

AASHTOWare BrD/BrR 6.8

Steel Structures Tutorial

STL8 – Pin and Hanger Rolled Beam Example

Topics Covered

- Steel rolled beam with cover plates input as girder system.
- Schedule based input.
- Pin and hanger in center span

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

STL6 - Pin and Hanger

Bridge ID: STL6 - Pin and Han NBI Structure ID (8): STL6 Template Superstructures
 Bridge Completely Defined Culverts

Description Description (cont'd) Alternatives Global Reference Point Traffic Custom Agency Fields

Name: Pin and Hanger Year Built:

Description:

Location: Length: ft

Facility Carried (7): Route Number:

Feat. Intersected (6): Mi. Post:

Default Units: US Customary

AASHTOWare Association... BrR BrD BrM OK Apply Cancel

Close the window by clicking Ok. This saves the data to memory and closed the window.

STL8 - Pin and Hanger Rolled Beam Example

To enter the materials to be used by members of the bridge, expand the tree for Materials. To add a new structural steel material, click on Structural Steel in the tree and select File/New from the menu (or right mouse click on Structural Steel and select New). The window shown below will open.

Bridge Materials - Structural Steel

Name: Description:

Material Properties

Specified minimum yield strength (Fy) = ksi

Specified minimum tensile strength (Fu) = ksi

Coefficient of thermal expansion = 1/F

Density = kcf

Modulus of elasticity (E) = ksi

Copy To Library... Copy from Library... OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

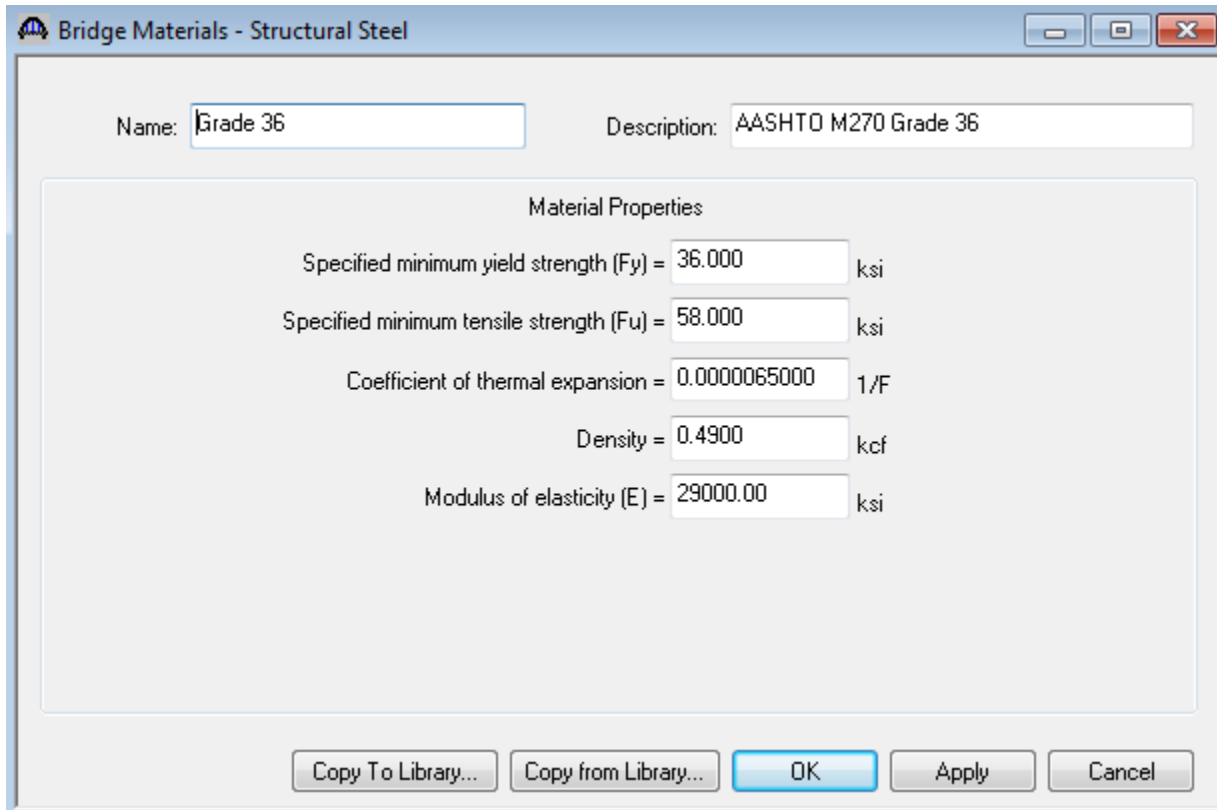
Add a structural steel material by selecting from the Structural Steel Materials Library by clicking the Copy from Library button.

