Truss Tutorial

T6 – Truss Cross Sections and Graphics

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BrDR Tutorial

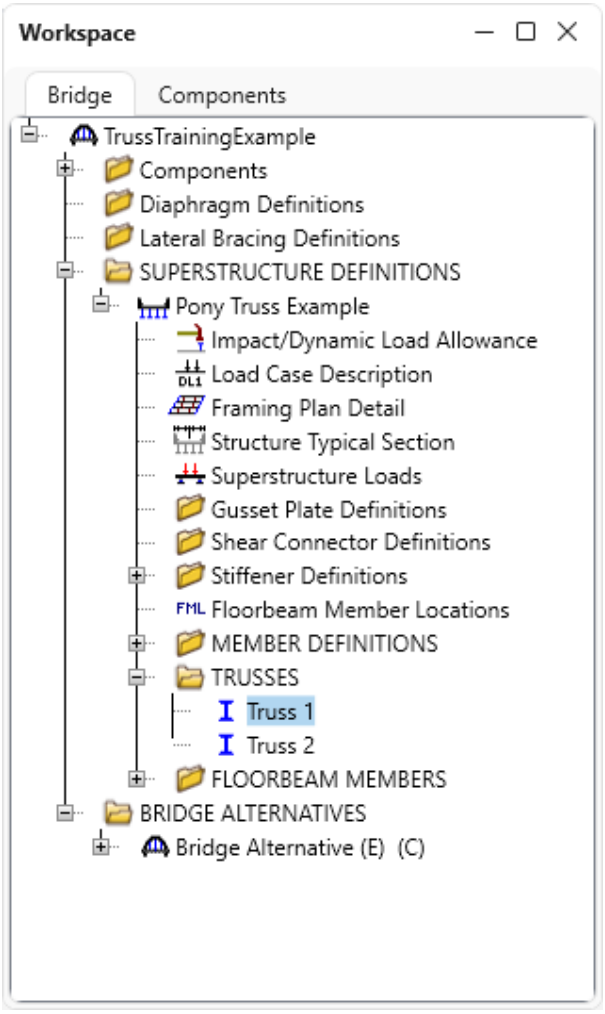
This example describes the definition of a Channelbox truss cross section with stacking plates on either side of channel webs and graphically viewing the truss cross sections.

Topics Covered

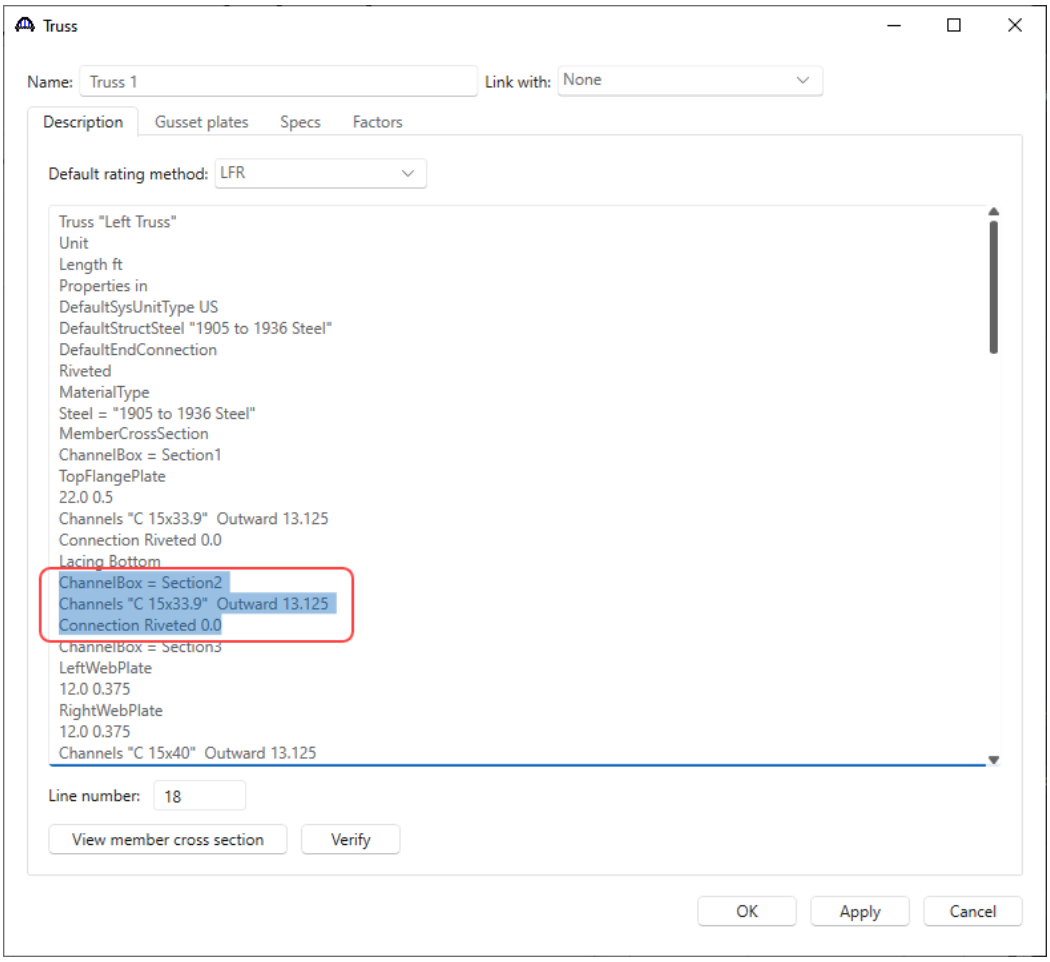
- Define Channelbox truss cross section with stacking plates on either side of channel webs
- View truss member cross section graphics from the Truss GUI
- LFR Analysis and Report

