AASHTOWare BrDR 7.5.0

Feature Tutorial

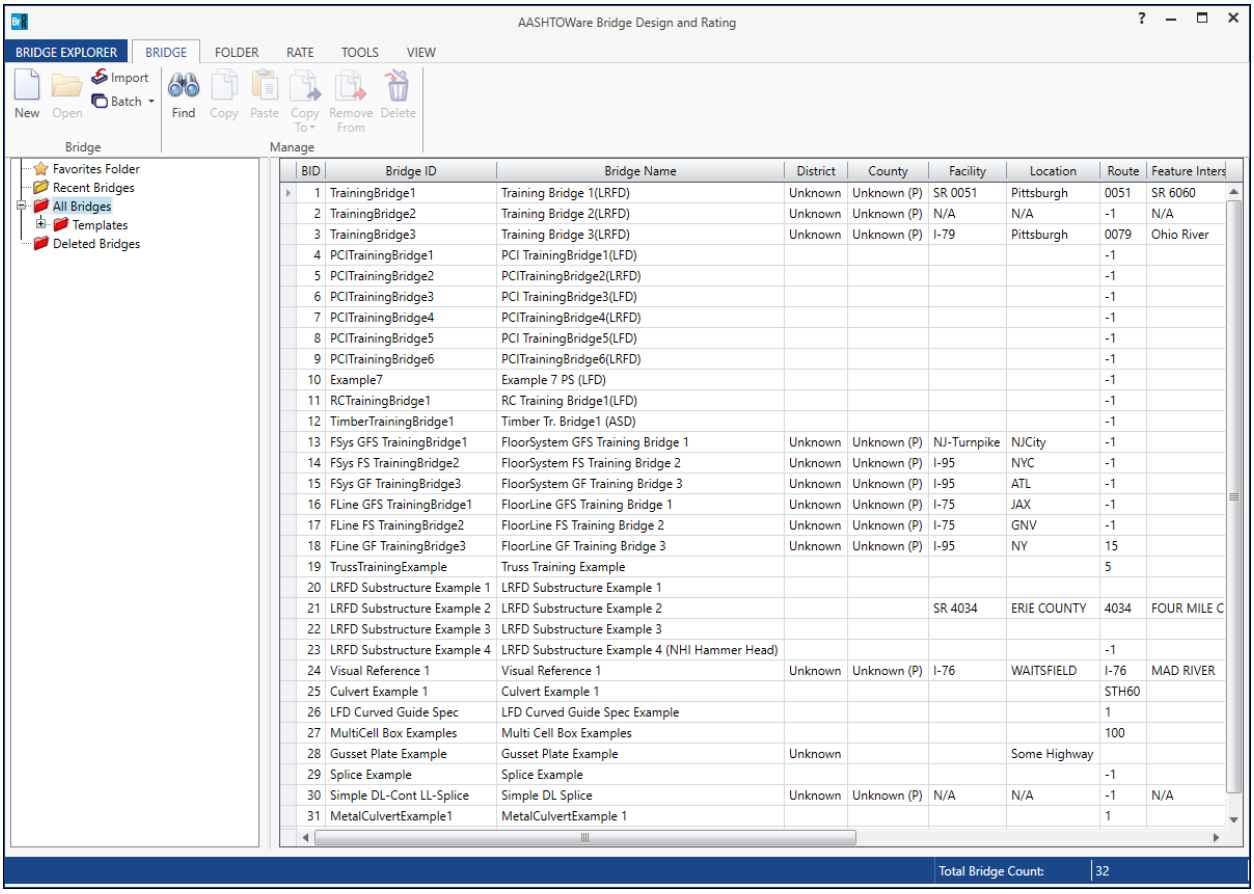
Field Verified Wearing Surface Thickness

Topics Covered

- Field verified wearing surface thickness for LRFR analysis.

Note: Field measured wearing surface thickness is used only in the LRFR analysis. LFR and ASR analysis do not use this feature.