Name	Description	Library	Units	Fy	Fu	alpha	Density/ Unit Load	Modulus of Elasticity
ASTM A588 - <= 4", Fy = 50 ksi	ASTM A588	Standar	US Cus	50.000	70.000	0.0000	0.4900	29000.00
ASTM A588 - > 4" to 5" incl.	ASTM A 588	Standar	US Cus	46.000	67.000	0.0000	0.4900	29000.00
ASTM A588 - > 5" to 8" incl.	ASTM A 588	Standar	US Cus	42.000	63.000	0.0000	0.4900	29000.00
ASTM A94 - <= 1 1/8"	ASTM A 94	Standar	US Cus	50.000	75.000	0.0000	0.4900	29000.00
ASTM A94 - over 1 1/8" to 2" incl.	ASTM A 94	Standar	US Cus	47.000	72.000	0.0000	0.4900	29000.00
Grade 100 - > 2.5" to 4" incl.	AASHTO M2	Standar	US Cus	90.000	100.00	0.0000	0.4900	29000.00
Grade 100 <= 2.5"	AASHTO M2	Standar	US Cus	100.00	110.00	0.0000	0.4900	29000.00
Grade 100W - > 2.5" to 4" incl.	AASHTO M2	Standar	US Cus	90.000	100.00	0.0000	0.4900	29000.00
Grade 100W <= 2.5"	AASHTO M2	Standar	US Cus	100.00	110.00	0.0000	0.4900	29000.00
Grade 250	AASHTO M2	Standar	SI / Met	250.00	400.00	0.0000	7849.000	199948.00
Grade 345	AASHTO M2	Standar	SI / Met	345.00	450.00	0.0000	7849.000	199948.00
Grade 345W	AASHTO M2	Standar	SI / Met	345.00	485.00	0.0000	7849.000	199948.00
Grade 36	AASHTO M2	Standar	US Cus	36.000	58.000	0.0000	0.4900	29000.00
Grade 485W	AASHTO M2	Standar	SI / Met	485.00	620.00	0.0000	7849.000	199948.00
Grade 50	AASHTO M2	Standar	US Cus	50.000	65.000	0.0000	0.4900	29000.00
Grade 50W	AASHTO M2	Standar	US Cus	50.000	70.000	0.0000	0.4900	29000.00
Grade 690 - > 65 to 100 incl.	AASHTO M2	Standar	SI / Met	620.00	690.00	0.0000	7849.000	199947.95
Grade 690 <= 65 mm	AASHTO M2	Standar	SI / Met	690.00	760.00	0.0000	7849.000	199948.00
Grade 690W - > 65 to 100 incl.	AASHTO M2	Standar	SI / Met	620.00	690.00	0.0000	7849.000	199947.95
Grade 690W <= 65 mm	AASHTO M2	Standar	SI / Met	690.00	760.00	0.0000	7849.000	199948.00
Grade 70W	AASHTO M2	Standar	US Cus	70.000	90.000	0.0000	0.4900	29000.00
Prior to 1905	Built prior to	Standar	US Cus	26.000	52.000	0.0000	0.4900	29000.00

Select the Grade 36 material and click Ok.

STL8 - Pin and Hanger Rolled Beam Example

The selected material properties are copied to the Bridge Materials – Structural Steel window as shown below.



The image shows a software dialog box titled "Bridge Materials - Structural Steel". It contains the following fields and values:

- Name: Grade 36
- Description: AASHTO M270 Grade 36
- Material Properties section:
 - Specified minimum yield strength (Fy) = 36.000 ksi
 - Specified minimum tensile strength (Fu) = 58.000 ksi
 - Coefficient of thermal expansion = 0.0000065000 1/F
 - Density = 0.4900 kcf
 - Modulus of elasticity (E) = 29000.00 ksi

At the bottom of the dialog box, there are five buttons: "Copy To Library...", "Copy from Library...", "OK", "Apply", and "Cancel".

STL8 - Pin and Hanger Rolled Beam Example

Add a concrete material using the same techniques. The window will look like this:

Bridge Materials - Concrete

Name: Description:

