

*AASHTOWare BrDR 7.5.0*

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*Timber Structure Tutorial*

*TMBR1- Single Span Timber Beam – Sawn Example*

## TMBR1- Single Span Timber Beam - Sawn Example

### BrDR Training

## TMBR1- Single Span Timber Beam Example

From the **Bridge Explorer**, create a new bridge and enter the following description data:

The screenshot shows a software dialog box titled "Timber Example". At the top, there are two input fields: "Bridge ID: Timber Example Sawn" and "NBI structure ID (8): Timber Example Sawn". To the right of these fields are several checkboxes: "Template" (unchecked), "Bridge completely defined" (unchecked), "Superstructures" (checked), "Culverts" (unchecked), and "Substructures" (checked). Below these are several tabs: "Description" (selected), "Description (cont'd)", "Alternatives", "Global reference point", "Traffic", and "Custom agency fields". The "Description" tab contains the following fields:

- "Name:" with a text box containing "Timber Brige (Sawn)" and "Year built:" with an empty text box.
- "Description:" with a text box containing "Single span timber bridge with nail-laminated deck. Example 7-9 and 7-11 from 'Timber Bridges: Design, Construction, Inspection, and Maintenance' USDA Forest Service, August 1992."
- "Location:" with an empty text box and "Length:" with an empty text box followed by "ft".
- "Facility carried (7):" with an empty text box and "Route number:" with a text box containing "-1".
- "Feat. intersected (6):" with an empty text box and "Mi. post:" with an empty text box.
- "Default units:" with a dropdown menu showing "US Customary".

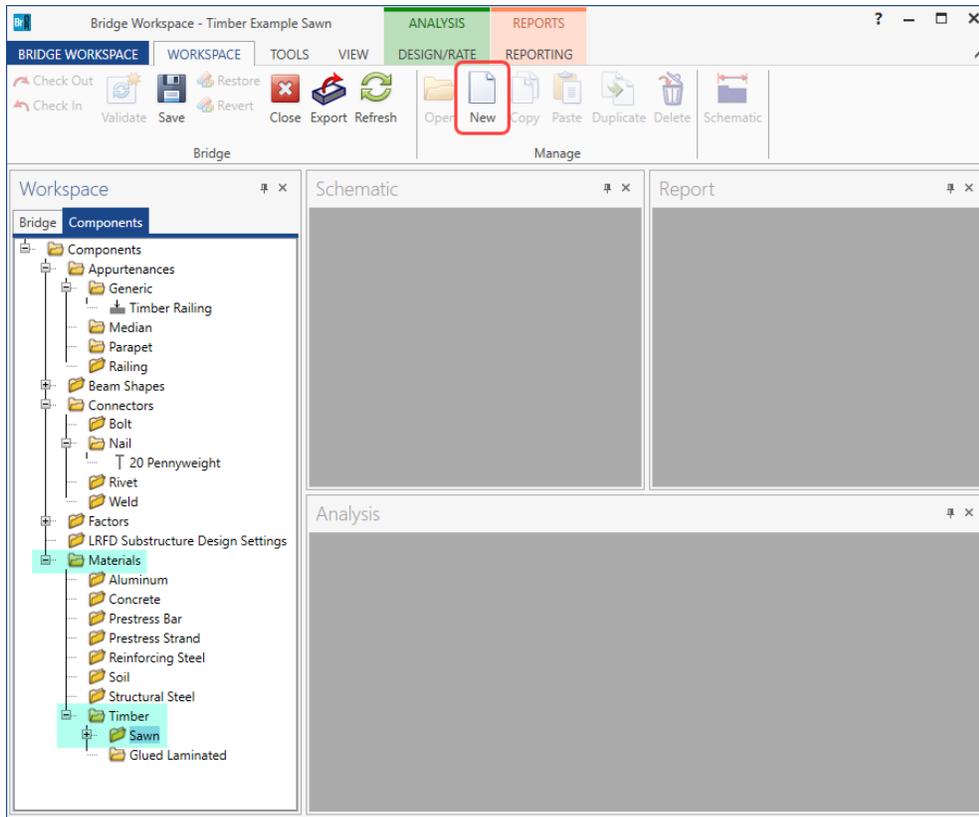
At the bottom of the dialog, there is a "Bridge association..." button and three checkboxes: "BrR" (checked), "BrD" (checked), and "BrM" (unchecked). At the very bottom right are three buttons: "OK", "Apply", and "Cancel".

Close the window by clicking **OK**. This saves the data to memory and closes the window.

## TMBR1- Single Span Timber Beam - Sawn Example

### Bridge Materials

To add a new timber material, in the **Components** tab of the Bridge Workspace, click on **Materials, Timber, Sawn** and select **New** from the **Manage** group of the Workspace ribbon (or right mouse click on Sawn and select New).



Click the **Copy from Library** button and select the following material from the library.

Name	Description	Library	Units	Grading method	Species	Commercial grade	Size class	Grading rule agency
Douglas Fir-Larch	Douglas Fir-Larch	Standard	US Customary	Visual	Douglas Fir-Larch	Select Structural	Posts and Timbers	WWPA
Douglas Fir-Larch	Douglas Fir-Larch	Standard	US Customary	Visual	Douglas Fir-Larch	Dense No. 1	Posts and Timbers	WWPA
Douglas Fir-Larch	Douglas Fir-Larch	Standard	US Customary	Visual	Douglas Fir-Larch	No. 1	Beams and Stringers	WWPA
Eastern Softwoods	Eastern Softwoods	Standard	US Customary	Visual	Eastern Softwoods	Select Structural	2" - 4" thick, 2" & wider	NELMA
Eastern Softwoods	Eastern Softwoods	Standard	US Customary	Visual	Eastern Softwoods	No. 1	2" - 4" thick, 2" & wider	NELMA
Eastern Softwoods	Eastern Softwoods	Standard	US Customary	Visual	Eastern Softwoods	No. 2	2" - 4" thick, 2" & wider	NELMA
Hem-Fir	Hem-Fir	Standard	US Customary	Visual	Hem-Fir	No. 1	Posts and Timbers	WWPA

Click **OK** and the following window will open. Change the **Name** field to **Beam Timber** from Douglas Fir-Larch. The ASD Tabulated Design Values in the **ASD** tab of this window and the LRFD Reference design values in the **LRFD** tab of this window are based on dry conditions and do not include any adjustment factors based on usage conditions. Do not change any of the values on these tabs. Click **OK** to save this timber material to memory and close the window.

# TMBR1- Single Span Timber Beam - Sawn Example

Bridge Materials - Timber - Sawn

Name:

Description:

General ASD LRFD

Grading method:

Species:

Commercial grade:

Size classification:

Grading rules agency:

Density:  kcf

Bridge Materials - Timber - Sawn

Name:

Description:

General ASD LRFD

Bending:  ksi

Tension (parallel):  ksi

Shear (parallel):  ksi

Compr. (perp):  ksi

Compr. (parallel):  ksi

Modulus of elasticity:  ksi

Notes:

## TMBR1- Single Span Timber Beam - Sawn Example

Bridge Materials - Timber - Sawn

Name:

Description:

General ASD LRFD

Bending:  ksi

Tension (parallel):  ksi

Shear (parallel):  ksi

Compr. (perp):  ksi

Compr. (parallel):  ksi

Modulus of elasticity:  ksi

Notes:

Follow the same procedure to copy **Southern Pine**, Visually graded No. 2, Size Class 2"-4" thick, 2"-4" wide, SPIB rules from the library for the deck material.

Bridge Materials - Timber - Sawn

Name:

Description:

General ASD LRFD

Grading method:

Species:

Commercial grade:

Size classification:

Grading rules agency:

Density:  kcf

# TMBR1- Single Span Timber Beam - Sawn Example

Bridge Materials - Timber - Sawn

Name:

Description:

General ASD LRFD

Bending:  ksi

Tension (parallel):  ksi

Shear (parallel):  ksi

Compr. (perp):  ksi

Compr. (parallel):  ksi

Modulus of elasticity:  ksi

Notes:

Bridge Materials - Timber - Sawn

Name:

Description:

General ASD LRFD

Bending:  ksi

Tension (parallel):  ksi

Shear (parallel):  ksi

Compr. (perp):  ksi

Compr. (parallel):  ksi

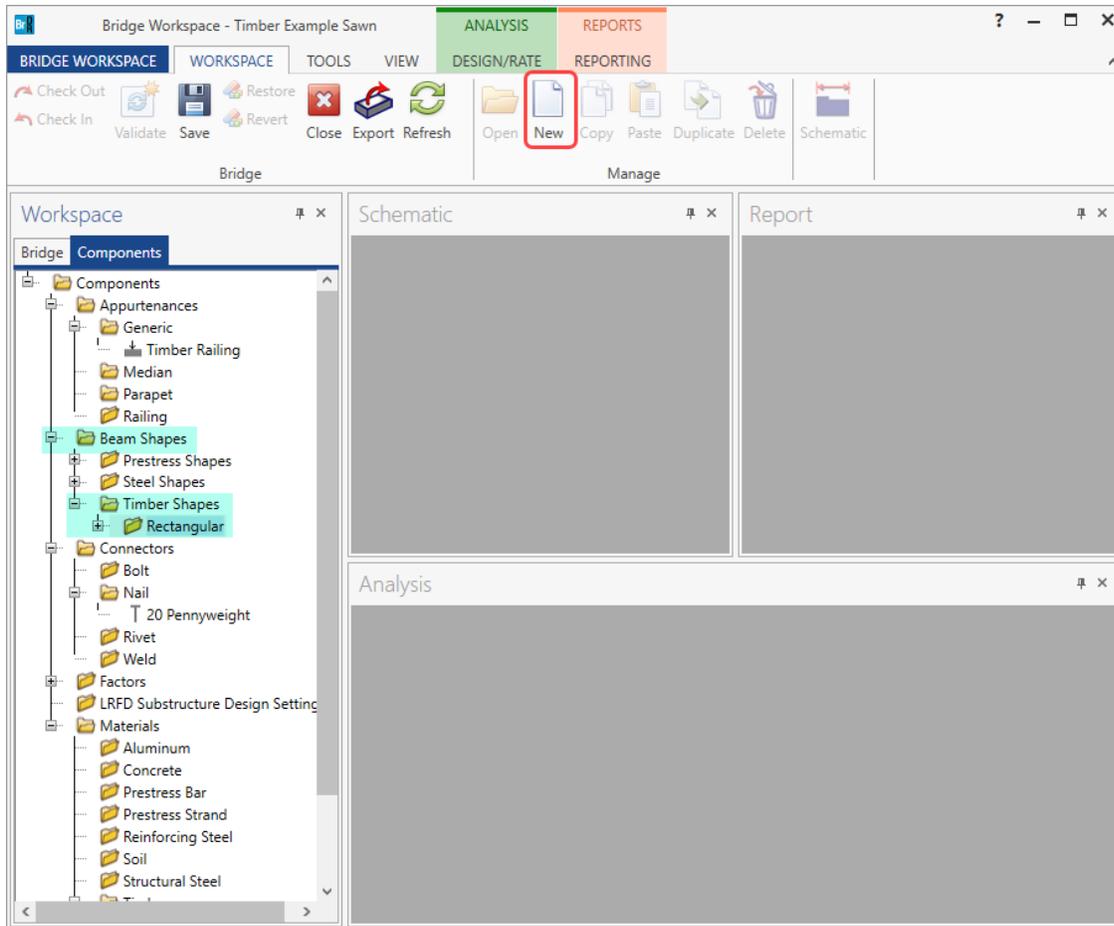
Modulus of elasticity:  ksi

Notes:

## TMBR1- Single Span Timber Beam - Sawn Example

### Timber Shape

Add a new timber beam shape by clicking on **Beam Shapes, Timber, Rectangular** in the **Components** tree and selecting **New** from the **Manage** group of the Workspace ribbon (or double click on Rectangular).



Enter the following data. Enter the actual beam dimensions to be used to calculate section properties on the **Dimensions** tab. Enter the nominal dimensions of the beam on the **Properties** tab and click on the **Compute** button to compute the section properties. Click **OK** to save the data to memory and close the window.

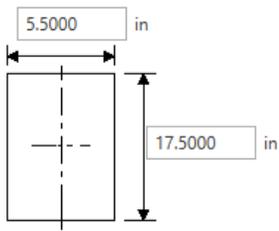
# TMBR1- Single Span Timber Beam - Sawn Example

Timber Shape - Rectangular

Name:

Description:

Dimensions **Properties**



5.5000 in

17.5000 in

Timber Shape - Rectangular

Name:

Description:

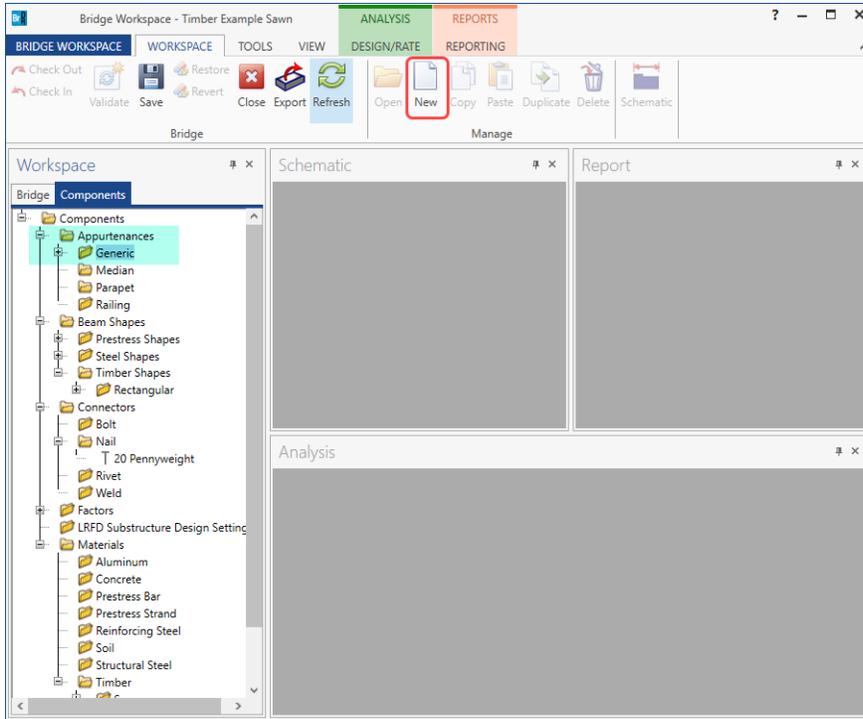
Dimensions **Properties**

Area:	<input type="text" value="96.25"/>	in <sup>2</sup>
Nominal load:	<input type="text" value="33.40"/>	lb/ft
Moment of inertia:	<input type="text" value="2456.4"/>	in <sup>4</sup>
CG from bottom:	<input type="text" value="8.7500"/>	in
Section modulus, top:	<input type="text" value="280.7"/>	in <sup>3</sup>
Section modulus, bottom:	<input type="text" value="280.7"/>	in <sup>3</sup>
Nominal width:	<input type="text" value="6.00"/>	in
Nominal depth:	<input type="text" value="18.0000"/>	in

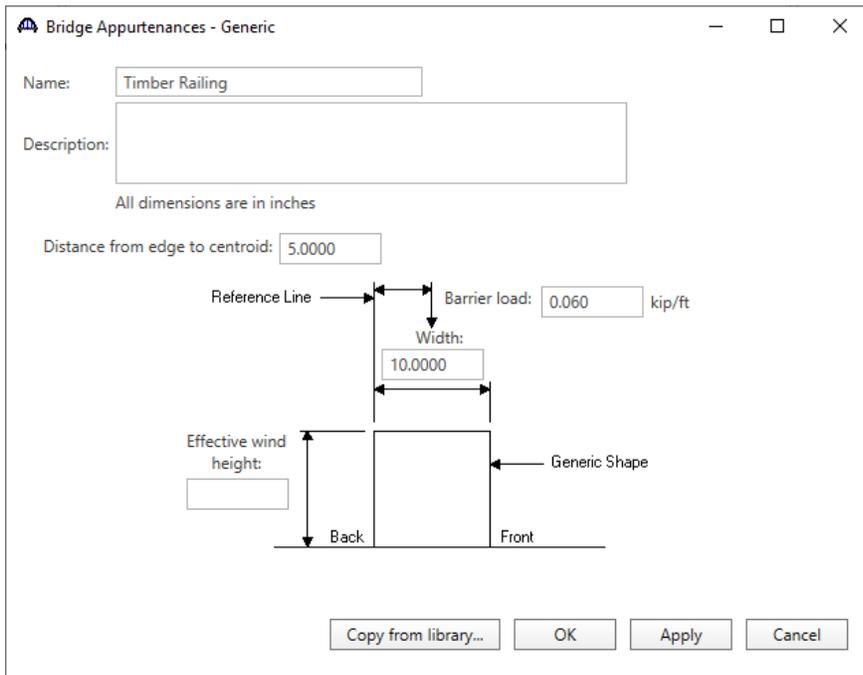
# TMBR1- Single Span Timber Beam - Sawn Example

## Bridge Appurtenances

To enter the appurtenances to be used within the bridge, expand the tree branch labeled **Appurtenances**. To define a generic railing, select **Generic** in the Components tree and click **New** from the **Manage** group of the Workspace ribbon (or double click on Generic).



Input the generic railing dimensions as shown below.

