

AASHTOWare BrDR 7.5.0

Steel Tutorial

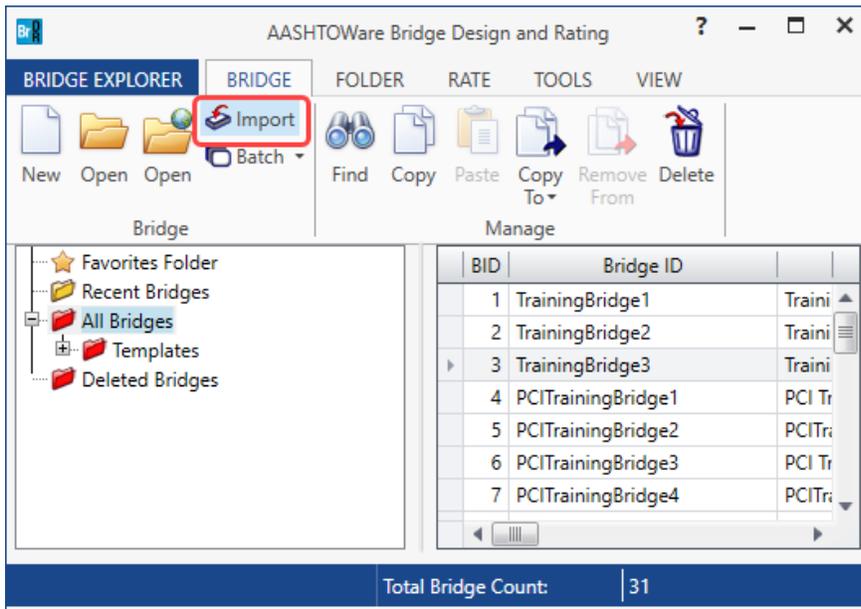
STL4 – Simple Span-Plate Girder With Loss Example

STL4 – Simple Span Plate Girder With Loss Example

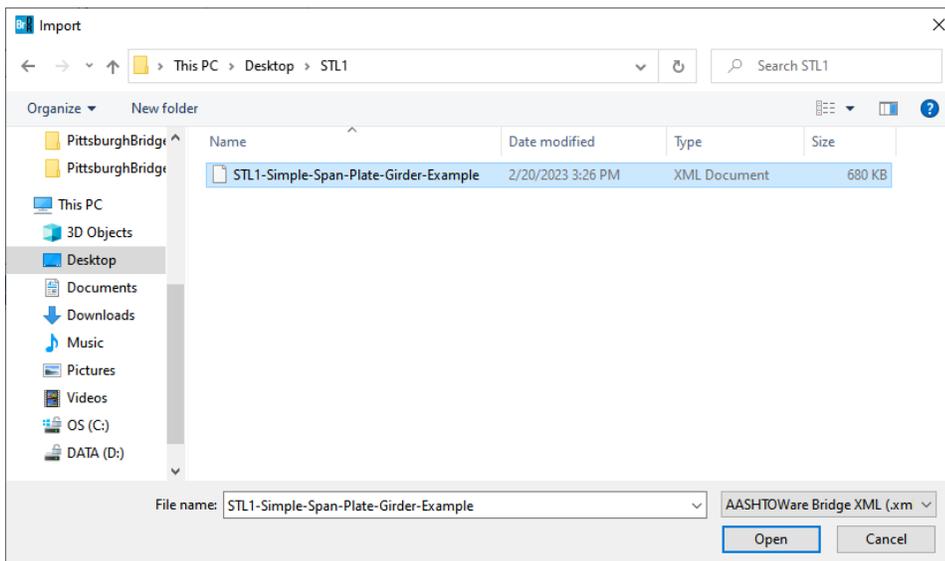
BrDR Tutorial

BrDR allows deterioration to be entered for steel members. The Deterioration window is not available in **BrD**. Deterioration data is only used in rating analyses. It is not used in design review analyses. This example problem describes using **BrDR** to enter deterioration for the bridge created in the **STL1 – Simple Span Plate Girder Example** problem.

Use the **Import** function of **BrDR** to import the bridge from **STL1** tutorial used in this example. Open **BrDR** and click on the **Import** button from the **Bridge** group of the **BRIDGE** ribbon as shown below.