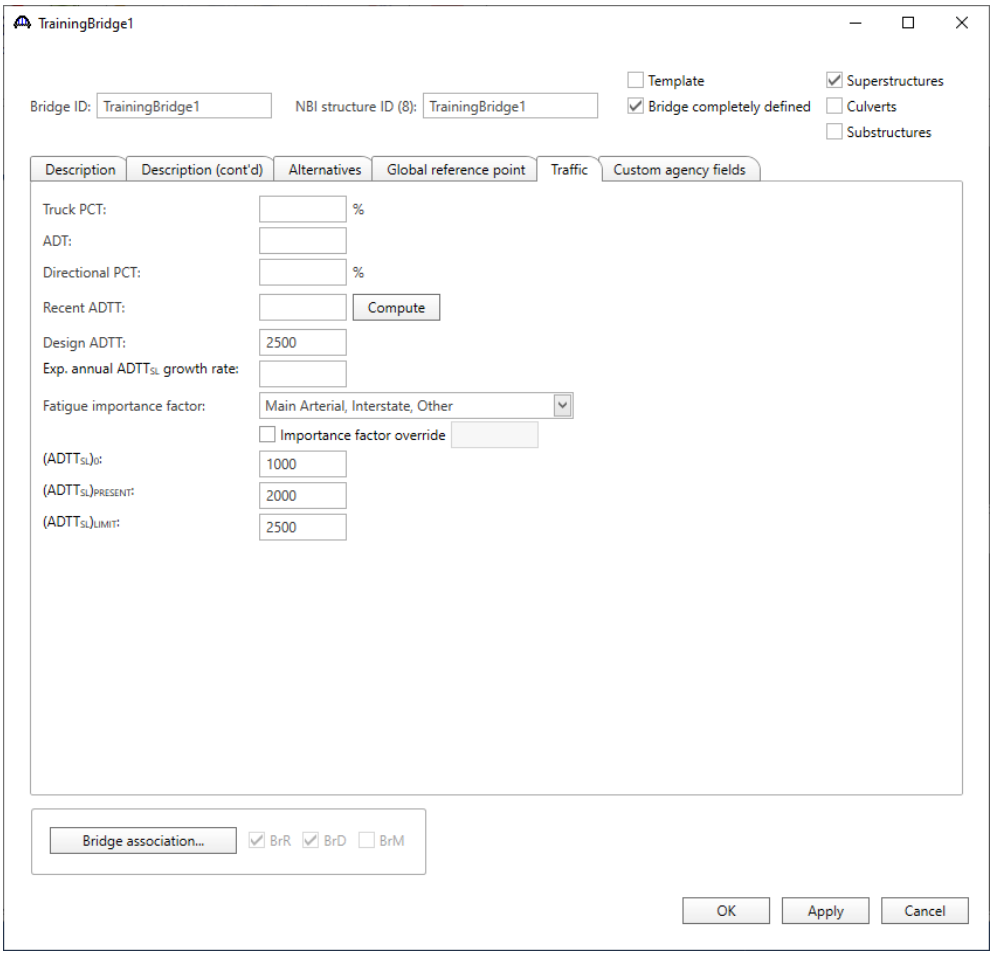
Field verified wearing surface thickness for LRFR analysis.



BID	Bridge ID	Bridge Name	District	County	Facility	Location	Route	Feature Inters
1	TrainingBridge1	Training Bridge 1(LRFD)	Unknown	Unknown (P)	SR 0051	Pittsburgh	0051	SR 6060
2	TrainingBridge2	Training Bridge 2(LRFD)	Unknown	Unknown (P)	N/A	N/A	-1	N/A
3	TrainingBridge3	Training Bridge 3(LRFD)	Unknown	Unknown (P)	I-79	Pittsburgh	0079	Ohio River
4	PCITrainingBridge1	PCI TrainingBridge1(LFD)					-1	
5	PCITrainingBridge2	PCITrainingBridge2(LRFD)					-1	
6	PCITrainingBridge3	PCI TrainingBridge3(LFD)					-1	
7	PCITrainingBridge4	PCITrainingBridge4(LRFD)					-1	
8	PCITrainingBridge5	PCI TrainingBridge5(LFD)					-1	
9	PCITrainingBridge6	PCITrainingBridge6(LRFD)					-1	
10	Example7	Example 7 PS (LFD)					-1	
11	RCTrainingBridge1	RC Training Bridge1(LFD)					-1	
12	TimberTrainingBridge1	Timber Tr. Bridge1 (ASD)					-1	
13	FSys GFS TrainingBridge1	FloorSystem GFS Training Bridge 1	Unknown	Unknown (P)	NJ-Turnpike	NJCity	-1	
14	FSys FS TrainingBridge2	FloorSystem FS Training Bridge 2	Unknown	Unknown (P)	I-95	NYC	-1	
15	FSys GF TrainingBridge3	FloorSystem GF Training Bridge 3	Unknown	Unknown (P)	I-95	ATL	-1	
16	FLine GFS TrainingBridge1	FloorLine GFS Training Bridge 1	Unknown	Unknown (P)	I-75	JAX	-1	
17	FLine FS TrainingBridge2	FloorLine FS Training Bridge 2	Unknown	Unknown (P)	I-75	GNV	-1	
18	FLine GF TrainingBridge3	FloorLine GF Training Bridge 3	Unknown	Unknown (P)	I-95	NY	15	
19	TrussTrainingExample	Truss Training Example					5	
20	LRFD Substructure Example 1	LRFD Substructure Example 1						
21	LRFD Substructure Example 2	LRFD Substructure Example 2			SR 4034	ERIE COUNTY	4034	FOUR MILE C
22	LRFD Substructure Example 3	LRFD Substructure Example 3						
23	LRFD Substructure Example 4	LRFD Substructure Example 4 (NHI Hammer Head)					-1	
24	Visual Reference 1	Visual Reference 1	Unknown	Unknown (P)	I-76	WAITSFIELD	I-76	MAD RIVER
25	Culvert Example 1	Culvert Example 1					STH60	
26	LFD Curved Guide Spec	LFD Curved Guide Spec Example					1	
27	MultiCell Box Examples	Multi Cell Box Examples					100	
28	Gusset Plate Example	Gusset Plate Example	Unknown			Some Highway		
29	Splice Example	Splice Example					-1	
30	Simple DL-Cont LL-Splice	Simple DL Splice	Unknown	Unknown (P)	N/A	N/A	-1	N/A
31	MetalCulvertExample1	MetalCulvertExample 1					1	