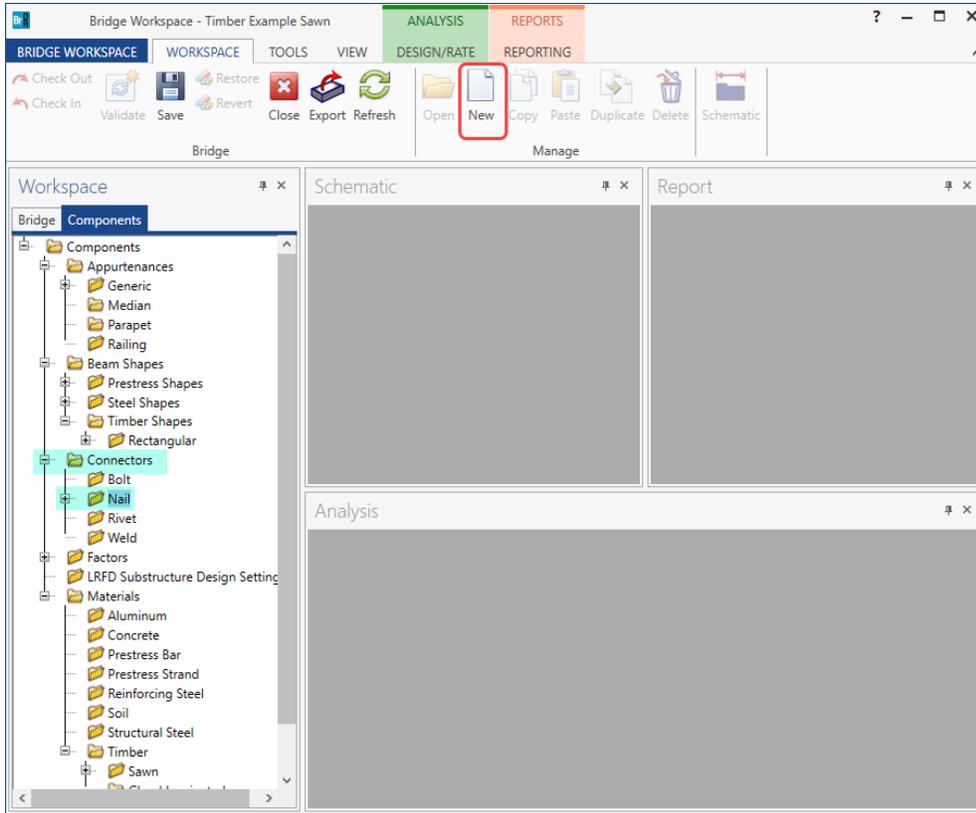


Click **OK** to save the data to memory and close the window.

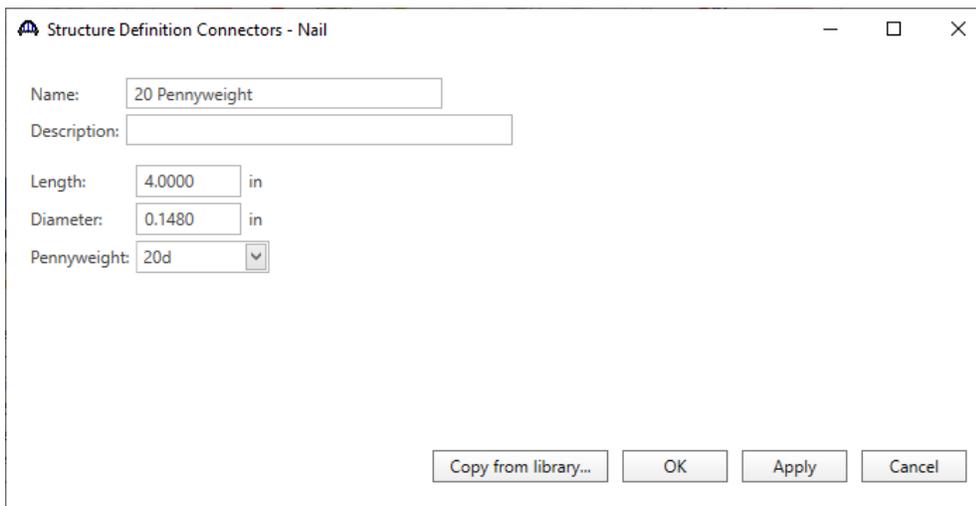
# TMBR1- Single Span Timber Beam - Sawn Example

## Bridge Connectors – Nail

To create a nail definition, expand the **Connectors** tree item and select **Nail** in the Components tree and click **New** from the **Manage** group of the **WORKSPACE** ribbon (or double click on Nail).



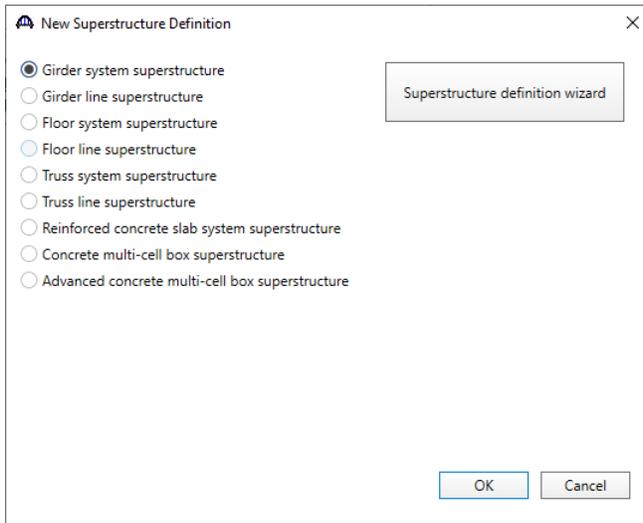
Define the nail as shown below. Click **OK** to save to memory and close the window.



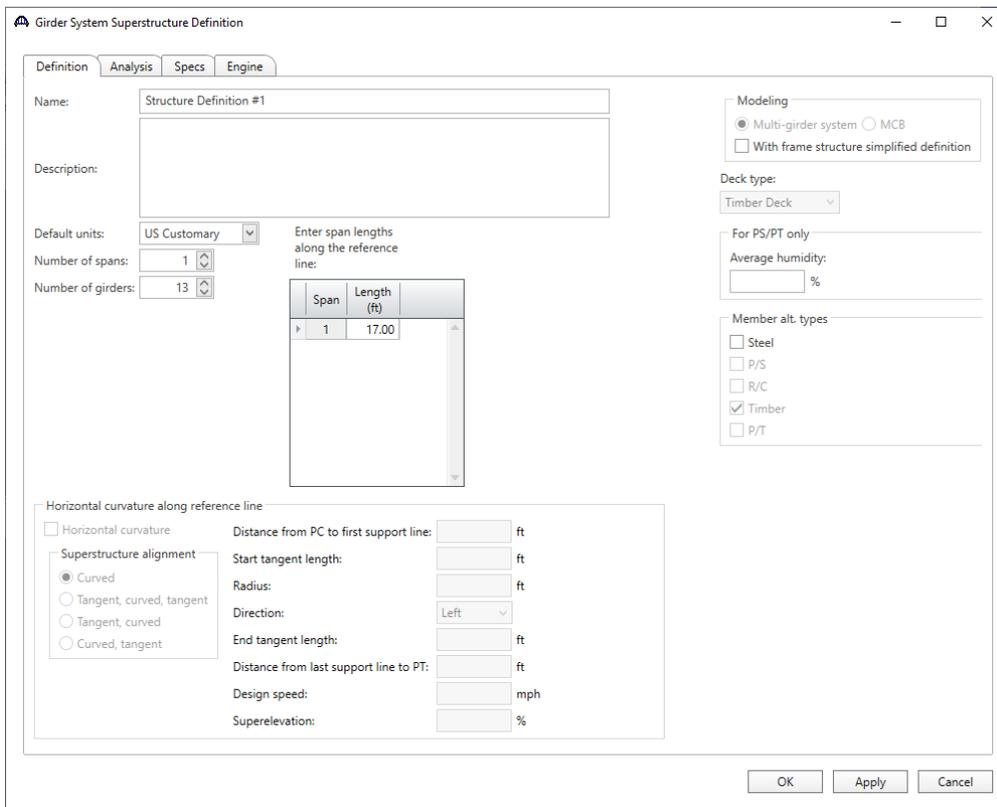
# TMBR1- Single Span Timber Beam - Sawn Example

## Superstructure Definition

Double click on **SUPERSTRUCTURE DEFINITIONS** (or click on **SUPERSTRUCTURE DEFINITIONS** and select **New** from the **Manage** group of the Workspace ribbon or right mouse click on **SUPERSTRUCTURE DEFINITIONS** and select **New** from the popup menu) to create a new structure definition. The window shown below will appear.