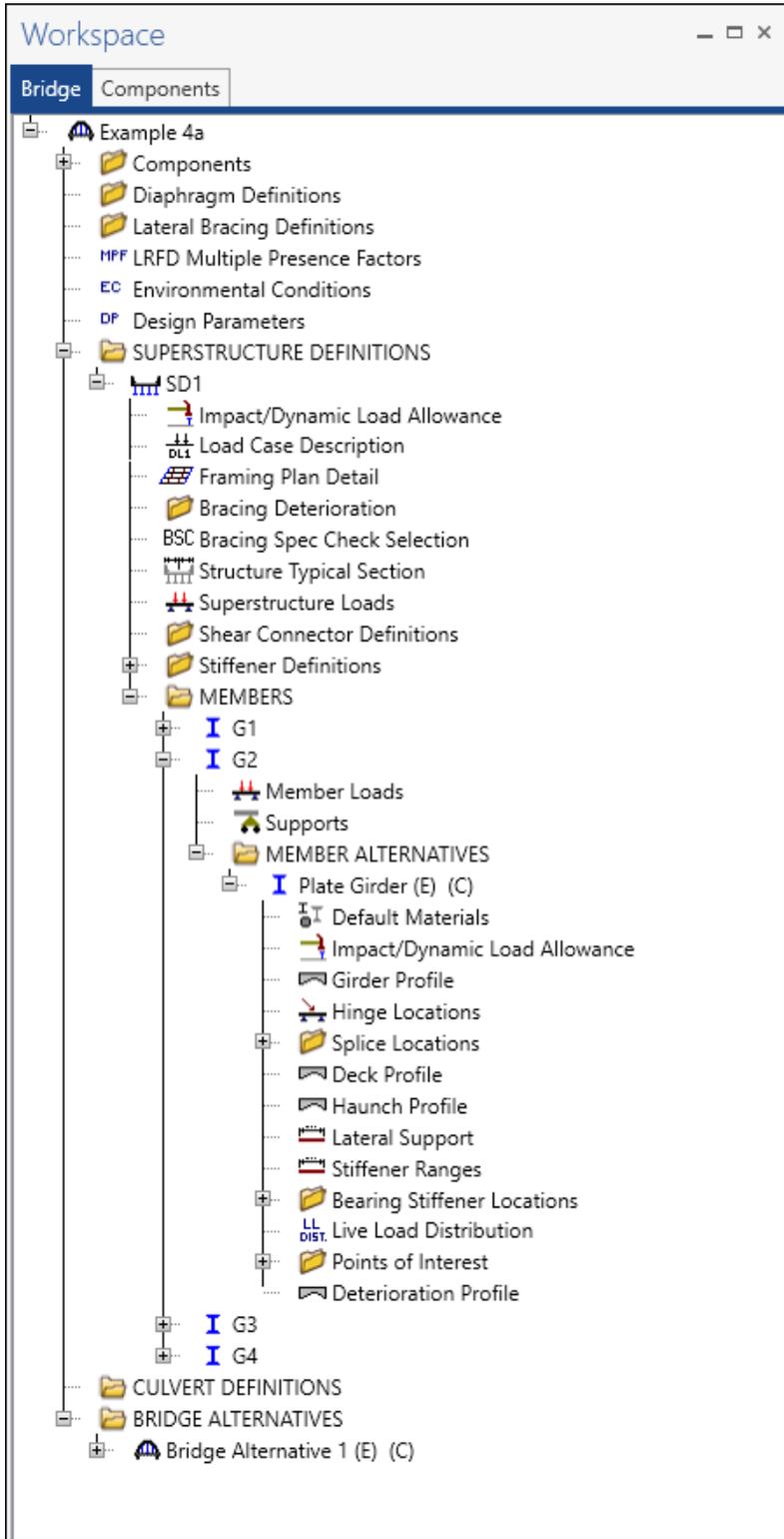
Select the bridge from the **STL1** tutorial and click the **Open** button to import this bridge into **BrDR**.



STL4 – Simple Span Plate Girder With Loss Example

STL1 Bridge Workspace

The following **Bridge Workspace** should exist after completing the example problem **STL1**.