Compressive strength at 28 days (f'c) = ksi

Initial compressive strength (f'ci) = ksi

Coefficient of thermal expansion = 1/F

Density (for dead loads) = kcf

Density (for modulus of elasticity) = kcf

Std Modulus of elasticity (Ec) = ksi

LRFD Modulus of elasticity (Ec) = ksi

Std Initial modulus of elasticity = ksi

LRFD Initial modulus of elasticity = ksi

Poisson's ratio =

Composition of concrete =

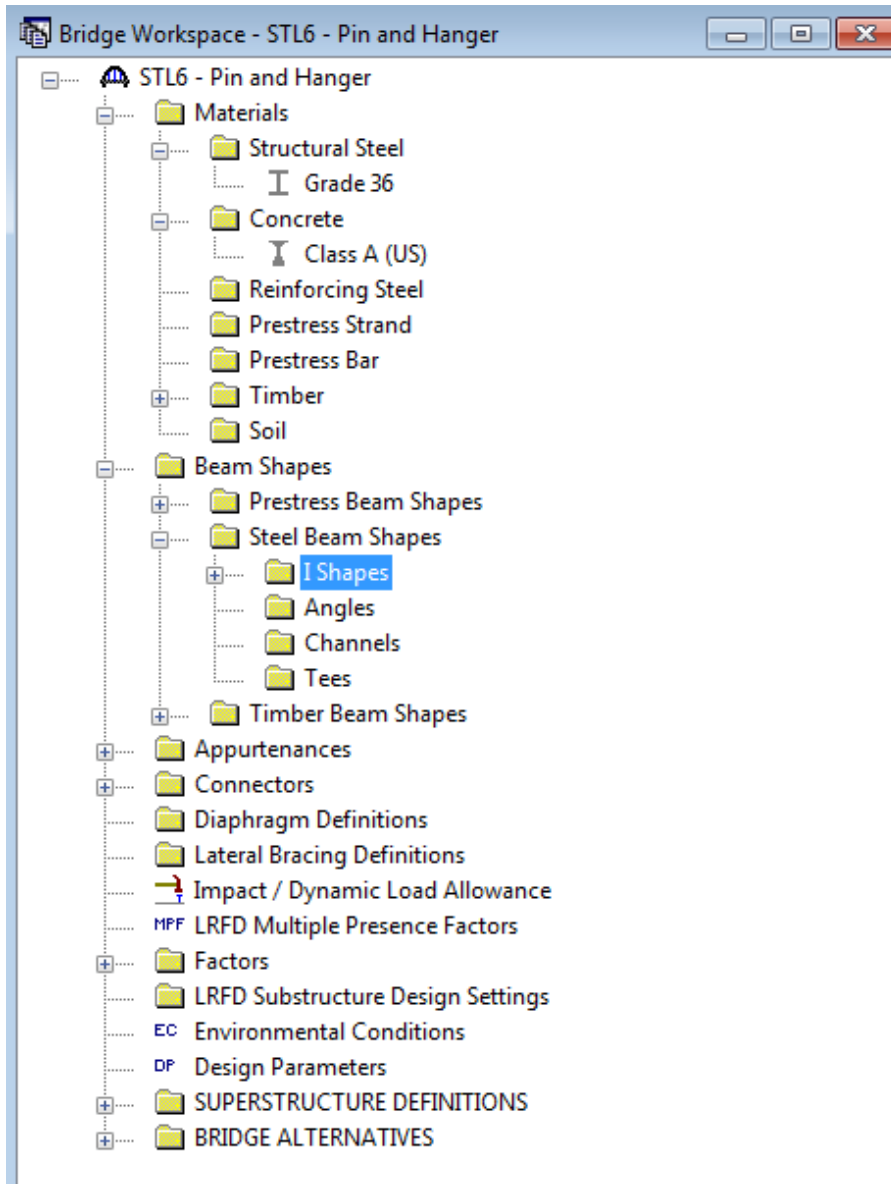
Modulus of rupture = ksi

Shear factor =

Splitting tensile strength (fct) = ksi

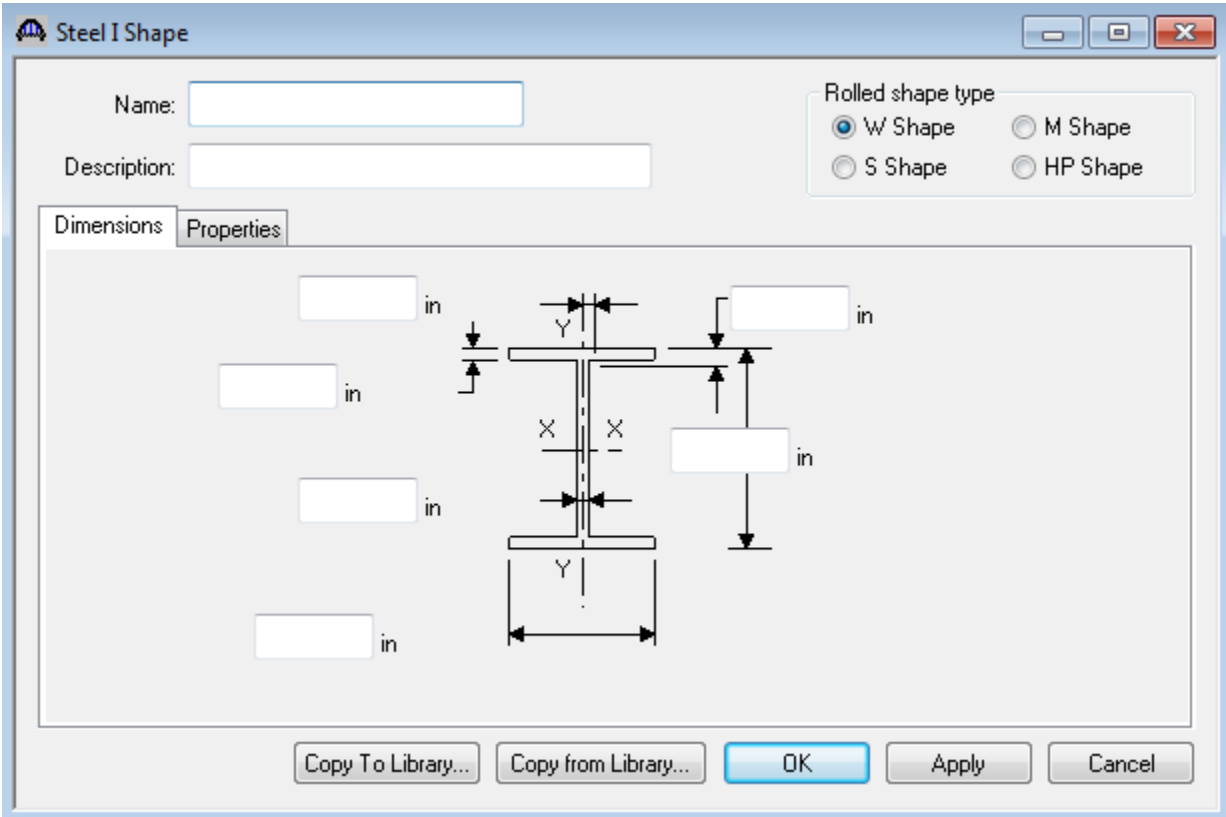
STL8 - Pin and Hanger Rolled Beam Example