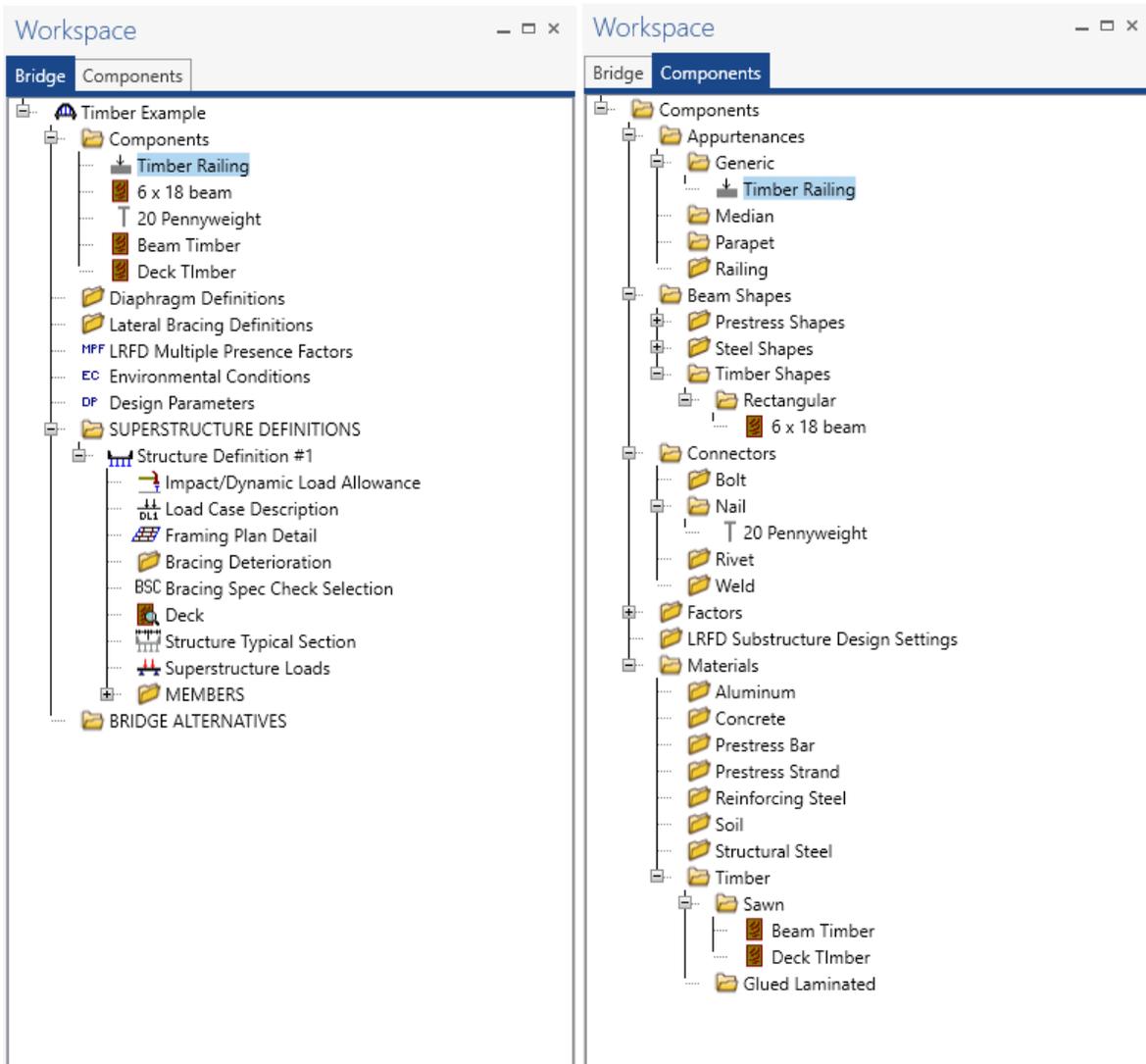


Select **Girder System Superstructure** and the Superstructure Definition window will open. Enter the data as shown below.



# TMBR1- Single Span Timber Beam - Sawn Example

The partially expanded Bridge Workspace tree for each of its tabs are shown below



## TMBR1- Single Span Timber Beam - Sawn Example

### Load Case Description

Click **Load Case Description** to define the dead load cases. The completed **Load Case Description** window is shown below.

Load case name	Description	Stage	Type	Time* (days)
Railing DL		Non-composite (Stage 1)	D,DC	
Wearing Surface DL		Non-composite (Stage 1)	D,DW	

\*Prestressed members only

Add default load case descriptions

New Duplicate Delete

OK Apply Cancel

### Framing Plan Detail

Double-click on **Framing Plan Detail** to describe the framing plan. Enter the data as shown below.

Number of spans: 1 Number of girders: 13

Layout Diaphragms

Support	Skew (degrees)
1	0.000
2	0.000

Girder spacing orientation

Perpendicular to girder

Along support

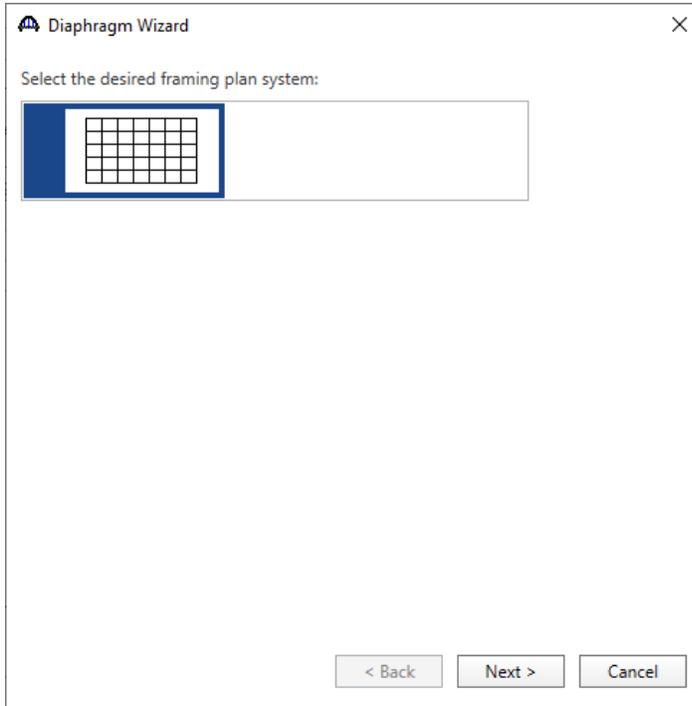
Girder bay	Girder spacing (ft)	
	Start of girder	End of girder
1	2.00	2.00
2	2.00	2.00
3	2.00	2.00
4	2.00	2.00
5	2.00	2.00
6	2.00	2.00
7	2.00	2.00
8	2.00	2.00
9	2.00	2.00
10	2.00	2.00
11	2.00	2.00
12	2.00	2.00

OK Apply Cancel

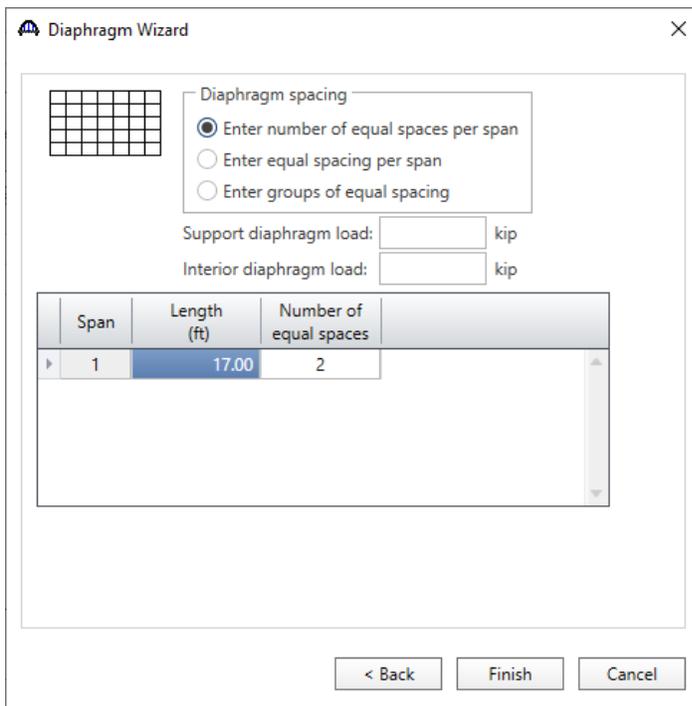
## TMBR1- Single Span Timber Beam - Sawn Example

### Diaphragms

Switch to the **Diaphragms** tab to enter diaphragm spacing. Select the Diaphragm Wizard button to have BrDR generate the diaphragm locations. The following window appears. Select the **Next** button to continue.



Enter 2 equal spaces in the span and click the **Finish** button.



TMBR1- Single Span Timber Beam - Sawn Example

The **Diaphragm Wizard** generates the following diaphragm locations.

Structure Framing Plan Details

Number of spans: 1    Number of girders: 13

Layout    Diaphragms

Girder bay: 1    Copy bay to...    Diaphragm wizard...

Support number	Start distance (ft)		Diaphragm spacing (ft)	Number of spaces	Length (ft)	End distance (ft)		Load (kip)	Diaphragm
	Left girder	Right girder				Left girder	Right girder		
1	0.00	0.00	0.00	1	0.00	0.00	0.00		--Not Assigned--
1	0.00	0.00	8.50	1	8.50	8.50	8.50		--Not Assigned--
1	17.00	17.00	0.00	1	0.00	17.00	17.00		--Not Assigned--

New    Duplicate    Delete

OK    Apply    Cancel

## TMBR1- Single Span Timber Beam - Sawn Example

### Deck

Enter the deck description by double-clicking on **Deck** in the Bridge Workspace tree. BrDR only supports transverse timber decks. Select the type of deck as **Nail-Laminated**. The timber material to be used for the deck is selected from the list of bridge materials described above. Select the **20 Pennyweight** nail definition for the **Nail** field.

The **Deck LL distribution width** is the wheel load distribution width in the direction perpendicular to the deck span as per AASHTO Standard Specifications for Highway Bridges, Article 3.25.1.1 (see figure below). This value equals **18.5"** for this structure.