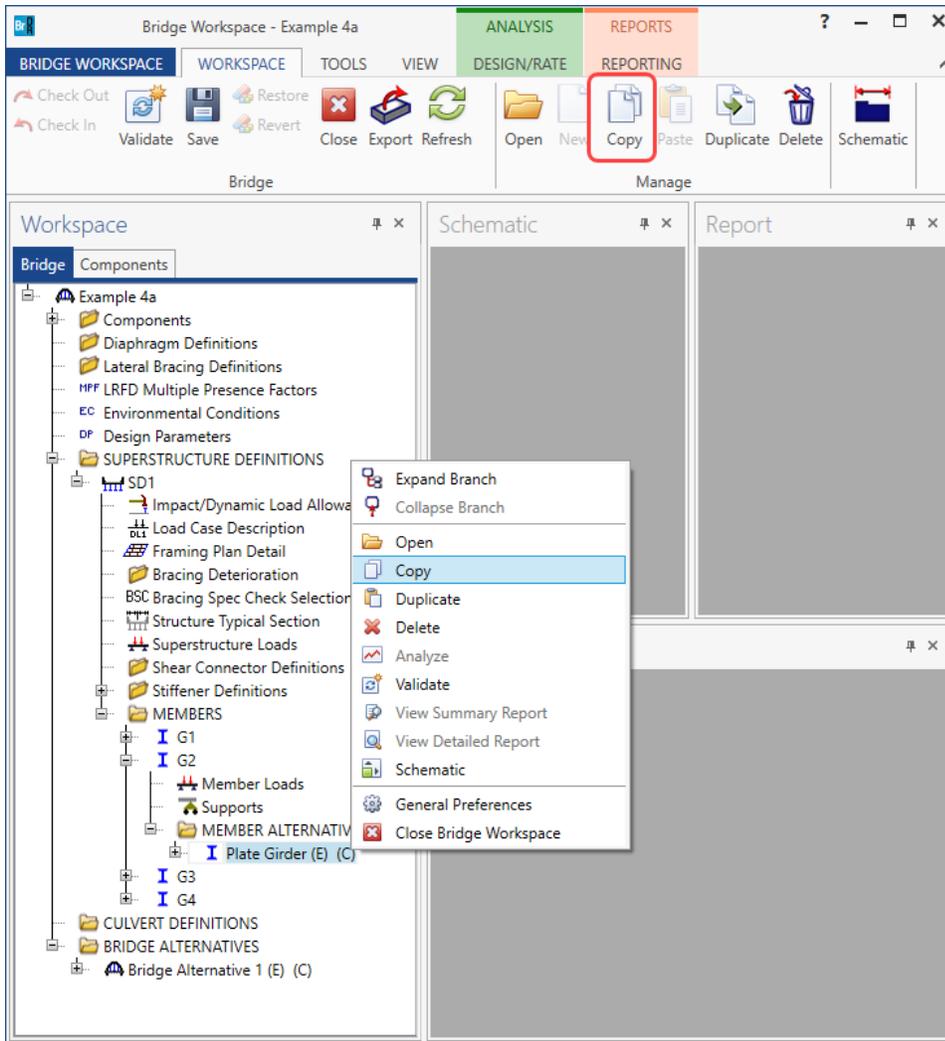


STL4 – Simple Span Plate Girder With Loss Example

Copy – Member alternative

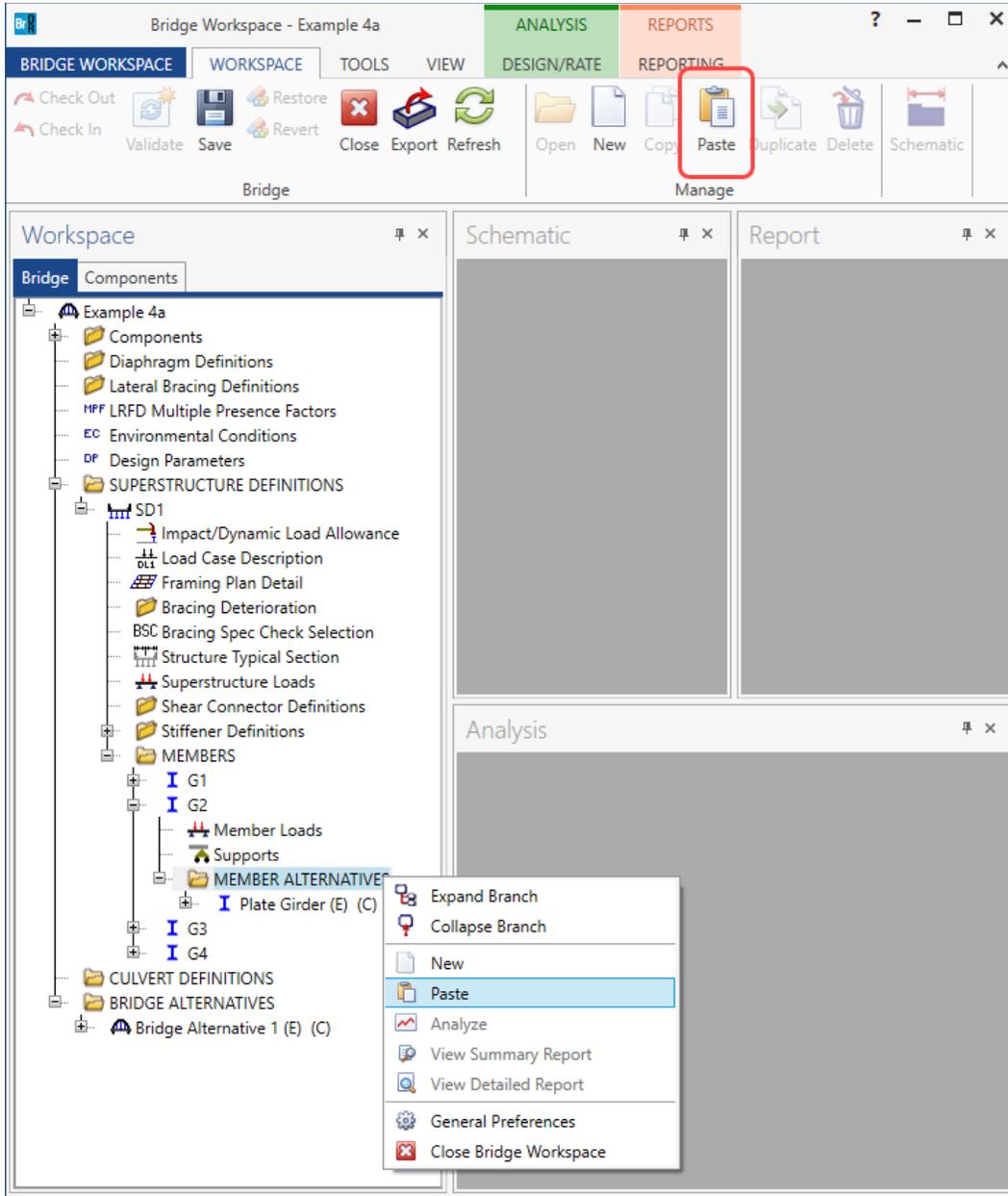
For this example, make a copy of the **Plate Girder** member alternative for member **G2** and enter the deterioration for this copy.