To enter a steel rolled beam shape to be used in this bridge expand the tree labeled Beam Shapes as shown below:



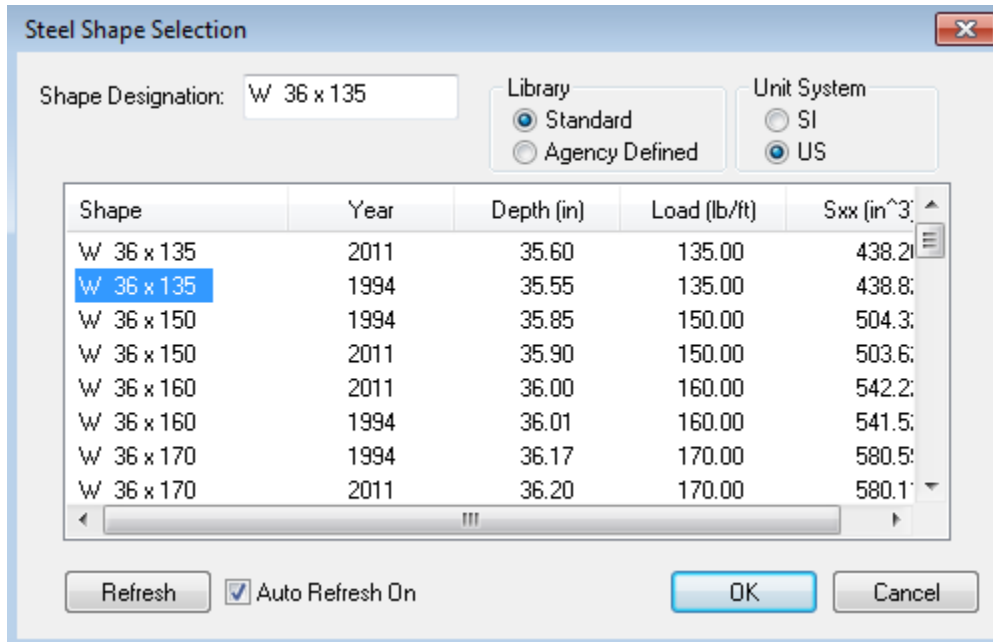
STL8 - Pin and Hanger Rolled Beam Example

Click on I Shapes in the tree and select File/New from the menu (or double click on I Shapes in the tree). The window shown below will open.



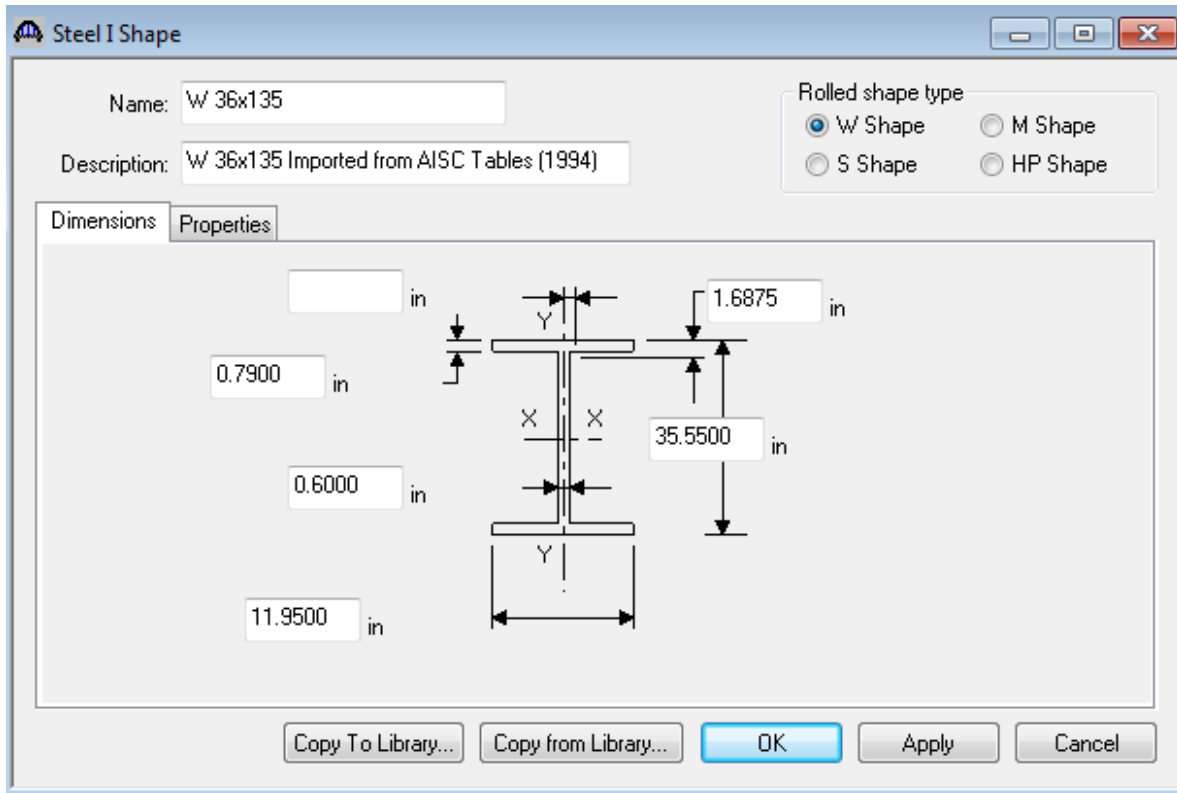
STL8 - Pin and Hanger Rolled Beam Example

Select the Rolled Shape Type as W Shape and click on the copy from Library button. The Steel Shape Selection window will appear. This window displays all of the steel shapes available in the library. The list can be sorted by clicking on the Depth, Weight or Sxx column headers. Enter "W36" in the Shape Designation field and the list of steel shapes shown in the window will filter to show the W36 shapes. Select W36x135 and click Ok.