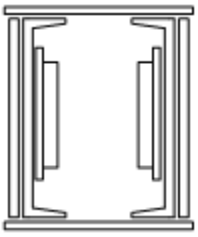
Define Channelbox truss cross section with stacking plates on either side of channel webs

From the **Bridge Explorer** double click on **BID 19 TrussTrainingExample** to open the bridge. Expand the **Pony Truss Example** superstructure definition, **TRUSSES**, and double click on the **Truss 1** node in the **Bridge Workspace** tree to open the **Truss** window as shown below.



Replace the commands for Section 2 with the lines below to define a Channelbox cross section with stacking plates on either side of channel webs.





ChannelBox = Section2

TopFlangePlate

14.5 0.5

BottomFlangePlate

14.5 0.5

LeftWebPlate

15.0 0.75

RightWebPlate

15.0 0.75

LeftWebPlate2

9.0 0.375

7.5 1.0

RightWebPlate2

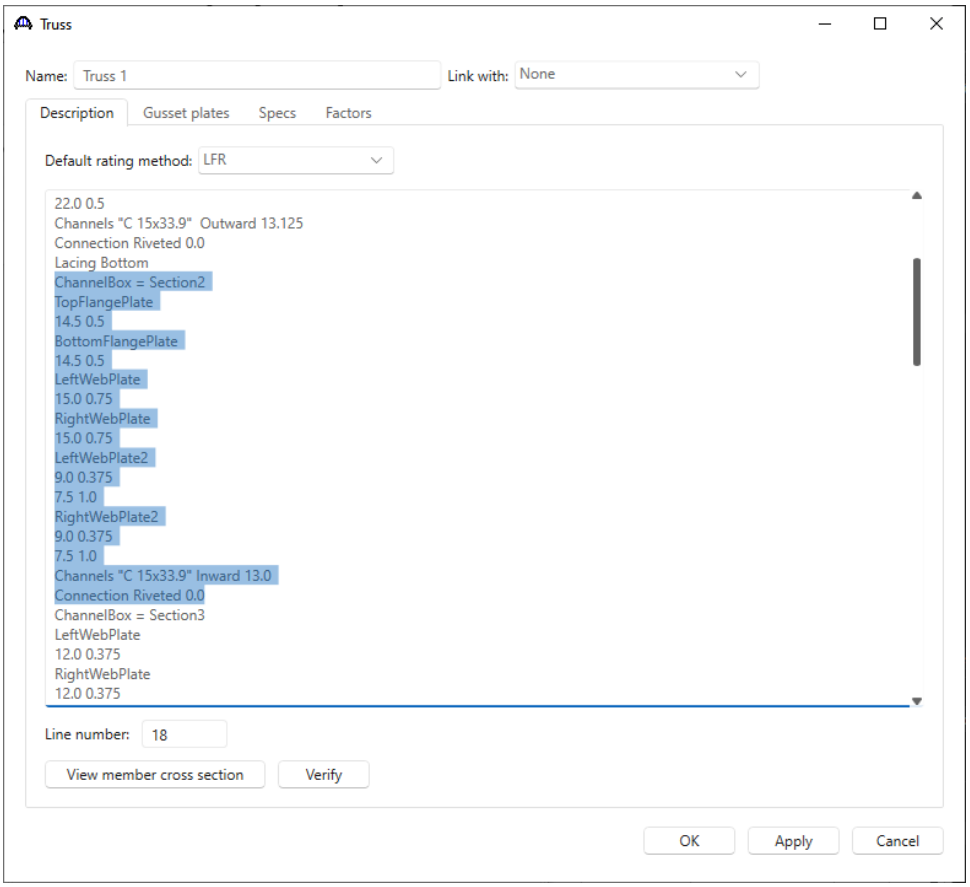