To make a copy, select the **Plater Girder** member alternative for member **G2** in the **Bridge Workspace** tree and click the **Copy** button from the **Manage** group of the **WORKSPACE** ribbon (or right click and select **Copy** from the menu) as shown below.



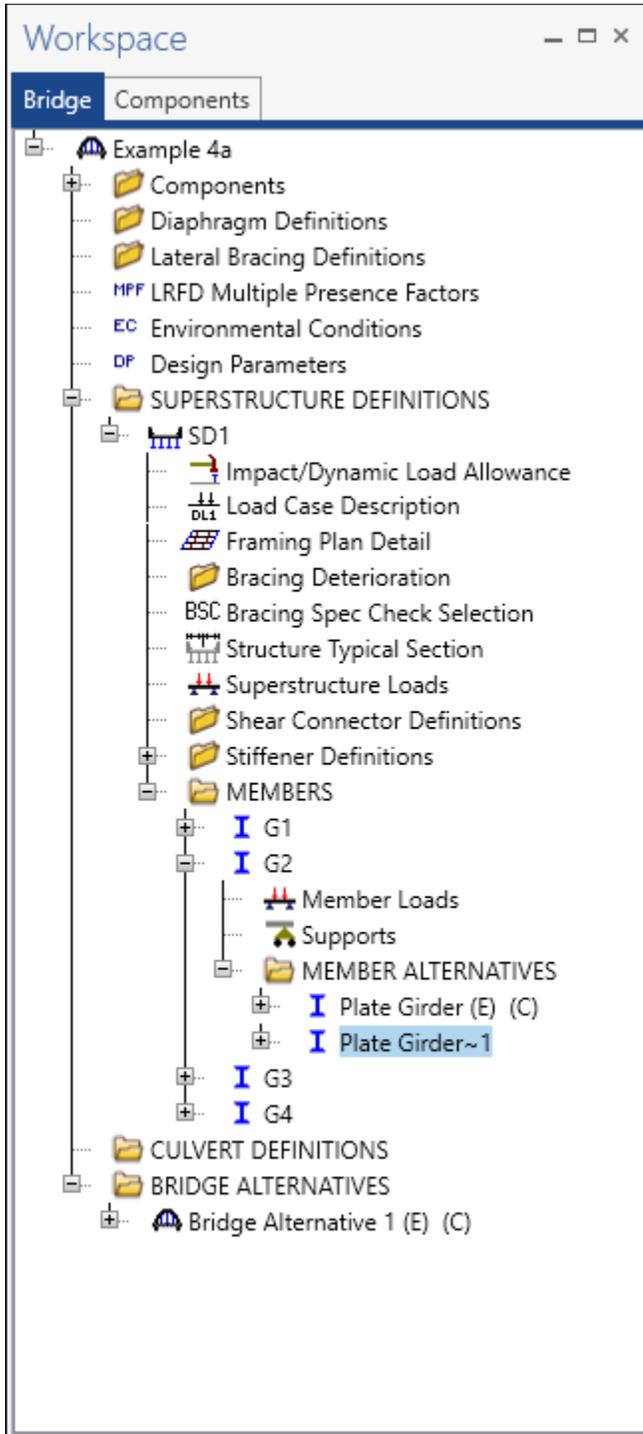
STL4 – Simple Span Plate Girder With Loss Example