STL8 - Pin and Hanger Rolled Beam Example

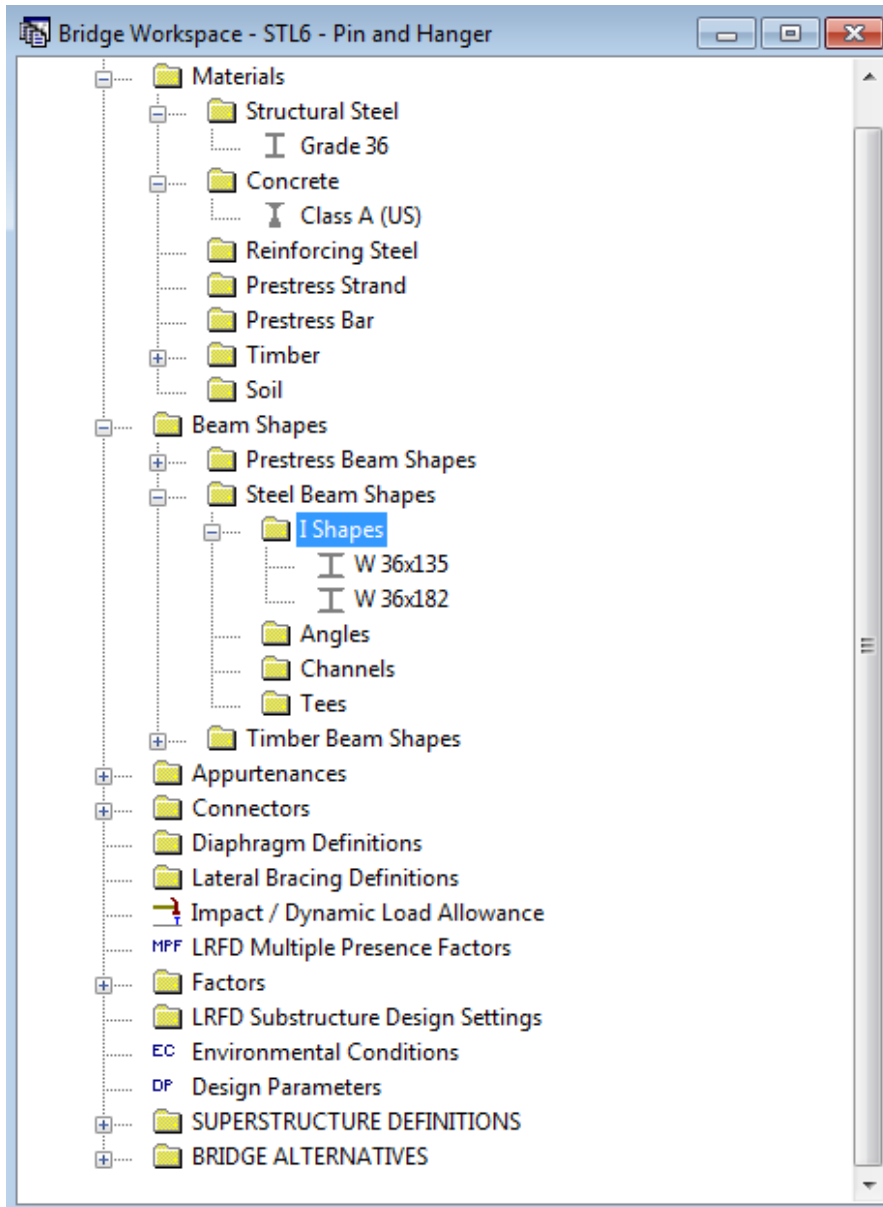
The beam properties are copied to the Steel I Shape window as shown below.



Follow the same procedure to copy a W36x182 shape from the library.

STL8 - Pin and Hanger Rolled Beam Example

A partially expanded Bridge Workspace is shown below.



STL8 - Pin and Hanger Rolled Beam Example

To enter the appurtenances to be used within the bridge expand the tree branch labeled Appurtenances. To define the brush block curb, double click on Generic in the tree. Enter the following details and click Ok to save the data to memory and close the window.