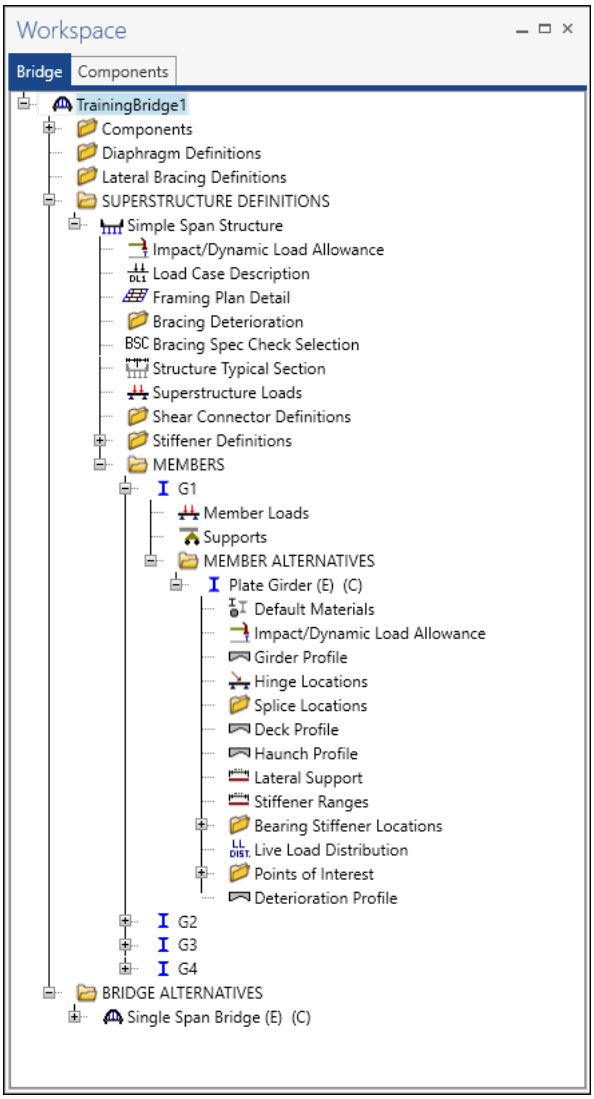
Open BrDR. From the Bridge Explorer select **TrainingBridge1 (BID 1)** and double click (or right click and select Open) to open it.

To evaluate a fatigue truck, the $ADTT_{SL}$ values need to be entered. To do this, double-click on **Training Bridge1** in the Bridge Workspace to open the **TrainingBridge1** window. Click on **Traffic** tab and enter the values as shown below:

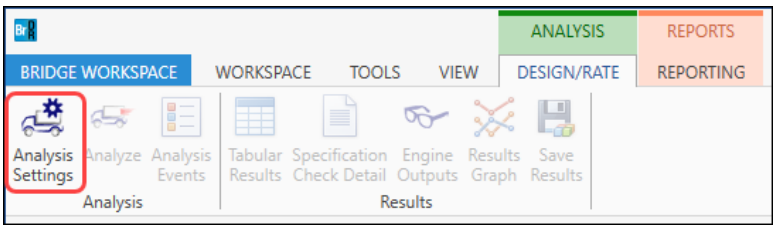


Click the **OK** button to save and close the window.

In the Bridge Workspace tree, expand the **Simple Span Structure** node located under **SUPERSTRUCTURE DEFINITIONS** by clicking on the + button. Expand the **MEMBERS, G1** and **Plate Girder (E) (C)** nodes as shown below:

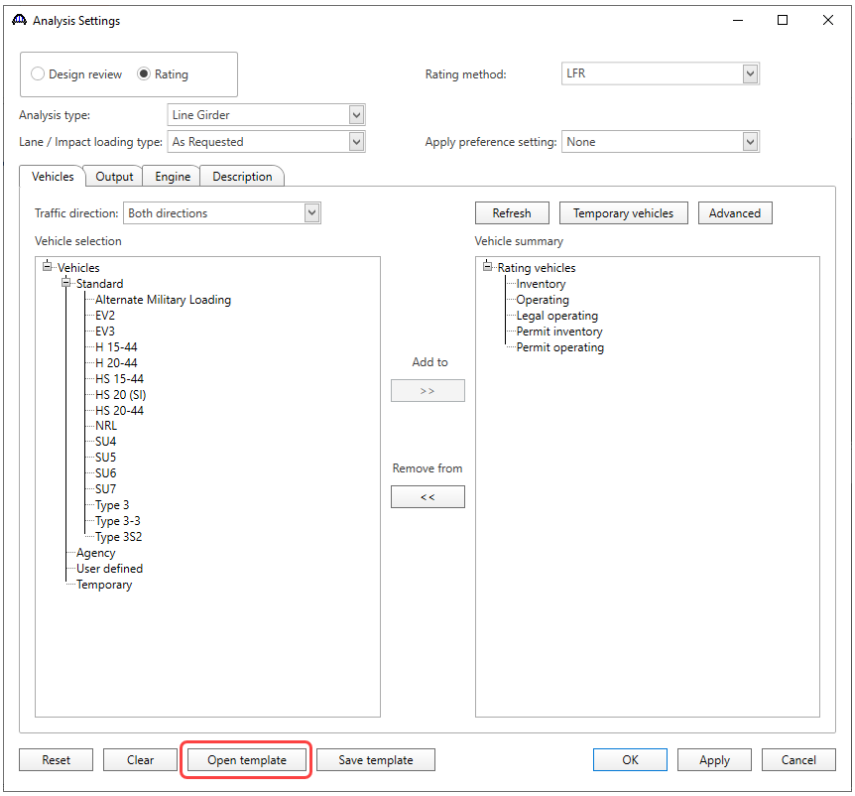


Select the member alternative **Plate Girder (E) (C)**, and then click on the **Analysis Settings** button located on the **Analysis** group of the **DESIGN/RATE** ribbon as shown below.



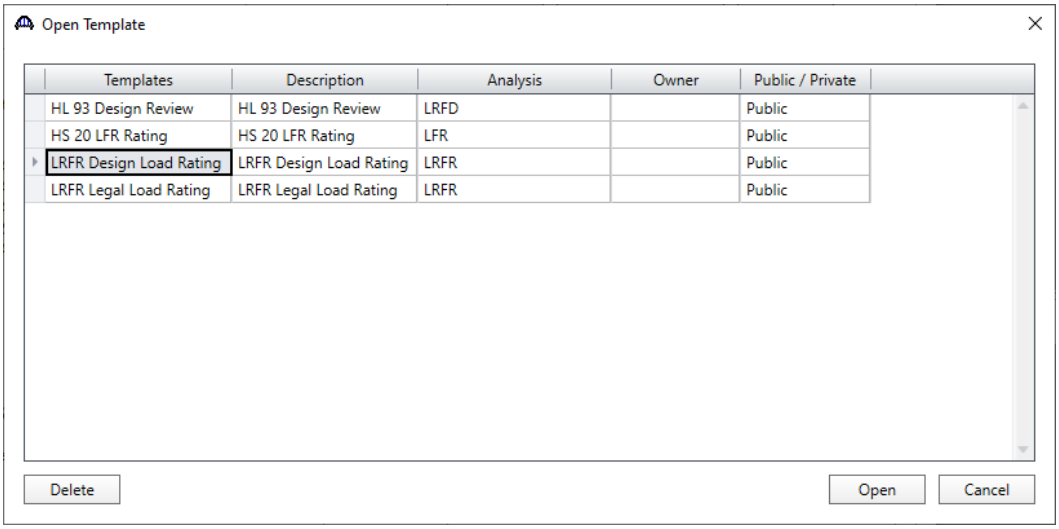
Analysis Settings

Click the **Open template** button in the **Analysis Settings** window as shown below.