9.0 0.375

7.5 1.0

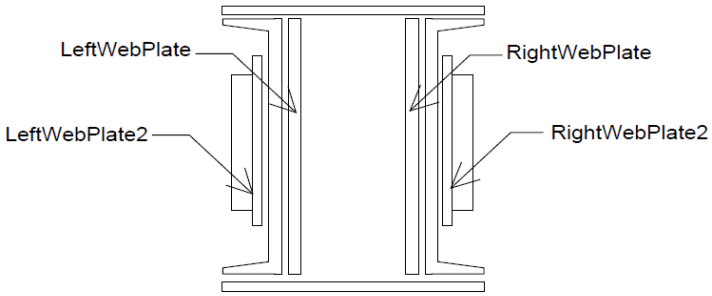
Channels "C 15x33.9" Inward 13.0

Connection Riveted 0.0

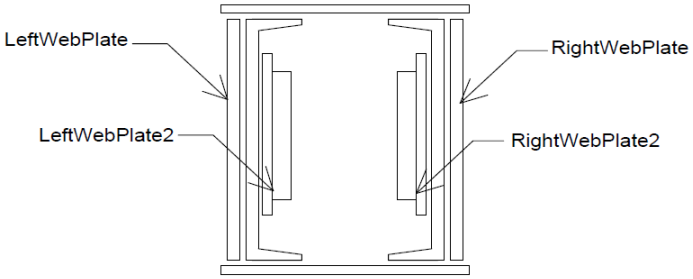
The Updated Truss window after replacing the Section 2 with the above Channelbox section is shown below.



The commands “LeftWebPlate2” and “RightWebPlate2” allow defining stacking web plates on either side of the channel web in the channelbox truss cross sections.

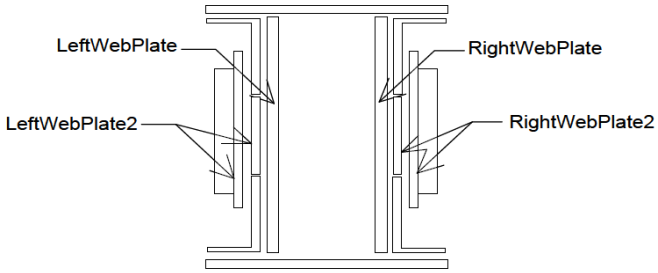


Channel Box w/
Channels Outward w/
Stacking Web Plates

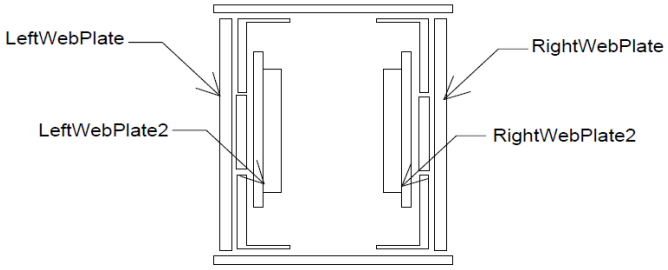


Channel Box w/
Channels Inward w/
Stacking Web Plates

Similarly, the same commands are available in the Anglebox command to define stacking web plates on either side of the angle legs.