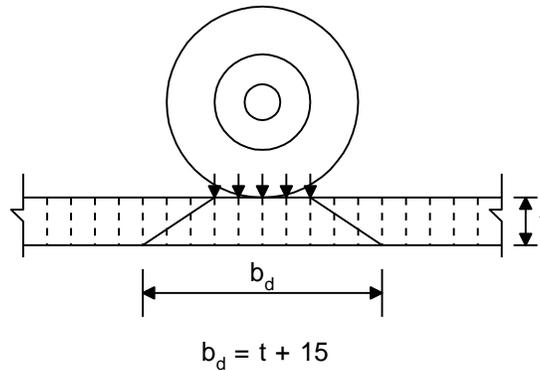


Figure – Relation between total deck thickness and deck LL distribution width as per Article 3.25.1.1

Deck

Description Specs Adjustment factors Factors Engine

Default rating method: ASR

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: 18.5000 in

Nail: 20 Pennyweight

OK Apply Cancel

## TMBR1- Single Span Timber Beam - Sawn Example

### Deck – Factors

The **Factors** tab of the Deck window provides entries for the **LRFR** and **ASR** factors to be used for the deck.

Deck

Description Specs Adjustment factors **Factors** Engine

LRFR

Condition factor: Good or Satisfactory

Field measured section properties

System factor: All Other Girder/Slab Bridges

System factor override:

ASR factors

OPER

Timber:

OK Apply Cancel

### Deck – Adjustment Factors

The **Adjustment factors** tab of the Deck window provides entries 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 adjustment factors for the deck timber material based on Wet usage conditions. Enter the **shear factor as 1.0**.

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 ( $C_F$ ):	1.00
Flat use ( $C_{F1}$ ):	1.00
Repetitive use ( $C_F$ ):	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 ( $C_{F2}$ ):	
Format conversion (bearing) ( $C_{F2}$ ):	
Size (flexure) ( $C_F$ ):	1.000
Size (modulus) ( $C_F$ ):	1.000
Flat use ( $C_{F1}$ ):	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

# TMBR1- Single Span Timber Beam - Sawn Example

## Structure Typical Section - Deck

Next, define the structure typical section by double-clicking on **Structure Typical Section** in the Bridge Workspace tree. Input the data describing the typical section as shown below.

Diagram labels: Distance from left edge of deck to superstructure definition ref. line, Distance from right edge of deck to superstructure definition ref. line, Deck thickness, Superstructure Definition Reference Line, Left overhang, Right overhang.

Superstructure definition reference line is within the bridge deck.

Parameter	Start (ft)	End (ft)
Distance from left edge of deck to superstructure definition reference line:	12.83	12.83
Distance from right edge of deck to superstructure definition reference line:	12.83	12.83
Left overhang:	0.83	0.83
Computed right overhang:	0.83	0.83

Buttons: OK, Apply, Cancel

## Structure Typical Section - Generic Appurtenances

Enter the railings on the **Generic** tab. Click **New** to add a row to the table. Enter the following data as shown below:

Diagram labels: Generic Shape, Back, Front.

Name	Load case	Measure to	Edge of deck dist. measured from	Distance at start (ft)	Distance at end (ft)	Front face orientation
Timber Railing	Railing DL	Back	Left Edge	0.00	0.00	Right
Timber Railing	Railing DL	Back	Right Edge	0.00	0.00	Left

Buttons: New, Duplicate, Delete, OK, Apply, Cancel

## TMBR1- Single Span Timber Beam - Sawn Example

### Structure Typical Section - Lane Positions

Select the **Lane Position** tab. Enter the values shown below or click the **Compute...** button to automatically compute the lane positions. A window showing the results of the computation opens. Click **Apply** to apply the computed values. The **Lane Position** tab is populated as shown below.

Travelway number	Distance from left edge of travelway to superstructure definition reference line at start (A) (ft)	Distance from right edge of travelway to superstructure definition reference line at start (B) (ft)	Distance from left edge of travelway to superstructure definition reference line at end (A) (ft)	Distance from right edge of travelway to superstructure definition reference line at end (B) (ft)
1	-12.00	12.00	-12.00	12.00

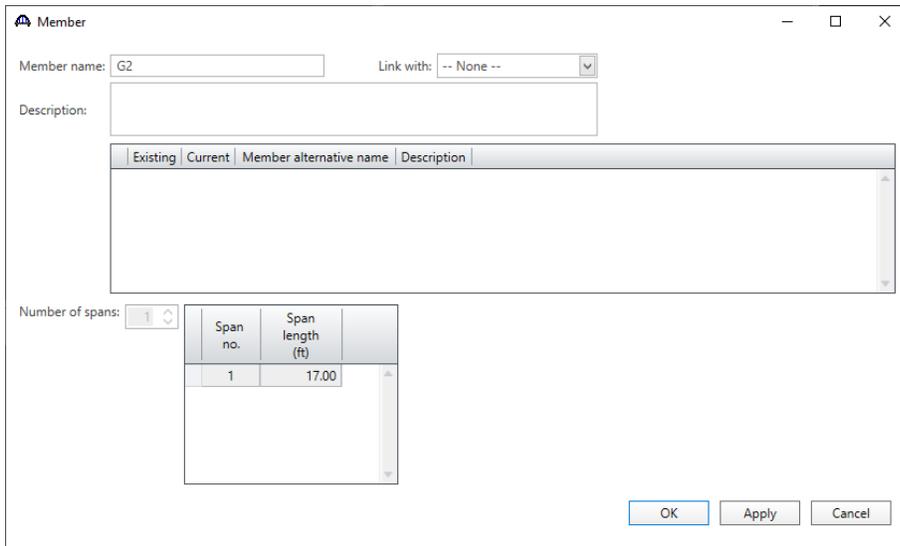
### Structure Typical Section -Wearing Surface

Enter the following wearing surface information on the **Wearing Surface** tab.

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### Describing a member

The **Member** window shows the data that was generated when the structure definition was created. No changes are required at this time. After a Member Alternative is defined it will appear in the list of member alternatives.



Member name: G2      Link with: -- None --

Description:

Existing	Current	Member alternative name	Description
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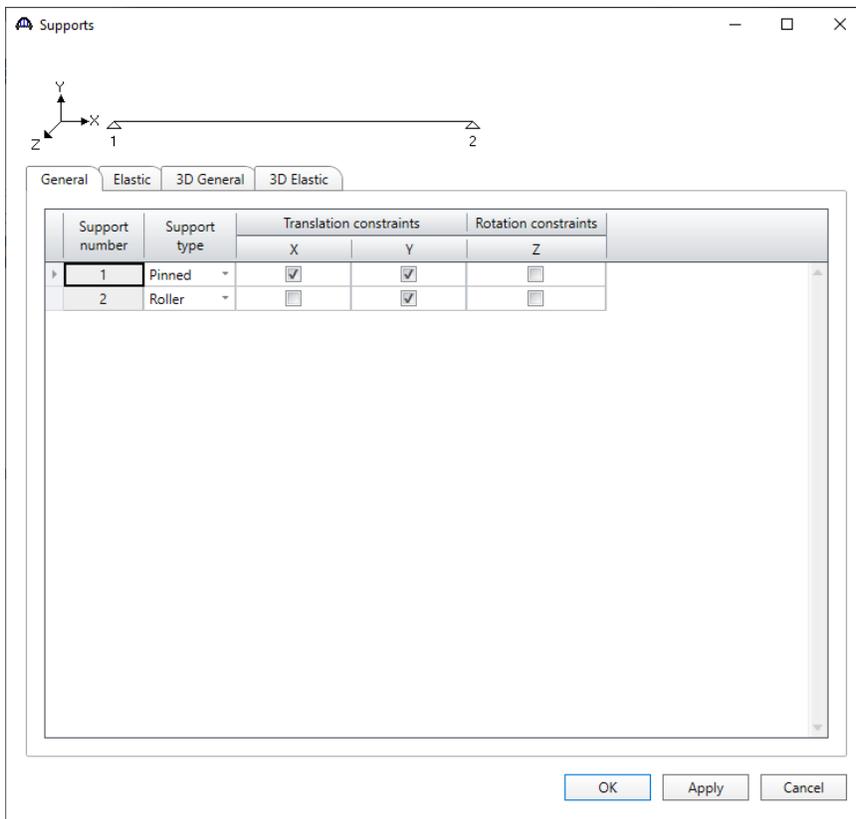
Number of spans: 1

Span no.	Span length (ft)
1	17.00

OK    Apply    Cancel

### Support Constraints

Support constraints were generated when the structure definition was created and are shown below. No changes are required.