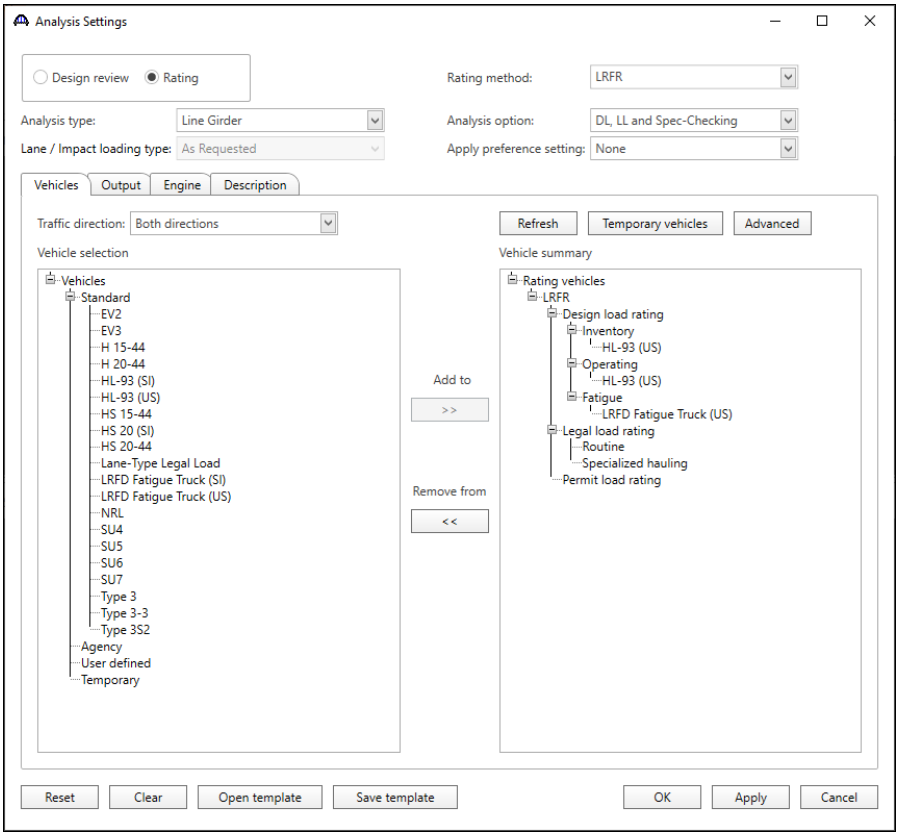


Open Template

Select the **LRFR Design Load Rating** template. Click **Open** to apply this template.

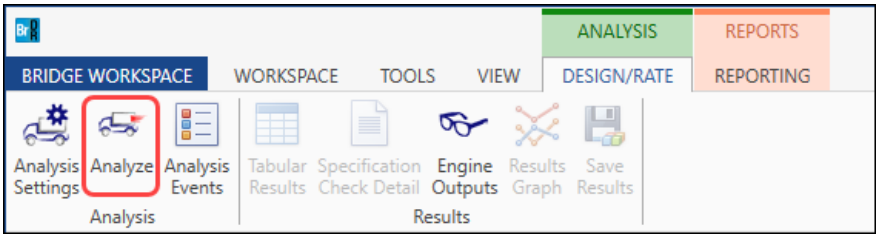


The **Analysis settings** window with the selected vehicles is shown below.



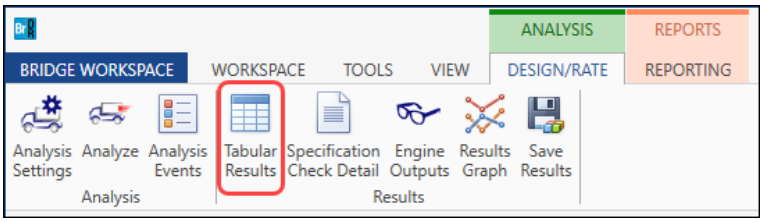
Click the **OK** button to save and close the **Analysis Settings** window.

To Analyze, click the **Analyze** button on the Analysis group of the **DESIGN/RATE** ribbon to start the rating process as shown below

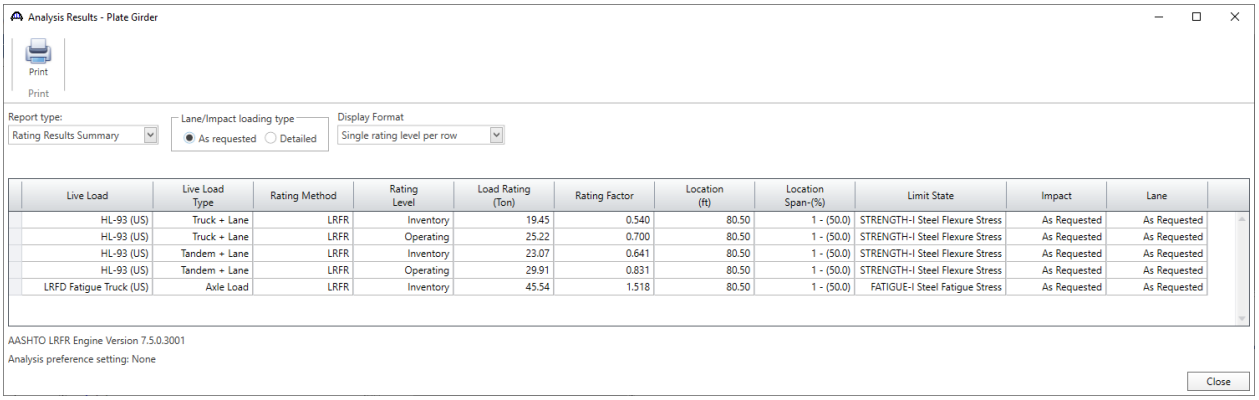


Tabular Results

Once the analysis is complete, click the **Tabular Results** button on the **Results** group of the **DESIGN/RATE** ribbon to review the results as shown below.

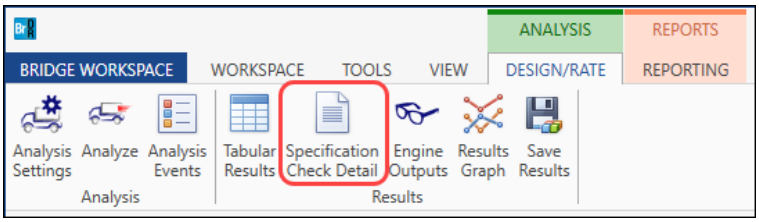


On the **Analysis Results** window select Display Format as **Single rating level per row** to display analysis results as shown below.