Bridge Appurtenances - Generic

Name:

Description:

All dimensions are in inches

Distance from edge to centroid =

Reference Line →

Barrier load = kip/ft

Width =

Effective wind height =

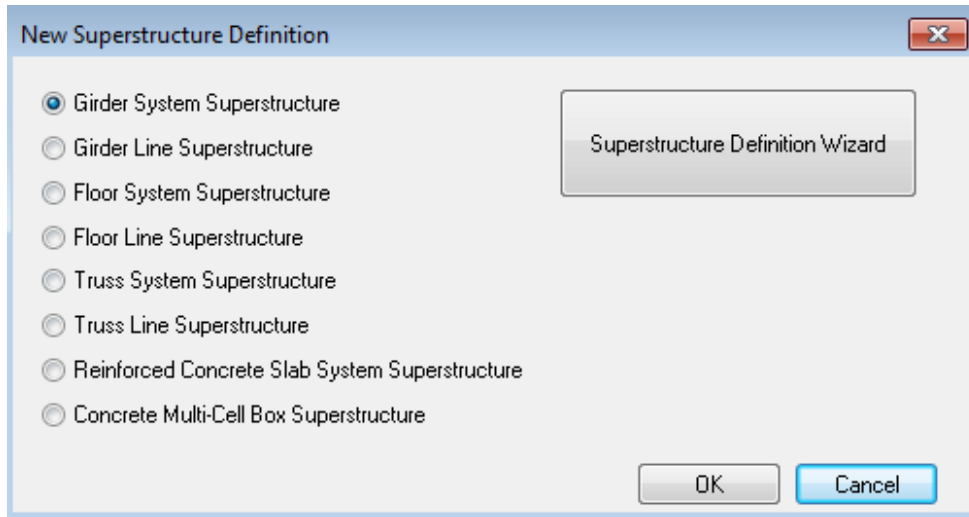
Generic Shape

Back Front

We will come back to Bridge Alternatives after entering a Structure Definition.

STL8 - Pin and Hanger Rolled Beam Example

Double click on SUPERSTRUCTURE DEFINITIONS (or click on SUPERSTRUCTURE DEFINITIONS and select File/New from the menu or right mouse click on SUPERSTRUCTURE DEFINITIONS and select New from the popup menu) to create a new structure definition. The dialog shown below will appear.



STL8 - Pin and Hanger Rolled Beam Example

Select Girder System, click Ok and the Superstructure Definition window will open. Enter the appropriate data as shown below:

Girder System Superstructure Definition

Definition Analysis Specs Engine

Name: Girder System

Description:

Default Units: US Customary

Number of spans: 3

Number of girders: 5

Enter Span Lengths Along the Reference Line:

Span	Length (ft)
1	40.00
2	82.00
3	40.00

Frame Structure Simplified Definition:

Deck type: Concrete

For PS only

Average humidity: 0 %

Member Alt. Types

- Steel
- P/S
- R/C
- Timber

Horizontal Curvature Along Reference Line

Horizontal curvature

Superstructure Alignment

- Curved
- Tangent, curved, tangent
- Tangent, curved
- Curved, tangent

Distance from PC to first support line: 0 ft

Start tangent length: 0 ft

Radius: 0 ft

Direction: Left

End tangent length: 0 ft

Distance from last support line to PT: 0 ft

Design speed: 0 mph

Superelevation: 0 %

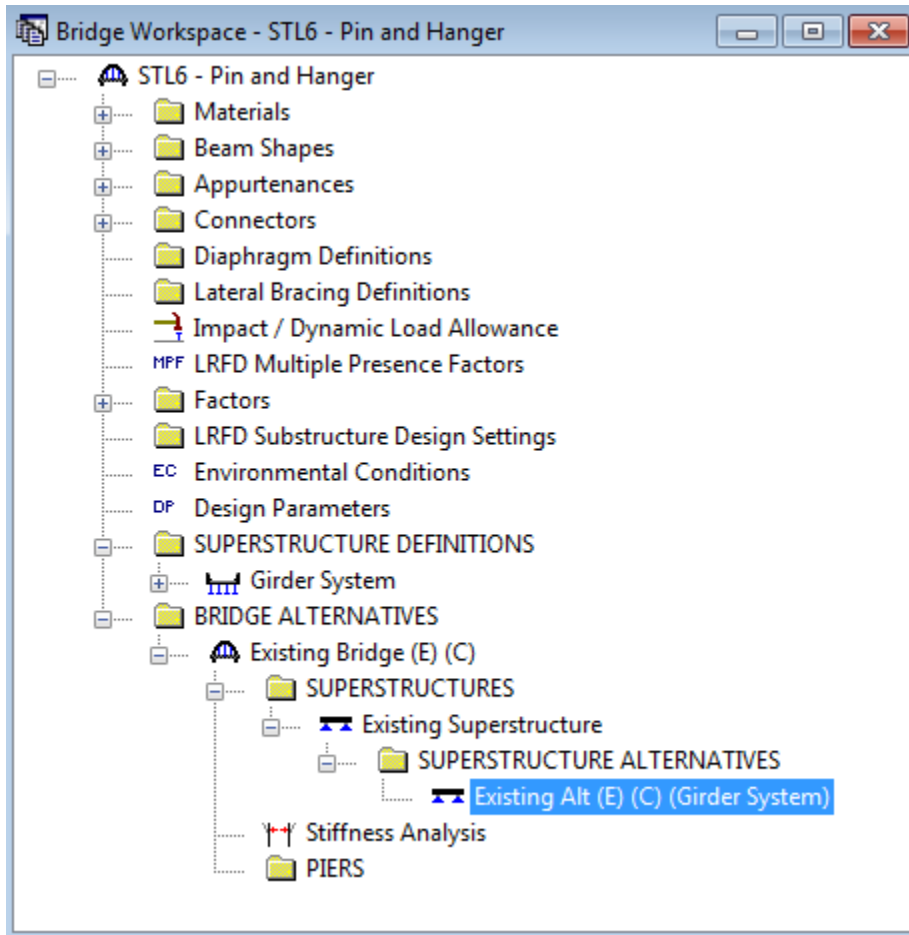
OK Apply Cancel

Click on Ok to save the data to memory and close the window.