Supports

Y  
X  
Z

1      2

General    Elastic    3D General    3D Elastic

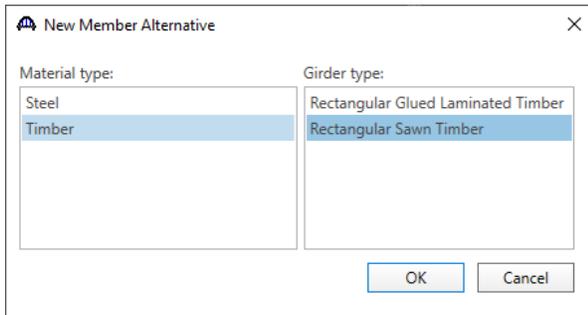
Support number	Support type	Translation constraints			Rotation constraints
		X	Y	Z	
1	Pinned	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2	Roller	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

OK    Apply    Cancel

## TMBR1- Single Span Timber Beam - Sawn Example

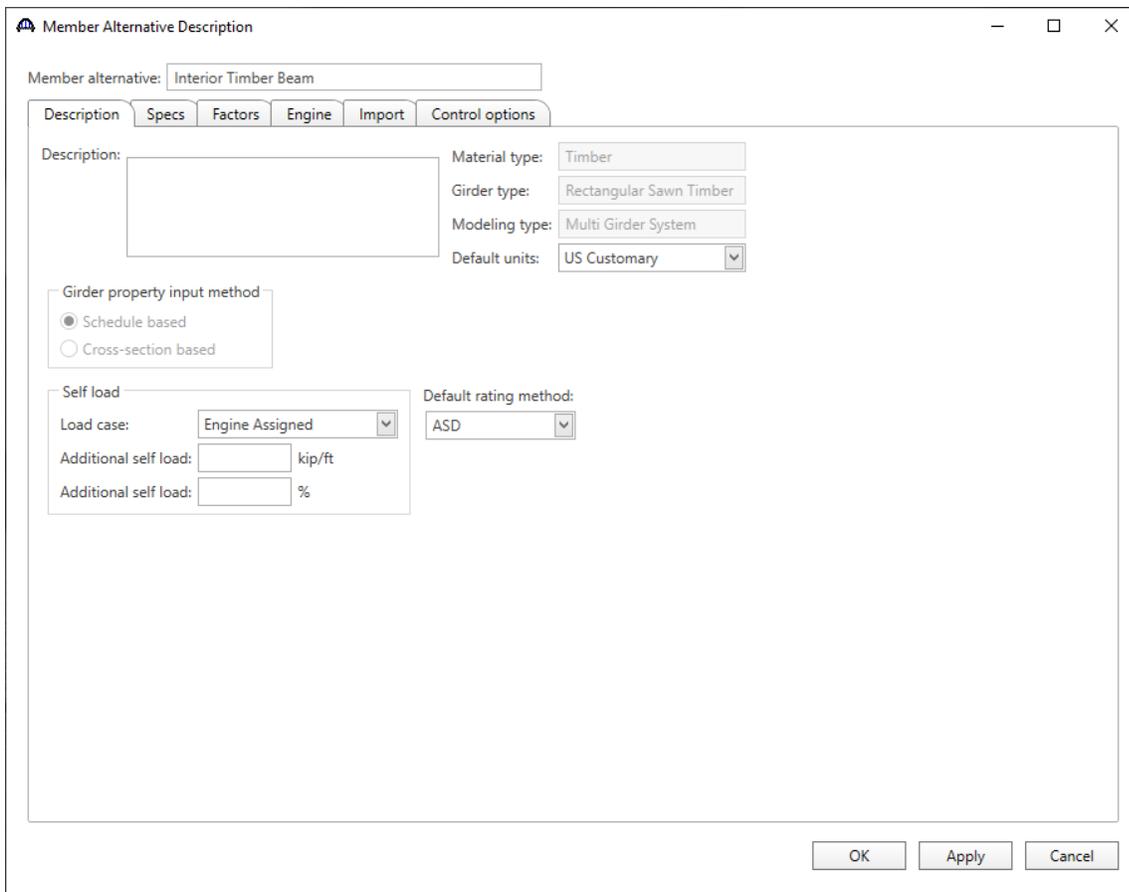
### Defining a Member Alternative

Double click **MEMBER ALTERNATIVES** in the tree to create a new alternative. The **New Member Alternative** window shown below will open. Select **Timber** for the **Material Type** and **Rectangular Sawn Timber** for the **Girder Type**.



The "New Member Alternative" dialog box contains two list boxes. The "Material type:" list box has "Steel" and "Timber" (selected). The "Girder type:" list box has "Rectangular Glued Laminated Timber" and "Rectangular Sawn Timber" (selected). "OK" and "Cancel" buttons are at the bottom.

Enter the following data for the Member Alternative. Click **OK** to save to memory and close the window.



The "Member Alternative Description" dialog box shows the following configuration:

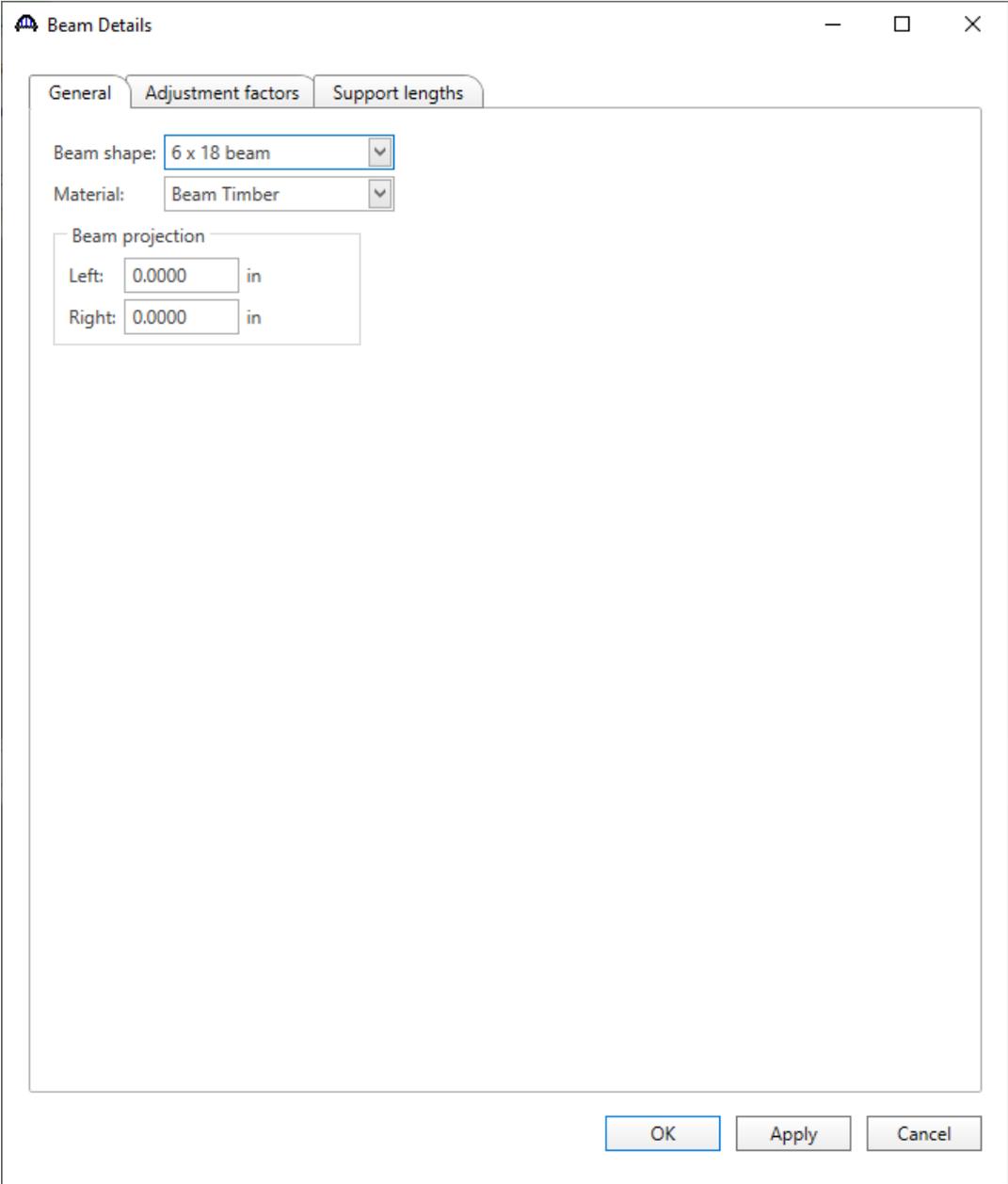
- Member alternative: Interior Timber Beam
- Material type: Timber
- Girder type: Rectangular Sawn Timber
- Modeling type: Multi Girder System
- Default units: US Customary
- Girder property input method:  Schedule based,  Cross-section based
- Self load: Load case: Engine Assigned; Additional self load: [ ] kip/ft; Additional self load: [ ] %
- Default rating method: ASD

Buttons: OK, Apply, Cancel

TMBR1- Single Span Timber Beam - Sawn Example

Beam Details - General

Open the **Beam Details** window by double clicking on **Beam Details** in the tree. The Beam Details window is shown below. No changes are required on the **General** tab



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### Beam Details - Adjustment Factors

The **Adjustment Factors** tab of the Beam Details window provides input entry for the adjustment factors to modify the **ASD** tabulated design values and the **LRFD** Reference design values entered on the **Bridge Materials – Timber – Sawn** window. The tabulated design values modified by these adjustment factors produce the design allowable stresses.