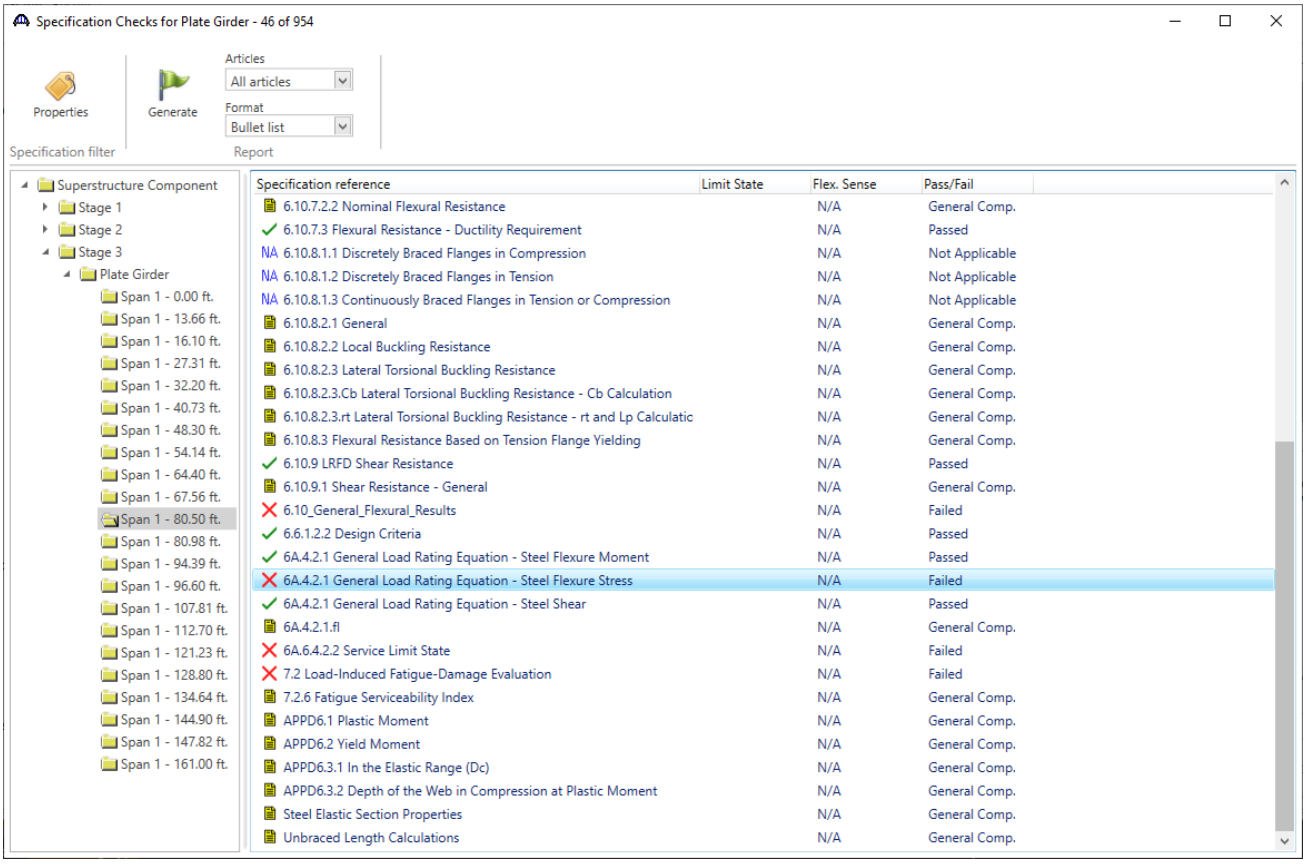


Specification Check Detail

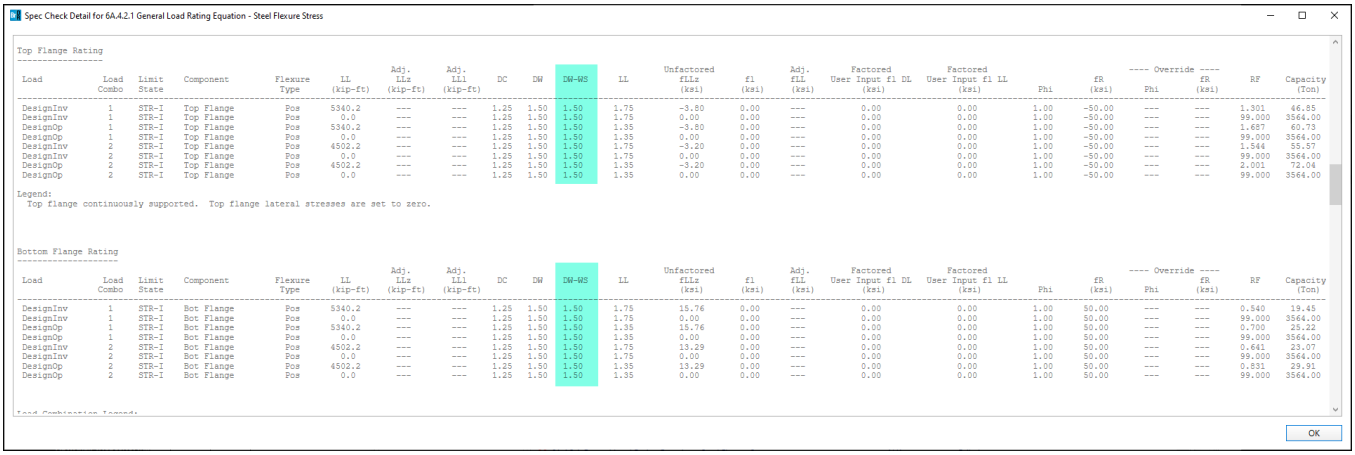
Select the **Specification Check Detail** button on the **Results** group of the **DESIGN/RATE** ribbon to open the **Specification Checks** window as shown below.