Now select the **MEMBER ALTERNATIVES** node in the **Bridge Workspace** tree for member **G2** and click the **Paste** button from the **Manage** group of the **WORKSPACE** ribbon (or right click and select **Paste** from the menu) as shown below.



STL4 – Simple Span Plate Girder With Loss Example

The resulting partially expanded **Bridge Workspace** tree is shown below.



STL4 – Simple Span Plate Girder With Loss Example

Member Alternative Description

Double click on the newly copied member alternative for member **G2 – Plate Girder ~ 1** to open the **Member Alternative Description** window. Change the name of this member alternative to **Plate Girder with Section Loss** as shown below. This member alternative does not have the (E)(C) designation in the name.

Member Alternative Description

Member alternative: Plate Girder with Section Loss

Description Specs Factors Engine Import Control options

Description: Add additional weight for steel details such as diaphragms and stiffeners

Material type: Steel

Girder type: Plate

Modeling type: Multi Girder System

Default units: US Customary

Girder property input method: Schedule based Cross-section based

End bearing locations: Left: 6.0000 in Right: 6.0000 in

Self load: Load case: Engine Assigned

Additional self load: 0.034 kip/ft

Additional self load: %

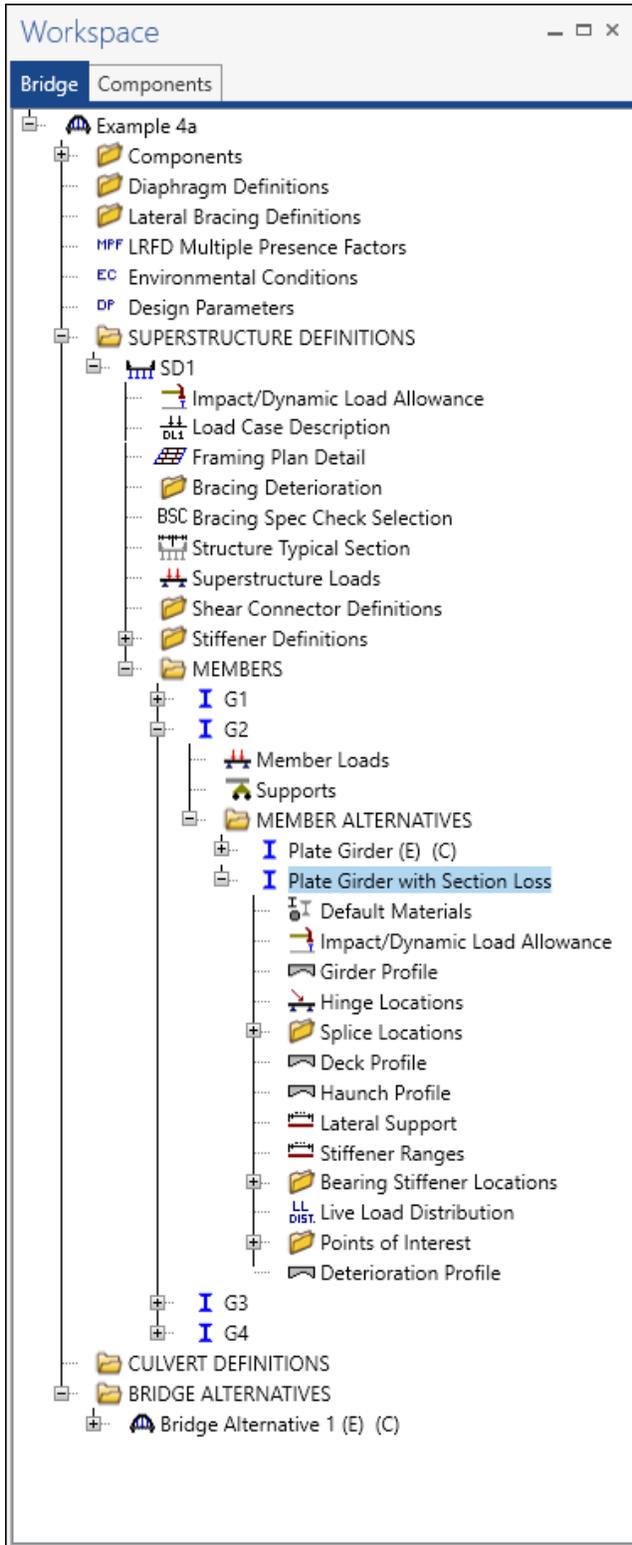
Default rating method: LFR

OK Apply Cancel