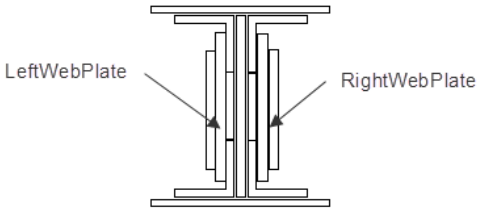


Angle Box w/ Angles Outward w/
Stacking Web Plates



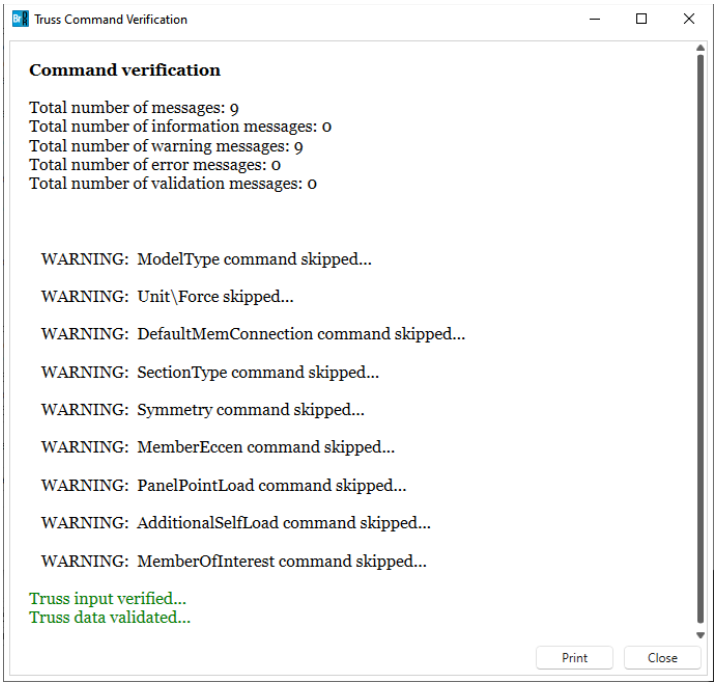
Angle Box w/ Angles Inward w/
Stacking Web Plates

For builtup sections, the “LeftWebPlate” and “RightWebPlate” commands are available to define stacking web plates on either side of main web plates.



Full I Section w/
Stacking Web Plates

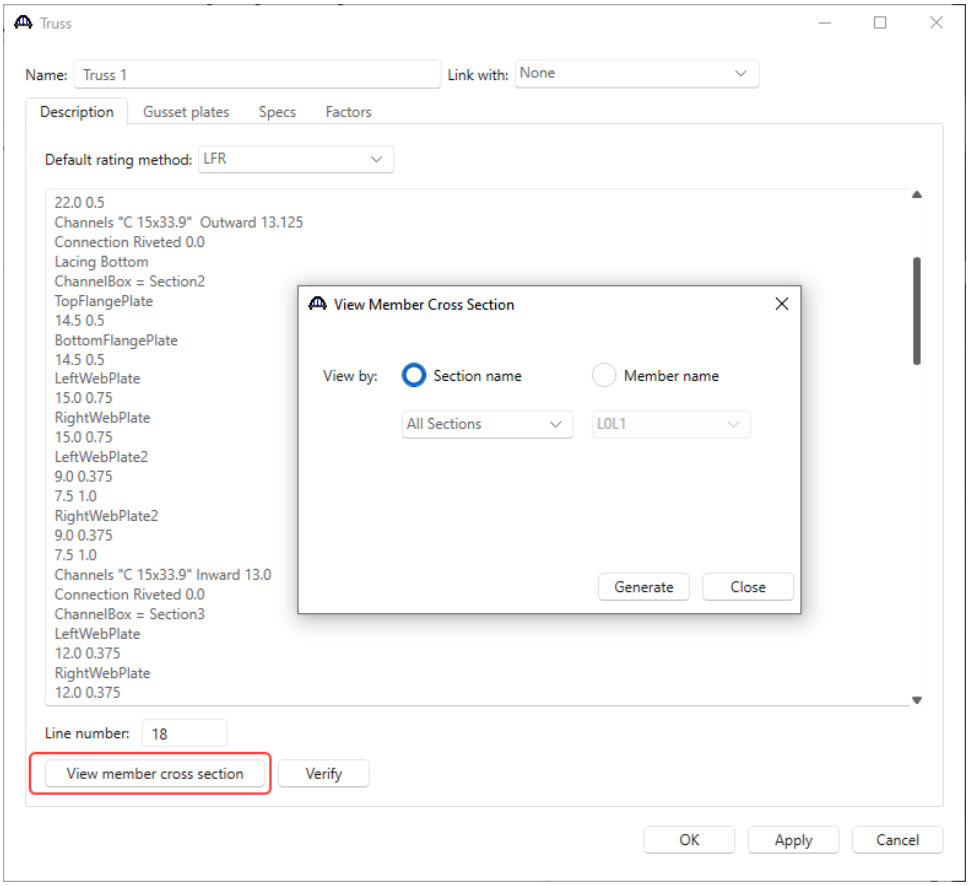
Click **Verify** button to verify the truss input commands. Below are the results of the verification as displayed in the **Truss Command Verification** window.