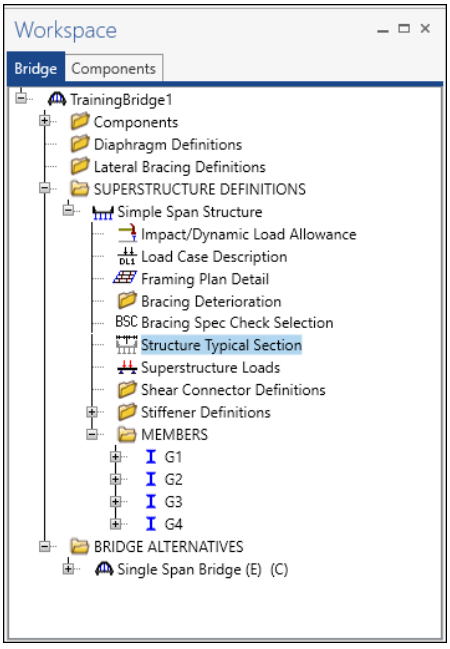
Expand **Stage 3** -> **Plate Girder** and select **Span 1 – 80.50 ft**. (midpoint of span 1). This displays a list of articles checked for this location. Select and open article **6A.4.2.1 General Load Rating Equation – Steel Flexure Stress** by double clicking on it.



This opens the spec check detail computation of the article. The Load Factors **DW-WS** is considered as 1.50 according to MBE Table 6A.4.2.2 -1.

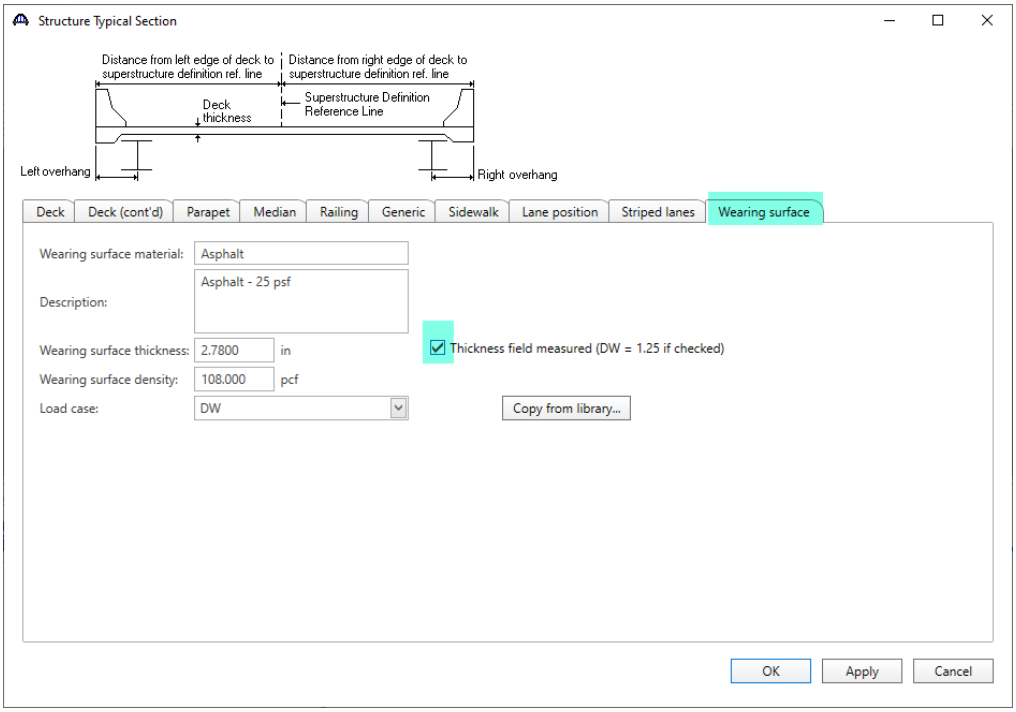


Close the article and the Specification Check Detail window. Again, navigate to the **SUPERSTRUCTURE DEFINITIONS** -> **Simple Span Structure**. Double click on the **Structure Typical Section** to open this window.