Click **OK** to apply the data and close the window.

STL4 – Simple Span Plate Girder With Loss Example

The partially expanded **Bridge Workspace** tree is shown below.



STL4 – Simple Span Plate Girder With Loss Example

Deterioration Profile

To define the deterioration for the bottom flange, open the **Deterioration Profile** window by double clicking on the **Deterioration Profile** node in the **Bridge Workspace** tree for the **Plate Girder with Section Loss** member alternative. Enter the data as shown below.

The screenshot shows the 'Deterioration Profile' dialog box. At the top, the 'Type' is set to 'Plate Girder'. Below this, there are three tabs: 'Web', 'Top flange', and 'Bottom flange'. The 'Bottom flange' tab is currently selected. Inside the dialog, there is a table with the following columns: '% Width loss (%)', '% Thickness loss (%)', 'Support number', 'Start distance (ft)', 'Length (ft)', and 'End distance (ft)'. The table contains one row of data with the following values: '% Width loss (%)', '10.0', '1', '78.00', '5.00', and '83.00'. Below the table, there are three buttons: 'New', 'Duplicate', and 'Delete'. At the bottom of the dialog, there are three buttons: 'OK', 'Apply', and 'Cancel'.

% Width loss (%)	% Thickness loss (%)	Support number	Start distance (ft)	Length (ft)	End distance (ft)
	10.0	1	78.00	5.00	83.00

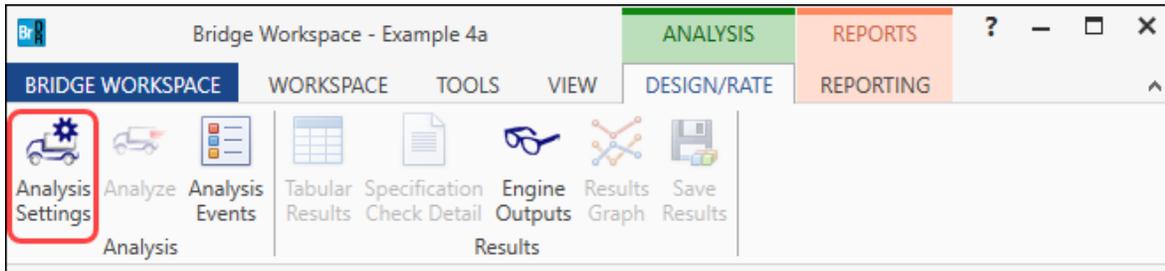
Click **OK** to apply the data and close the window.