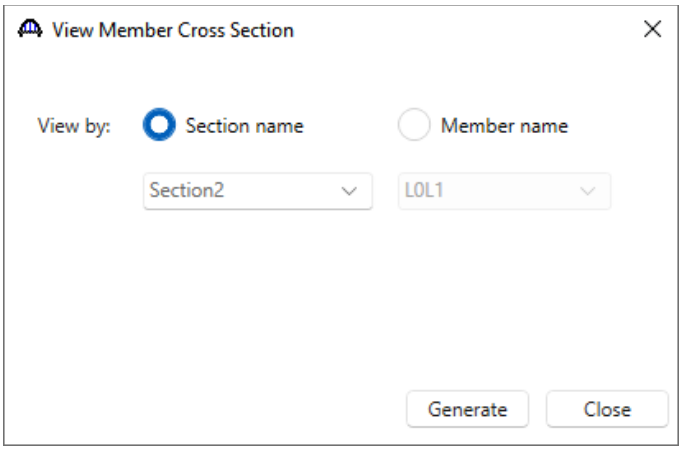
Close the **Truss Command Verification** window.

View truss member cross section graphics from Truss GUI and report

Click **View member cross section** button to open the window to generate the truss cross section graphics as shown below.



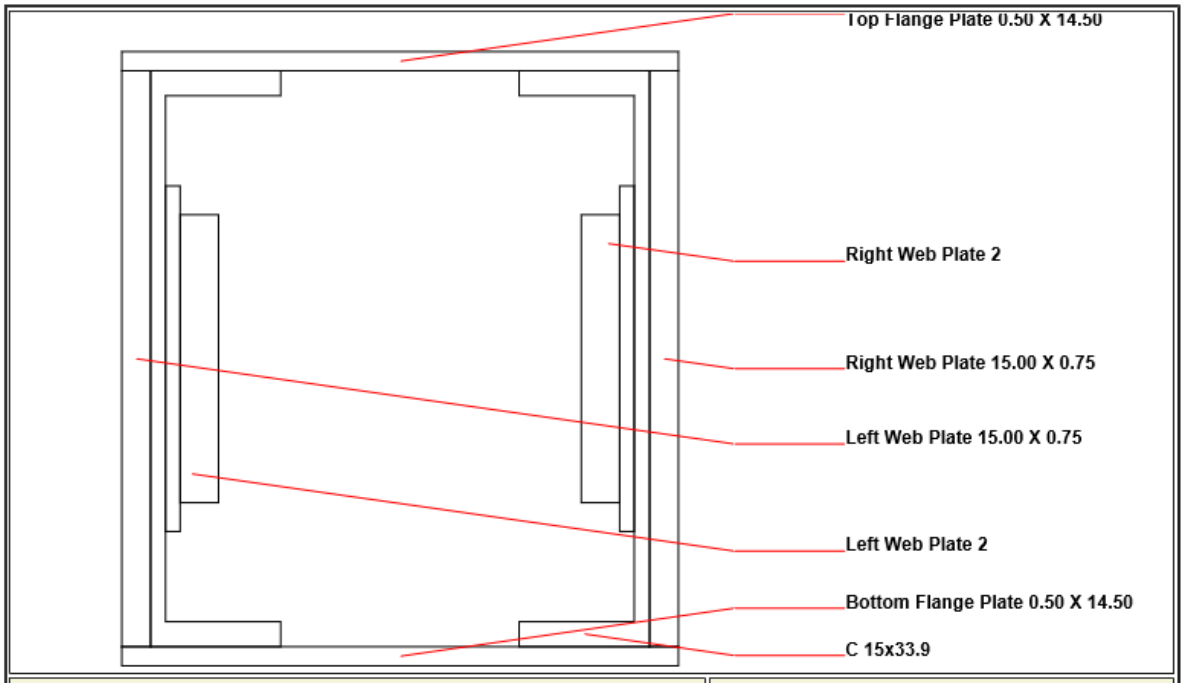
Select **Section2** in the **Section name** drop down list.



