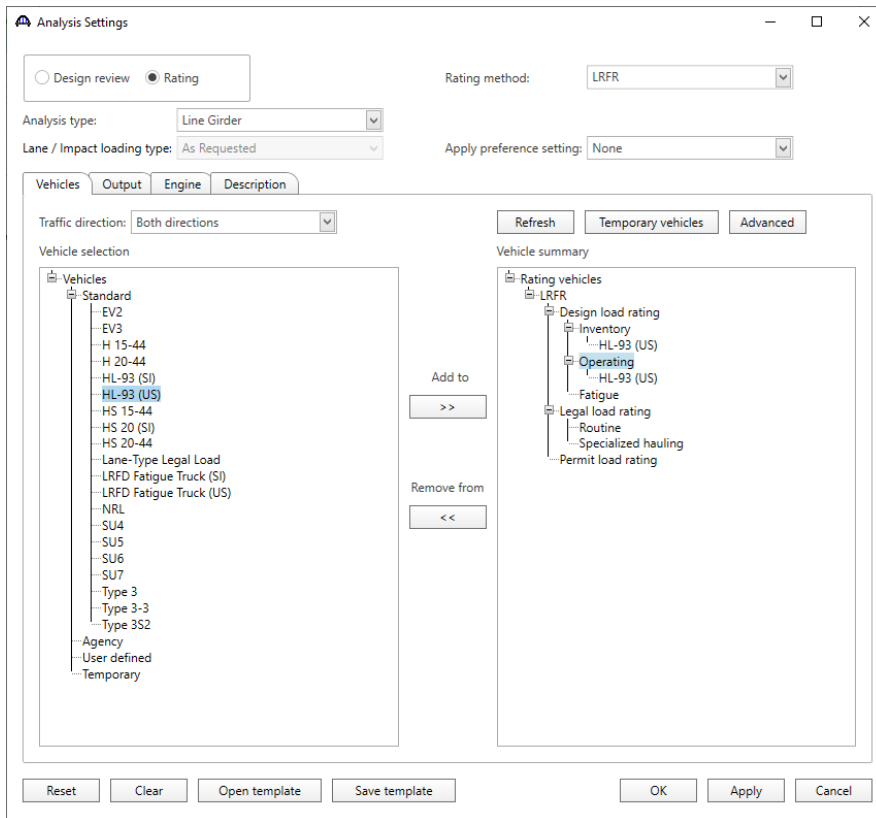
The screenshot shows the 'Analysis Results - Deck' window. It features a 'Report type' dropdown set to 'Rating Results Summary' and radio buttons for 'As requested' (selected) and 'Detailed'. Below is a table with the following data:

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location	Limit State	Impact	Lane
HS 20-44	Axle Load	ASR	Inventory	42.36	1.177	23.891	Simple Start Moment	As Requested	As Requested
HS 20-44	Axle Load	ASR	Operating	56.39	1.566	23.891	Simple Start Moment	As Requested	As Requested

At the bottom, it displays 'AASHTO ASR Engine Version 7.5.0.3001' and 'Analysis preference setting: None'. A 'Close' button is in the bottom right corner.

LRFR analysis

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




The screenshot shows the 'Analysis Settings' dialog box. The 'Rating method' is set to 'LRFR'. Under 'Vehicles', the 'HL-93 (US)' vehicle is selected. The 'Vehicle summary' pane shows a tree structure where 'HL-93 (US)' is added to both 'Inventory' and 'Operating' categories. The 'Rating vehicles' section shows a tree structure with 'Design load rating' containing 'Inventory' and 'Operating', both with 'HL-93 (US)' listed. Below the tree are 'Add to' and 'Remove from' buttons. At the bottom are 'Reset', 'Clear', 'Open template', 'Save template', 'OK', 'Apply', and 'Cancel' buttons.

TMBR2 - Timber Deck Rating Example

Tabular Results

Next click the **Analyze** button on the Analysis group of the **DESIGN/RATE** ribbon while **Deck** is selected in the BWS tree to perform the rating. When the rating is finished the results can be reviewed by clicking the **Tabular Results** button on the ribbon. The window shown below will open.

Analysis Results - Deck
— □ ×



Print

Report type:
Rating Results Summary

Lane/Impact loading type
 As requested Detailed

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	STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Axle Load	LRFR	Operating	29.27	0.813	15.833	STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Inventory	28.90	0.803	15.833	STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Operating	37.46	1.041	15.833	STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Axle Load	LRFR	Inventory	37.69	1.047	21.833	STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Axle Load	LRFR	Operating	48.86	1.357	21.833	STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Inventory	48.24	1.340	21.833	STRENGTH-I Moment	As Requested	As Requested
HL-93 (US)	Tandem	LRFR	Operating	62.54	1.737	21.833	STRENGTH-I Moment	As Requested	As Requested

AASHTO LRFR Engine Version 7.5.0.3001
Analysis preference setting: None

Close