Select the **Wet** condition for **Shear/Flexure, Bearing** and **Modulus** fields. Use the **Compute** button to calculate the factors for the beam based on the Wet moisture conditions. Enter **1.1 for the Shear factor** since it is not calculated by the Compute button. This factor is not computed since it is dependent on the visual characteristics of the actual timber material used.

Beam Details

General Adjustment factors Support lengths

Moisture condition for shear/flexure: Wet

Moisture condition for bearing: Wet

Moisture condition for modulus: Wet

Compute

ASD	LRFD
Wet service (flexure) ( $C_M$ ): 1.000	Wet service (flexure) ( $C_M$ ): 1.000
Wet service (shear) ( $C_M$ ): 1.000	Wet service (shear) ( $C_M$ ): 1.000
Wet service (bearing) ( $C_M$ ): 0.670	Wet service (bearing) ( $C_M$ ): 0.670
Wet service (modulus) ( $C_M$ ): 1.000	Wet service (modulus) ( $C_M$ ): 1.000
Shear ( $C_u$ ): 1.100	Format conversion ( $C_{KF}$ ):
Flat use ( $C_{fu}$ ): 1.000	Format conversion (bearing) ( $C_{KF}$ ):
Repetitive use ( $C_r$ ): 1.000	Size (flexure) ( $C_F$ ): 0.956
Load duration ( $C_D$ ): 1.150	Size (modulus) ( $C_F$ ): 1.000
Size ( $C_F$ ): 0.956	Flat use ( $C_{fu}$ ): 1.000
Bearing ( $C_b$ ):	Incising (flexure, shear) ( $C_i$ ): 1.000
Beam stability ( $C_s$ ):	Incising (bearing) ( $C_i$ ): 1.000
	Incising (modulus) ( $C_i$ ): 1.000
	Bearing ( $C_b$ ):
	Time effects (STRENGTH - I) ( $C_t$ ): 0.800
	Time effects (STRENGTH - II) ( $C_t$ ): 1.000
	Beam stability ( $C_s$ ):

OK Apply Cancel

TMBR1- Single Span Timber Beam - Sawn Example

Beam Details - Support lengths

Enter the following data on the **Support lengths** tab. Click **OK** to save to memory and close the Beam Details window.

The screenshot shows a software dialog box titled "Beam Details" with three tabs: "General", "Adjustment factors", and "Support lengths". The "Support lengths" tab is active and contains a table with the following data:

Support number	Bearing length (in)	Bearing width (in)
1	7.0000	5.5000
2	7.0000	5.5000

At the bottom of the dialog box are three buttons: "OK", "Apply", and "Cancel".

# TMBR1- Single Span Timber Beam - Sawn Example

## Live Load Distribution Factors

Open the **Live Load Distribution** window and in **Standard** tab, use the **Compute from typical section** button to compute the following live load distribution factors for Standard live load distribution factors.

The screenshot shows the 'Live Load Distribution' window with the 'Standard' tab selected. The 'Distribution factor input method' is set to 'Use simplified method'. The checkbox 'Allow distribution factors to be used to compute effects of permit loads with routine traffic' is unchecked. The table below displays the distribution factors for different lane configurations.

Lanes loaded	Distribution factor (wheels)			
	Shear	Shear at supports	Moment	Deflection
1 Lane	0.522	1.000	0.444	0.154
Multi-lane	0.550	1.000	0.500	0.308

Buttons at the bottom of the window include 'Compute from typical section...', 'View calcs', 'OK', 'Apply', and 'Cancel'.

## TMBR1- Single Span Timber Beam - Sawn Example

The live load distribution factors are computed as follows:

Moment DF (AASHTO Table 3.23.1)

$$\text{Single Lane Moment DF} = \frac{S}{4.5} = \frac{2}{4.5} = 0.4444$$

$$\text{Multi Lane Moment DF} = \frac{S}{4.0} = \frac{2}{4.0} = 0.5000$$

Shear at Supports DF (AASHTO Article 3.23.1.2)

By simple beam distribution, both single and multi lane Shear at Support DF = 1.0000

Shear DF (AASHTO Article 3.23.1.2 refers to AASHTO Article 13.6.5.2)

$$V_{LL} = 0.50[(0.60V_{LU}) + V_{LD}] \text{ (AASHTO Eq. 13 - 10)}$$

where  $V_{LU}$  = shear due to undistributed wheel loads (i.e., one line of wheels carried by one bending member) = 1

$V_{LD}$  = shear due to wheel loads distributed laterally as specified for moment in Article 3.23

$$\text{Single Lane Shear DF} = 0.50[(0.60(1) + 0.4444)] = 0.5222$$

$$\text{Multi Lane Shear DF} = 0.50[(0.60(1) + 0.5000)] = 0.5500$$

Deflection DF

$$\text{Single Lane Deflection DF} = \frac{1 \text{ lane} * 2 \text{ wheels/lane}}{13 \text{ beams}} = 0.1538$$

$$\text{Multi Lane Deflection DF} = \frac{2 \text{ lane} * 2 \text{ wheels/lane}}{13 \text{ beams}} = 0.3077$$

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## Point of Interest

Define points of interest using the **Point of Interest** window shown below. A window for defining a point of interest is opened by double clicking on the **Points of Interest** tree item.

Point Of Interest

Distance from leftmost support: 8.50 ft or Span: Span 1 Fraction: 0.500000

Side  
 Left  Right

ASD design values ASD adjustment factors ASD operating stress percentage LRFD design values LRFD adjustment factors Bracing Engine

Override deck design values  Override beam design values

Tabulated design values

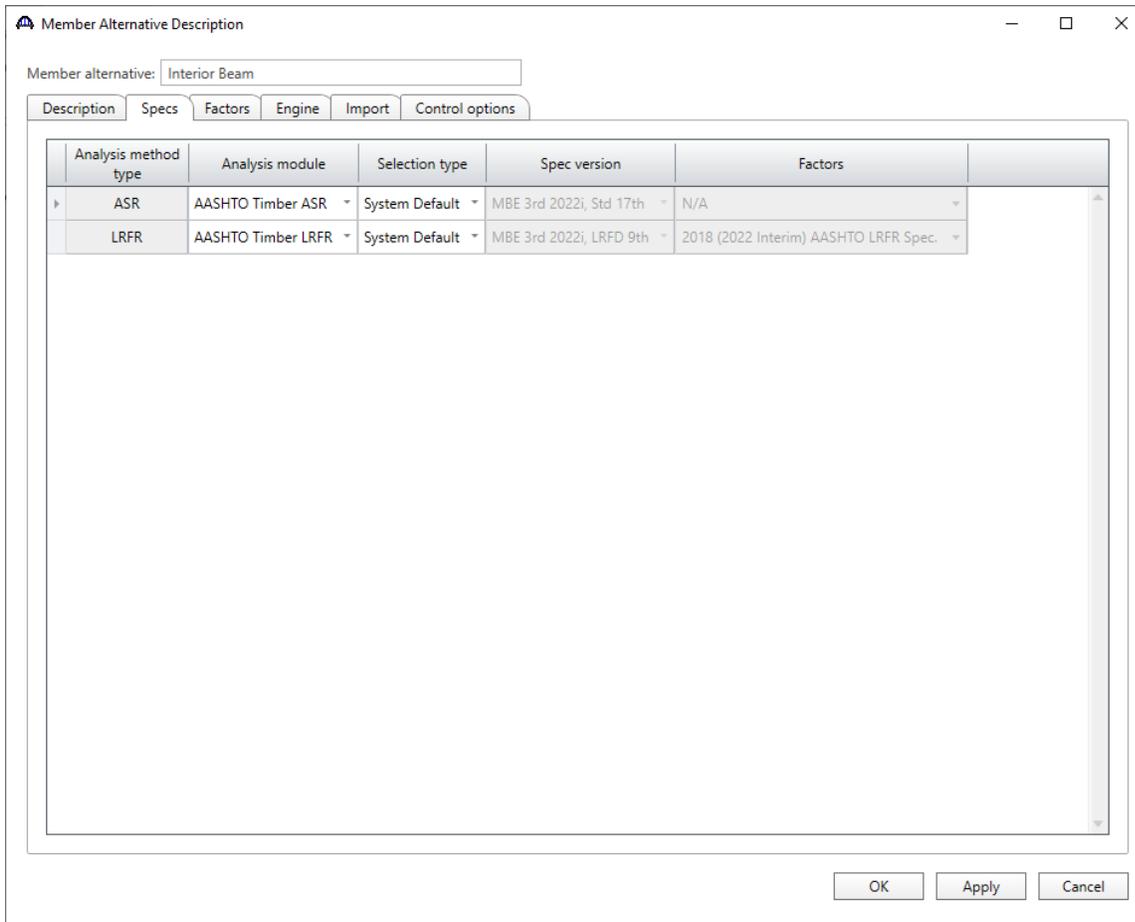
Bending:	<input type="text"/>	ksi	Bending:	<input type="text"/>	ksi
Tension parallel to grain:	<input type="text"/>	ksi	Tension parallel to grain:	<input type="text"/>	ksi
Shear parallel to grain:	<input type="text"/>	ksi	Shear parallel to grain:	<input type="text"/>	ksi
Compr. perp. to grain:	<input type="text"/>	ksi	Compr. perp. to grain:	<input type="text"/>	ksi
Compr. parallel to grain:	<input type="text"/>	ksi	Compr. parallel to grain:	<input type="text"/>	ksi