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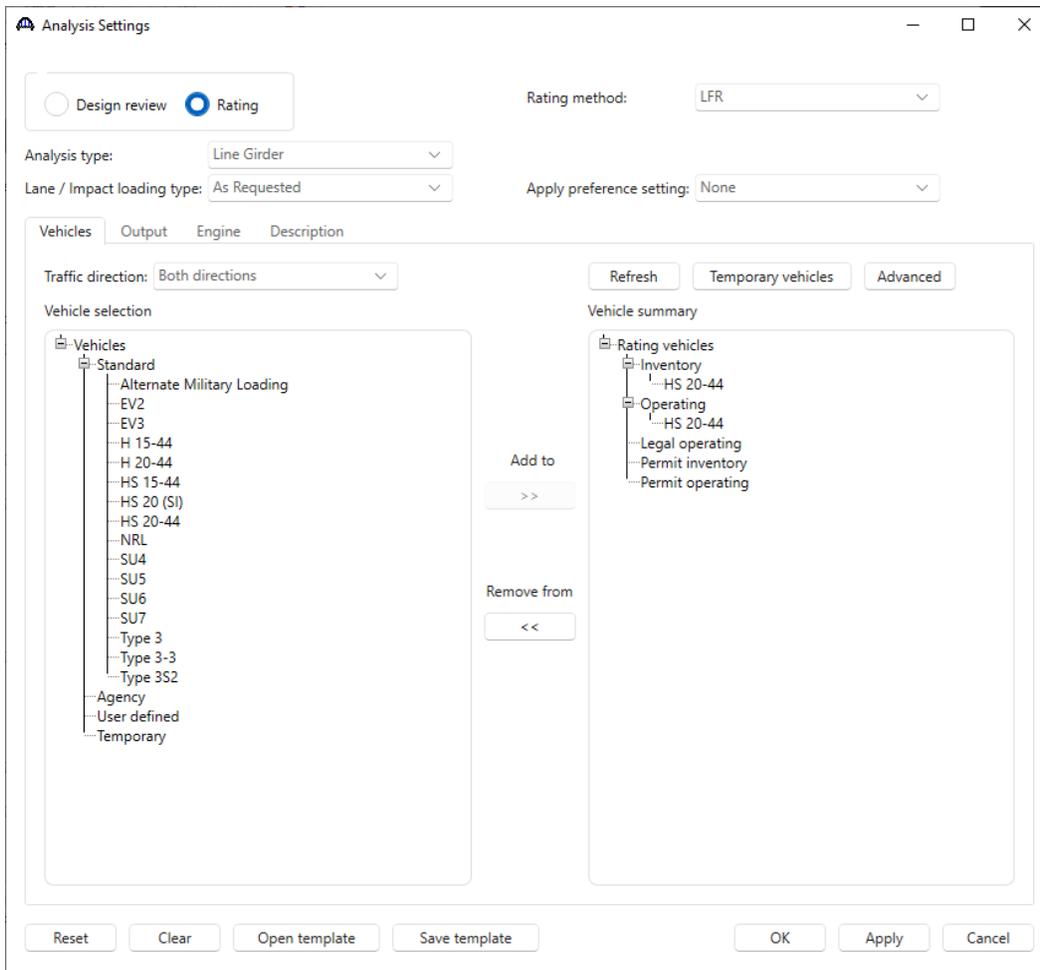
Now the rating factors can be compared between the original member alternative and the member alternative with section loss.

LFR Analysis

To perform an **LFR** rating, select the **Analysis Settings** button on the **Analysis** group of the **DESIGN/RATE** ribbon. The window shown below opens.



Select the vehicles to used in the analysis as shown below.

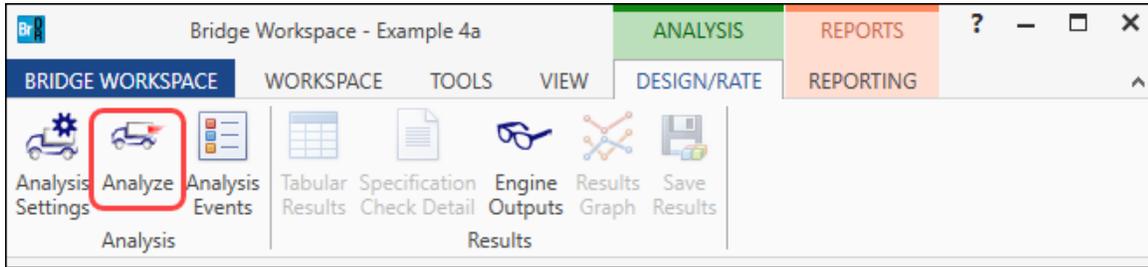


Click **OK** to apply the analysis settings and close the window.