STL8 - Pin and Hanger Rolled Beam Example

We now go back to the Bridge Alternatives and create a new Bridge Alternative, a new Superstructure, and a new Superstructure Alternative as we did previously.

The partially expanded Bridge Workspace tree showing these alternatives is shown below:



STL8 - Pin and Hanger Rolled Beam Example

Click Load Case Description to define the dead load cases. Use the “Add Default Load Case Descriptions” button to populate the window as shown below.

Load Case Name	Description	Stage	Type	Time* (Days)
DC1	DC acting o	Non-composite (Stage 1)	D,DC	
DC2	DC acting o	Composite (long term) (Stage 2)	D,DC	
DW	DW acting	Composite (long term) (Stage 2)	D,DW	
SIP Forms	Weight due	Non-composite (Stage 1)	D,DC	

*Prestressed members only

Add Default Load Case Descriptions

New Duplicate Delete

OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

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

Structure Framing Plan Details

Number of spans = 3 Number of girders = 5

Layout Diaphragms Lateral Bracing Ranges

Girder Spacing Orientation

- Perpendicular to girder
- Along support

Support	Skew (Degrees)
1	0.0000
2	0.0000
3	0.0000
4	0.0000

Girder Bay	Girder Spacing (ft)	
	Start of Girder	End of Girder
1	8.75	8.75
2	8.75	8.75
3	8.75	8.75
4	8.75	8.75

OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

Click the Apply button to save this data to memory and switch to the Diaphragms tab to enter diaphragm spacing. Enter the following diaphragms for Girder Bay 1.

Structure Framing Plan Details

Number of spans = 3 Number of girders = 5

Layout Diaphragms Lateral Bracing Ranges

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	0.325	-- Not Assigned --
1	0.00	0.00	20.00	1	20.00	20.00	20.00	0.220	-- Not Assigned --
1	20.00	20.00	20.00	1	20.00	40.00	40.00	0.325	-- Not Assigned --
2	0.00	0.00	5.25	1	5.25	5.25	5.25	0.220	-- Not Assigned --
2	5.25	5.25	2.00	1	2.00	7.25	7.25	0.220	-- Not Assigned --
2	7.25	7.25	16.88	4	67.50	74.75	74.75	0.220	-- Not Assigned --
2	74.75	74.75	2.00	1	2.00	76.75	76.75	0.220	-- Not Assigned --
2	76.75	76.75	5.25	1	5.25	82.00	82.00	0.325	-- Not Assigned --
3	0.00	0.00	20.00	1	20.00	20.00	20.00	0.220	-- Not Assigned --
3	20.00	20.00	20.00	1	20.00	40.00	40.00	0.325	-- Not Assigned --

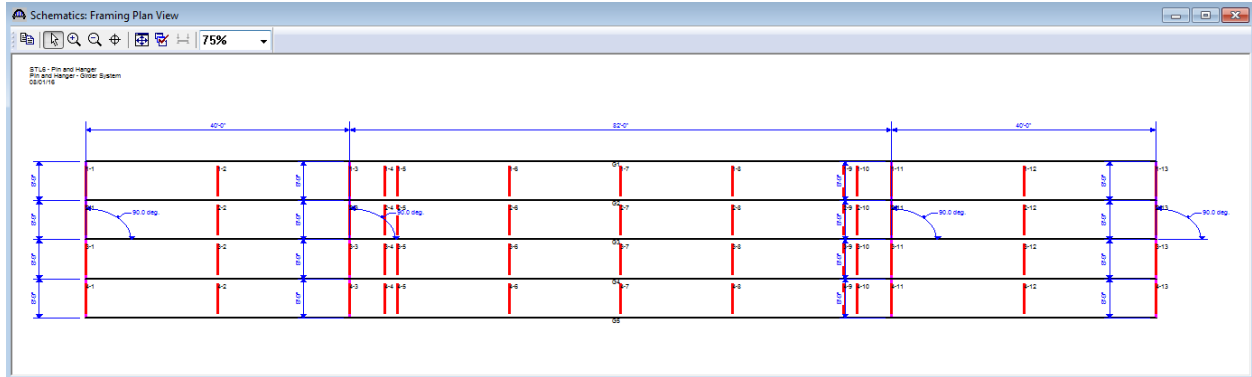
New Duplicate Delete

OK Apply Cancel

Click the Apply button to save this data to memory. Click the “Copy Bay To...” button, select bay 2 and click the Apply button. Click the Apply button to apply the data for bay2 to memory. Click the “Copy Bay To ...” button again, select bay3 and click the Apply button. Click the Apply button to apply the data for bay 3 to memory. Follow this process to copy the diaphragm data to bay 4. Click Ok to save this data to memory and close the window.

STL8 - Pin and Hanger Rolled Beam Example

While “Framing Plan Detail” is selected in the BWS tree, select the View Schematic toolbar button . The following schematic will be displayed.



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.

STL8 - Pin and Hanger Rolled Beam Example

Basic deck geometry:

The screenshot shows a software dialog box titled "Structure Typical Section" with a tabbed interface. The "Deck" tab is selected. At the top, a diagram illustrates the deck geometry with 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", and "Right overhang". Below the diagram is a table of input fields for these parameters.