OK Apply Cancel

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### Member Alternative Description – Specs

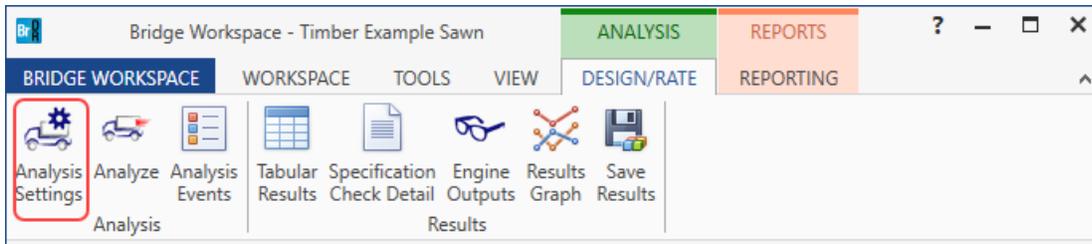
To select the analysis module for both ASR and LRFR analysis method types, double click on the member alternative **Interior Timber** Beam and click on the **Specs** tab. To run ASR analysis using AASHTO timber engine, select **AASHTO Timber ASR** option from the **Analysis module** options for the **ASR** analysis method type. Similarly, to run an LRFR analysis using the AASHTO timber engine, select **AASHTO Timber LRFR** option from the **Analysis module** options for the **LRFR** analysis method type.



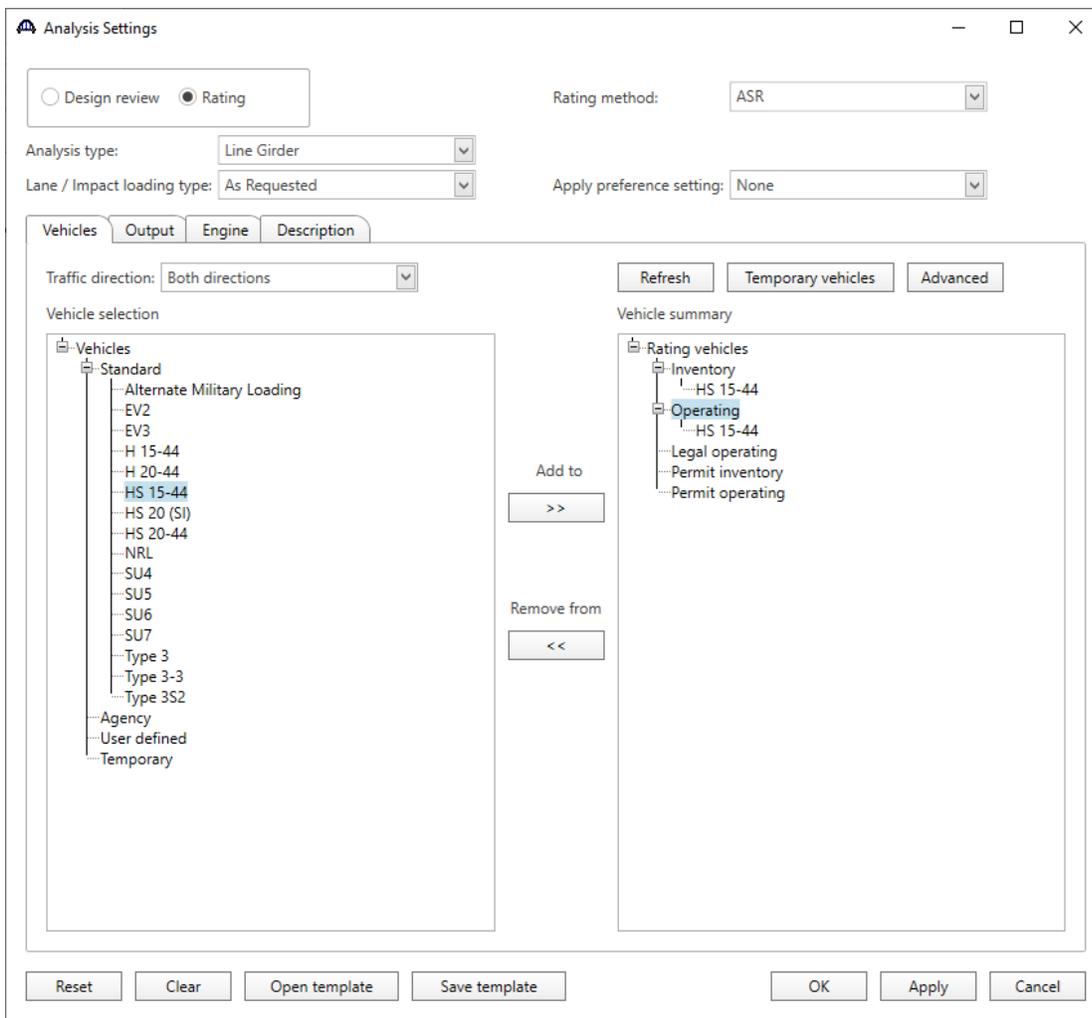
## TMBR1- Single Span Timber Beam - Sawn Example

### ASR Rating

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



To run an ASR analysis, select **ASR** as the Rating Method, select the **HS 15-44** vehicle to be used in the rating in **Inventory** and **Operating** and click **OK**.



Next click the **Analyze** button on the Analysis group of the **DESIGN/RATE** ribbon to perform the rating.

# TMBR1- Single Span Timber Beam - Sawn Example

## Tabular Results

When the rating is finished, the results can be reviewed by clicking the **Tabular Results** button on the **Results** group of the **DESIGN/RATE** ribbon. The window shown below will open.

Analysis Results - Interior Beam

Report type: Rating Results Summary | Lane/Impact loading type:  As requested  Detailed | Display Format: Single rating level per row

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
HS 15-44	Axle Load	ASR	Inventory	32.80	1.215	8.50	1 - (50.0)	Moment	As Requested	As Requested
HS 15-44	Axle Load	ASR	Operating	44.73	1.657	8.50	1 - (50.0)	Moment	As Requested	As Requested
HS 15-44	Lane	ASR	Inventory	36.46	1.350	17.00	1 - (100.0)	Shear	As Requested	As Requested
HS 15-44	Lane	ASR	Operating	49.67	1.840	17.00	1 - (100.0)	Shear	As Requested	As Requested

AASHTO ASR Engine Version 7.5.0.3001  
Analysis preference settings: None

Close

## LRFR Rating

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

Analysis Settings

Design review  Rating | Rating method: LRFR

Analysis type: Line Girder | Lane / Impact loading type: As Requested | Apply preference setting: None

Vehicles | Output | Engine | Description

Traffic direction: Both directions

Vehicle selection

- Vehicles
  - Standard
    - EV2
    - EV3
    - H 15-44
    - H 20-44
    - HL-93 (SI)
    - HL-93 (US)**
    - HS 15-44
    - HS 20 (SI)
    - HS 20-44
    - Lane-Type Legal Load
    - LRFD Fatigue Truck (SI)
    - LRFD Fatigue Truck (US)
    - NRL
    - SU4
    - SU5
    - SU6
    - SU7
    - Type 3
    - Type 3-3
    - Type 3S2
    - Agency
      - User defined
      - Temporary

Add to >>

Remove from <<

Vehicle summary

- Rating vehicles
  - LRFR
    - Design load rating
      - Inventory
        - HL-93 (US)
      - Operating**
        - HL-93 (US)
      - Fatigue
    - Legal load rating
      - Routine
      - Specialized hauling
    - Permit load rating

Reset | Clear | Open template | Save template | OK | Apply | Cancel

Next click the **Analyze** button on the Analysis group of the **DESIGN/RATE** ribbon to perform the rating.

# TMBR1- Single Span Timber Beam - Sawn Example

## Tabular Results

When the rating is finished, the results can be reviewed by clicking the **Tabular Results** button on the **DESIGN/RATE** ribbon. The window shown below will open.

The screenshot shows a software window titled "Analysis Results - Interior Beam". It contains a toolbar with a "Print" button. Below the toolbar are three controls: "Report type:" set to "Rating Results Summary", "Lane/Impact loading type:" with radio buttons for "As requested" (selected) and "Detailed", and "Display Format:" set to "Single rating level per row". The main area contains a table with the following data:

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	29.64	0.823	0.00	1 - (0.0)	STRENGTH-I Bearing	As Requested	As Requested
HL-93 (US)	Truck + Lane	LRFR	Operating	38.42	1.067	0.00	1 - (0.0)	STRENGTH-I Bearing	As Requested	As Requested
HL-93 (US)	Tandem + Lane	LRFR	Inventory	25.77	0.716	0.00	1 - (0.0)	STRENGTH-I Bearing	As Requested	As Requested
HL-93 (US)	Tandem + Lane	LRFR	Operating	33.40	0.928	0.00	1 - (0.0)	STRENGTH-I Bearing	As Requested	As Requested

At the bottom left of the window, it says "AASHTO LRFR Engine Version 7.5.0.3001" and "Analysis preference setting: None". A "Close" button is located at the bottom right.