Click the **Generate** button. The graphical representation of **Section2** will be displayed as shown below.

Truss member name : Truss 1

Cross section name : Section2



Component	Dimension
Left Web plate2 1	9.00 X 0.38
Left Web plate2 2	7.50 X 1.00
Right Web plate2 1	9.00 X 0.38
Right Web plate2 2	7.50 X 1.00

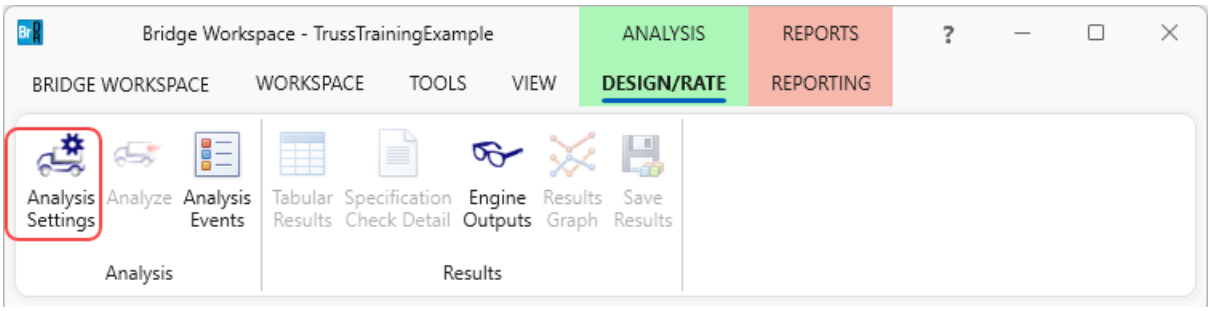
Note:
1. Left web plates 2 are listed from left to right
2. Right web plates 2 are listed from right to left

When **All Sections** in the **Section name** drop down list is selected, the graphic of each section will be displayed. Cross section graphics of a specific member can be generated by checking **Member Name** button, selecting the name of the member in the **Member name** drop down list and clicking **Generate** button.

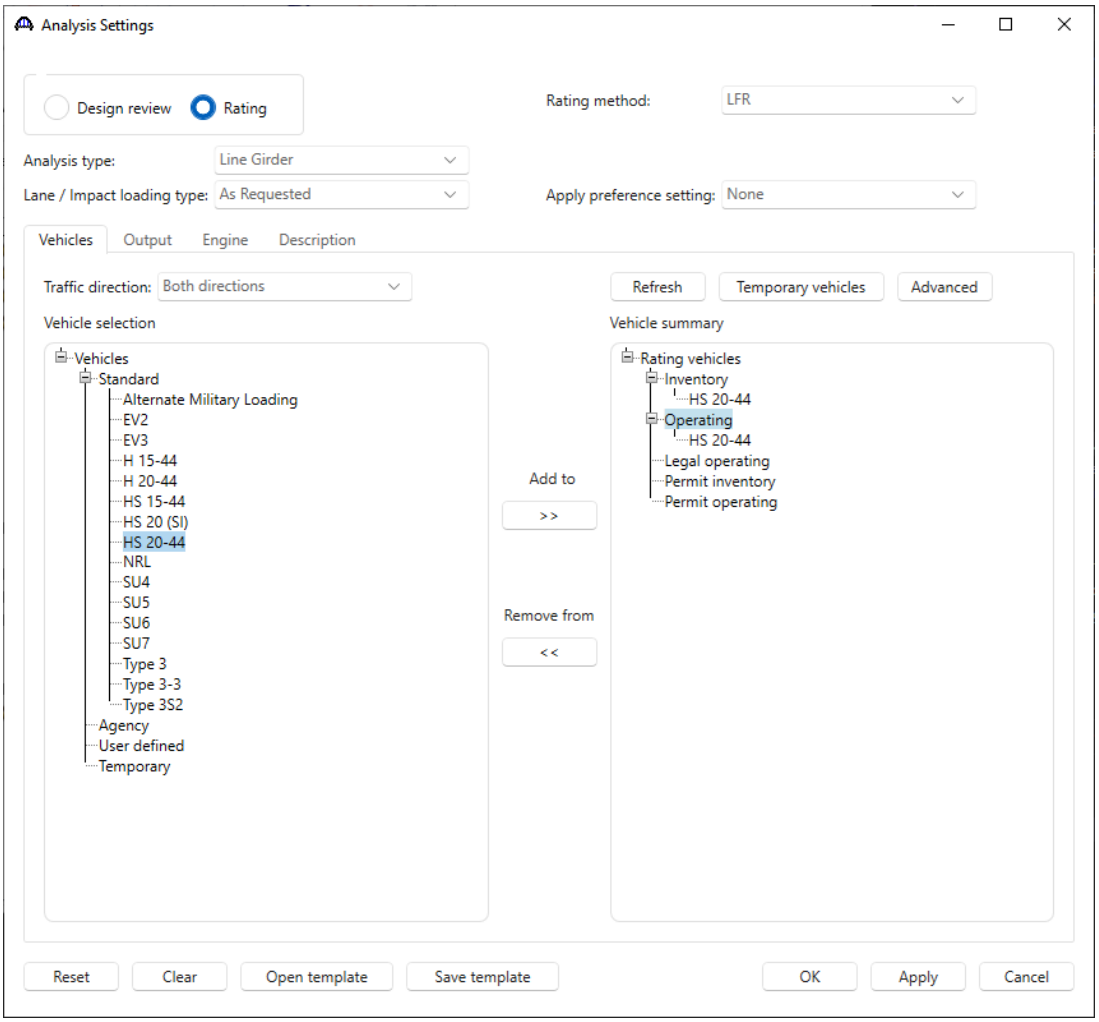
Close the **View Member Cross Section** window. Click the **OK** button in **Truss** window to apply the change of the cross section 2.