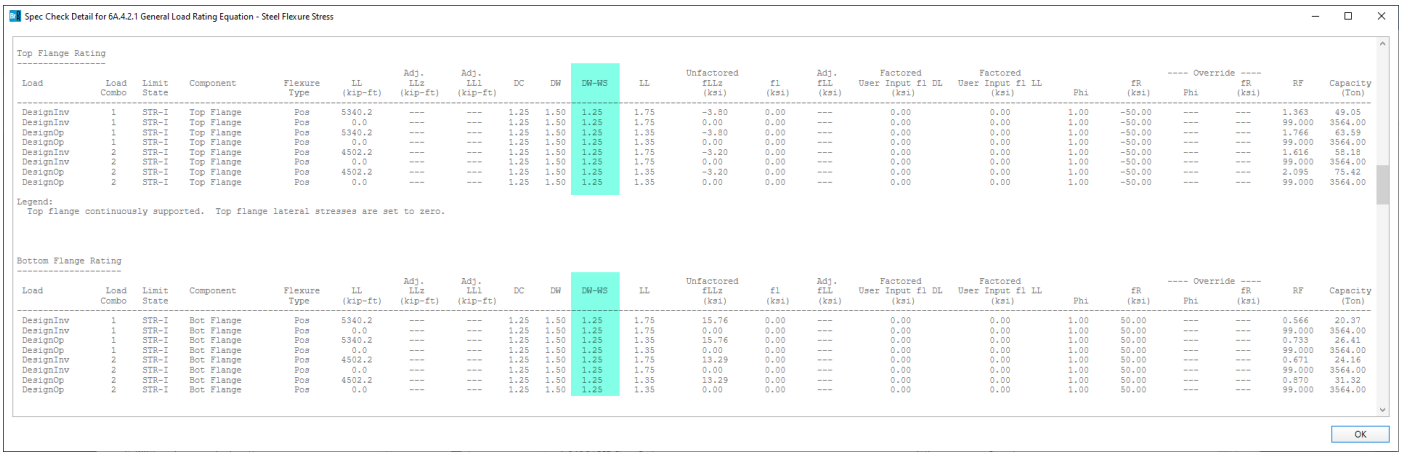
Structure Typical Section

On the **Structure Typical Section** window go to the **Wearing Surface** tab. Select field measured wearing surface thickness by checking the check box for **Thickness field Measured (DW = 1.25 if checked).** Click the **OK** button to save and close the **Structure Typical Section** window. Now rerun the analysis by clicking the **Analyze** button on the **Analysis** group of the **DESIGN/RATE** ribbon.



After the analysis is completed open the **Specification Checks** window by clicking on the **Specification Check Detail** button on the **Results** group of the **DESIGN/RATE** toolbar. From the spec articles list open spec article **6A.4.2.1 General Load Rating Equation – Steel Flexure Stress** for Stage 3, **Span 1 – 80.50ft.**

In this article the load factors for DW-WS are now taken as 1.25 according to MBE Table 6A.4.2.2-1 foot note point 3.



6A.4.2.2—Limit States

Strength is the primary limit state for load rating; service and fatigue limit states are selectively applied in accordance with the provisions of this Manual. Applicable limit states are summarized in Table 6A.4.2.2-1.

C6A.4.2.2

Service limit states that are relevant to load rating are discussed under the articles on resistance of structures (see Articles 6A.5, 6A.6, and 6A.7).

Table 6A.4.2.2-1—Limit States and Load Factors for Load Rating

Bridge Type	Limit State*	Dead Load γ_{DC}	Dead Load γ_{DW}	Design Load Inventory γ_{LL}	Design Load Operating γ_{LL}	Legal Load γ_{LL}	Permit Load γ_{LL}
Steel	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service II	1.00	1.00	1.30	1.00	1.30	1.00
	Fatigue	0.00	0.00	0.75	—	—	—
Reinforced Concrete	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service I	1.00	1.00	—	—	—	1.00
Prestressed Concrete	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1
	Service III	1.00	1.00	0.80	—	1.00	—
	Service I	1.00	1.00	—	—	—	1.00
Wood	Strength I	1.25	1.50	1.75	1.35	Tables 6A.4.4.2.3a-1 and 6A.4.4.2.3b-1	—
	Strength II	1.25	1.50	—	—	—	Table 6A.4.5.4.2a-1

* Defined in the *AASHTO LRFD Bridge Design Specifications*.

Notes:

- Shaded cells of the table indicate optional checks.
- Service I is used to check the 0.9 F_y stress limit in reinforcing steel.
- Load factor for DW at the strength limit state may be taken as 1.25 where thickness has been field measured.
- Fatigue limit state is checked using the LRFD fatigue truck (see Article 6A.6.4.1).

MBE Table 6A.4.2.2 -1.