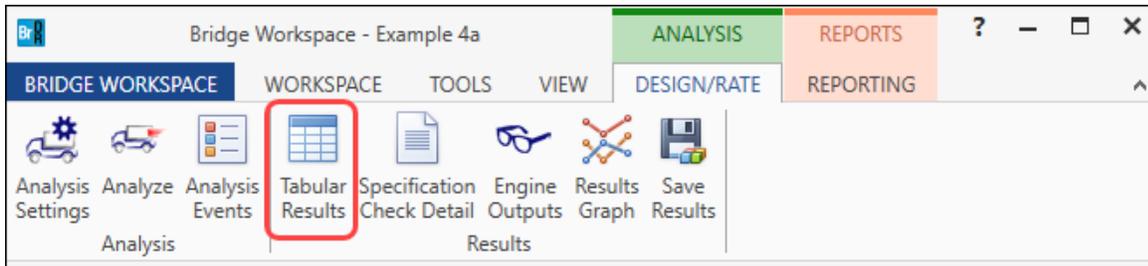
STL4 – Simple Span Plate Girder With Loss Example

Tabular Results

Select **Plate Girder (E) (C)** member alternative. Next click the **Analyze** button on the **Analysis** group of the **DESIGN/RATE** ribbon to perform the rating.



When the rating has finished, results can be reviewed by clicking the **Tabular Results** button on the **Results** group of the ribbon.



The window shown below will open.

Analysis Results - Plate Girder

Print

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 20-44	Axle Load	LFR	Inventory	33.73	0.937	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested
HS 20-44	Axle Load	LFR	Operating	56.33	1.565	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested
HS 20-44	Lane	LFR	Inventory	31.56	0.877	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested
HS 20-44	Lane	LFR	Operating	52.71	1.464	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested

AASHTO LFR Engine Version 7.5.0.3001
Analysis preference setting: None

Close

STL4 – Simple Span Plate Girder With Loss Example

Now run an **LFR** analysis with the same analysis settings as shown above for the **Plate Girder with Section Loss** member alternative. After the analysis is complete, open the **Tabular Results**. The following results are produced.

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
HS 20-44	Axle Load	LFR	Inventory	26.36	0.732	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested
HS 20-44	Axle Load	LFR	Operating	44.02	1.223	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested
HS 20-44	Lane	LFR	Inventory	24.66	0.685	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested
HS 20-44	Lane	LFR	Operating	41.19	1.144	80.50	1 - (50.0)	Service - Steel	As Requested	As Requested

AASHTO LFR Engine Version 7.5.0.3001
Analysis preference setting: None

Member – G2

Member **G2** has two member alternatives. To run the newly added **Plate Girder with Section Loss** member alternative during a batch analysis, this alternative needs to be set as the **Existing** alternative. A batch analysis can be performed in one of two ways.

1. Select the superstructure definition **SD** in the **Bridge Workspace** tree and click the **Analyze** button from the **Analysis** group of the **DESIGN/RATE** ribbon. The batch analysis will process each of the member alternatives in this superstructure definition that are marked as the **Existing** alternative.
2. A batch analysis can also be performed from the **Bridge Explorer**. Multiple bridges can be selected in **Bridge Explorer** and the Rate option from the **RATE** ribbon can be used to rate all the bridges. The analysis will process each of the member alternatives in the selected bridges that are marked as the **Existing** alternatives.

To set the newly added **Plate Girder with Section Loss** member alternative as **Existing**, Open the **Member** window for member **G2** by double clicking on the **G2** node in the **Bridge Workspace** tree. Check the **Existing** checkbox next to the **Plate Girder with Section Loss Member alternative name**.

The **Current** checkbox does not mean that this alternative is the member that currently exists on the bridge. It only indicates that this member alternative will be the member displayed in the **Schematic - Structure Typical Section** window. Select the **Current** checkbox next to the **Plate Girder with Section Loss** to keep it consistent with the **Existing** member alternative as shown below.

STL4 – Simple Span Plate Girder With Loss Example

Member

Member name: Link with:

Description:

Existing	Current	Member alternative name	Description
<input type="checkbox"/>	<input type="checkbox"/>	Plate Girder	Add additional weight for steel details such as diaphragms and stiffeners
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Plate Girder with Section Loss	Add additional weight for steel details such as diaphragms and stiffeners

Number of spans:

Span no.	Span length (ft)
1	161.00

OK Apply Cancel

Now when this bridge is part of a batch analysis on the **Bridge Explorer** or in the **Bridge Workspace**, the analysis will be performed on the member alternative with section loss.