LFR Analysis and Report

To perform a rating on **Truss 1**, select **Truss 1** in the **Bridge Workspace** tree and click the **Analysis Settings** button on the **Analysis** group of the **DESIGN/RATE** ribbon. The window shown below opens.

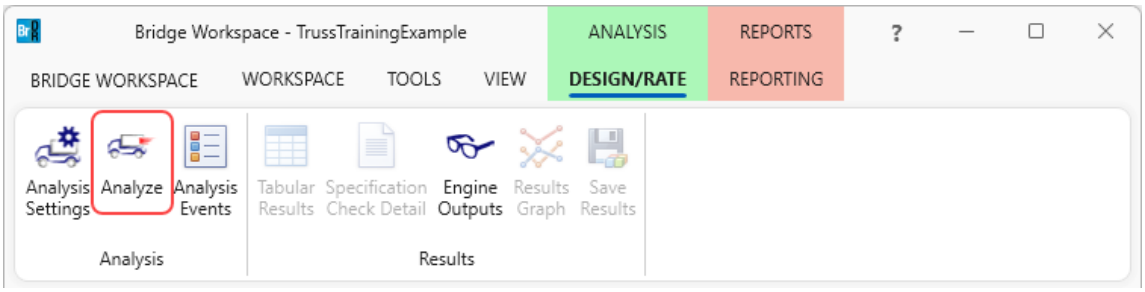


Select the vehicle **HS 20-44** under **Inventory** and **Operating** as shown below.



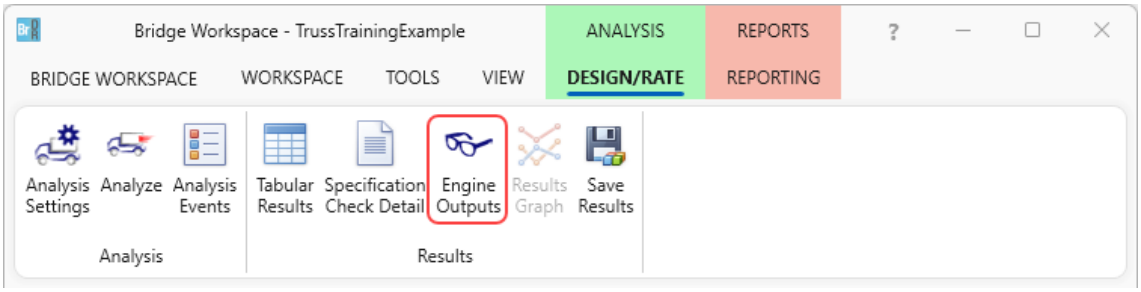
Click **OK** to apply the analysis settings and close the window.

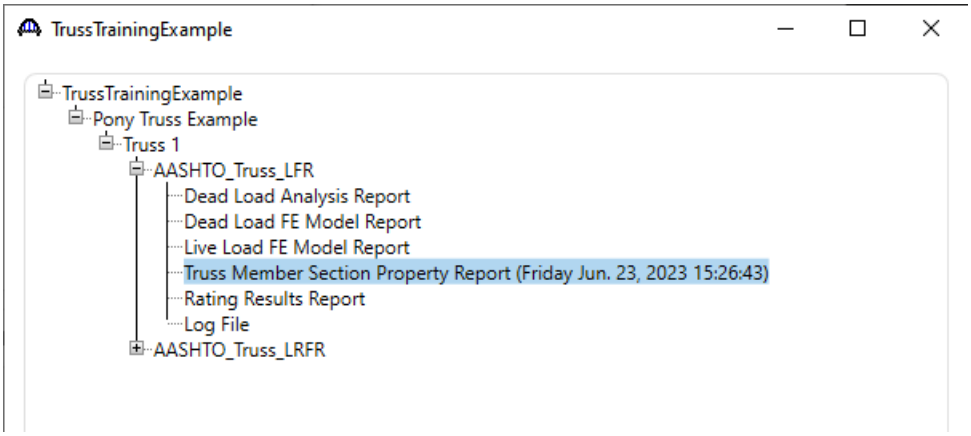
Select **Truss 1** in the **Bridge Workspace** tree and click the **Analyze** button from the **Analysis** group of the **DESIGN/RATE** ribbon to perform the rating.



Engine Outputs

After the rating analysis is completed, the output files can be viewed by clicking the **Engine Outputs** button on the **Results** group of the ribbon.



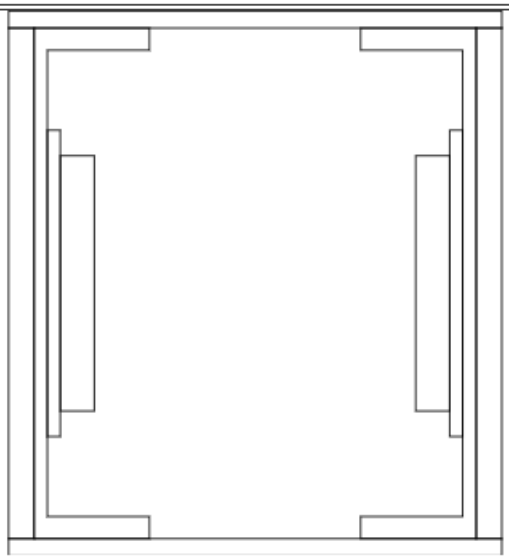


The **Truss Member Section Property Report** contains data related to the computed and user input truss member section properties. A portion of the **Truss Member Section Property Report** is shown below.

Detailed Section Property Calculations

Member: L0L1 - ChannelBox Section

Note:
1. Axis 1-1 is assumed at lowest fiber of bottom flange plate.
2. Y is measured from axis 1-1.
3. For channels facing outwards, axis 2-2 is assumed at back of left channel section.
4. For channels facing inwards, axis 2-2 is assumed at outermost fiber of leftmost web plate.
5. Z is measured from axis 2-2.



Component	Gross Area (in^2)	Y (in)	AY (in^3)	AY^2 (in^4)	Izz_{Self} (in^4)	Z (in)	AZ (in^3)	AZ^2 (in^4)	Iyy_{Self} (in^4)
Top Plate 1	7.25	15.75	114.19	1798.45	0.15	7.25	52.56	381.08	127.03
Left Web Plate 1	11.25	8.00	90.00	720.00	210.94	0.38	4.22	1.58	0.53
Right Web Plate 1	11.25	8.00	90.00	720.00	210.94	14.13	158.91	2244.55	0.53
Left Web Plate2 1	3.38	8.00	27.00	216.00	22.78	1.34	4.51	6.04	0.04
Left Web Plate2 2	7.50	8.00	60.00	480.00	35.16	2.03	15.19	30.76	0.63
Right Web Plate2 1	3.38	8.00	27.00	216.00	22.78	13.16	44.42	584.72	0.04
Right Web Plate2 2	7.50	8.00	60.00	480.00	35.16	12.48	93.56	1167.19	0.63

In the **Truss Member Section Property Report** , truss cross section graphics are displayed together with detailed section property calculations.