Parameter	Start	End
Distance from left edge of deck to superstructure definition reference line =	20.00 ft	20.00 ft
Distance from right edge of deck to superstructure definition reference line =	20.00 ft	20.00 ft
Left overhang =	2.50 ft	2.50 ft
Computed right overhang =	2.50 ft	2.50 ft

Buttons at the bottom: OK, Apply, Cancel.

STL8 - Pin and Hanger Rolled Beam Example

The Deck (cont'd) tab is used to enter information about the deck concrete and thickness. The material to be used for the deck concrete is selected from the list of bridge materials described above.

Structure Typical Section

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

Deck Deck (Cont'd) Parapet Median Railing Generic Sidewalk Lane Position Striped Lanes Wearing Surface

Deck concrete: Class A (US)

Total deck thickness: 8.0000 in

Load case: Engine Assigned

Deck crack control parameter: 130.000 kip/in

Sustained modular ratio factor: 3.000

Deck exposure factor:

OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

Curbs:

The two brush block curbs are described using the Generic tab. Click New to add a row to the table. The Name defaults to the only generic appurtenance described for the bridge. Change the “Load Case” to “DC2” and “Measure To” to “Back” (we are locating the curb on the deck by referencing the back of the curb to the left edge of the deck). Enter -0.2083’(=2.5”) for the “Distance at Start” and “Distance at End”. Change the “Front Face Orientation” to “Right”. The completed tab is shown below.

Name	Load Case	Measure To	Edge of Deck Dist. Measured From	Distance At Start (ft)	Distance At End (ft)	Front Face Orientation
Brush Block	DC2	Back	Left Edge	-0.21	-0.21	Right
Brush Block	DC2	Back	Right Edge	-0.21	-0.21	Left

Note: When you Validate or Save this bridge you will see an error message that the appurtenance is not located on the deck. You can ignore this error.

STL8 - Pin and Hanger Rolled Beam Example

Lane Positions:


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

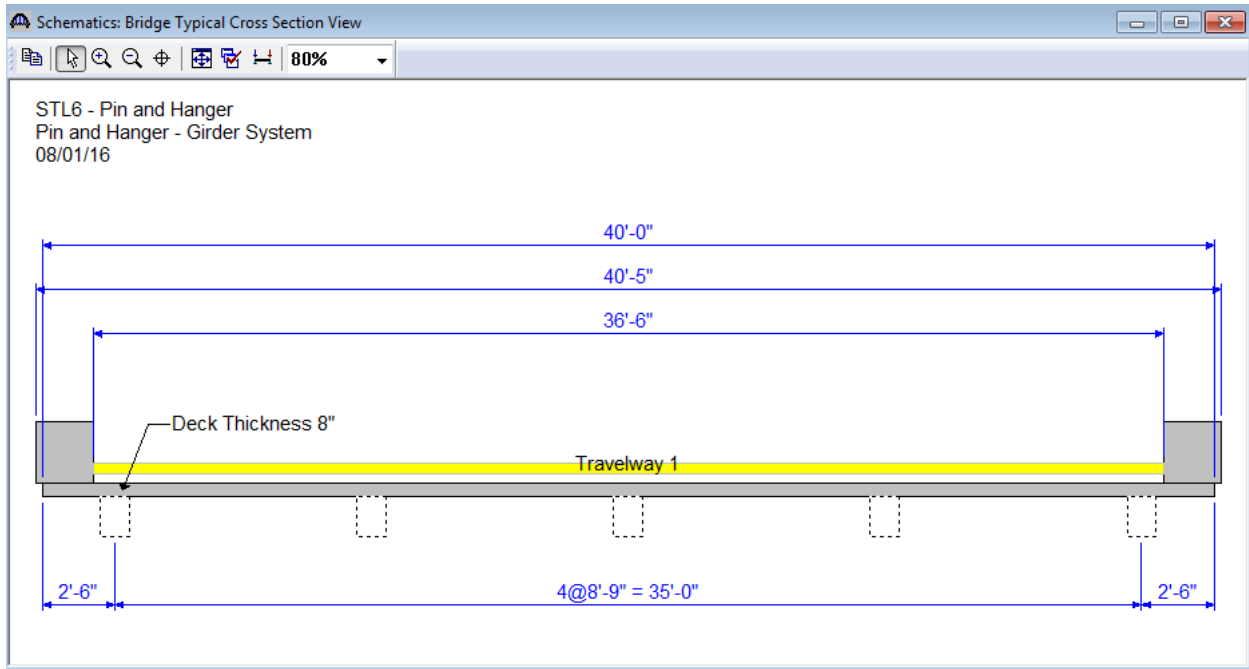
Travelway Number	Distance From Left Edge of Travelway to Superstructure Definition Reference Line At Start (A) (ft)	Distance From Right Edge of Travelway to Superstructure Definition Reference Line At Start (B) (ft)	Distance From Left Edge of Travelway to Superstructure Definition Reference Line At End (A) (ft)	Distance From Right Edge of Travelway to Superstructure Definition Reference Line At End (B) (ft)
1	-18.25	18.25	-18.25	18.25

Click Ok to save the data to memory and close the window.

STL8 - Pin and Hanger Rolled Beam Example

While Structure Typical Section is selected in the BWS tree, open the schematic for the typical section by selecting

the View Schematic toolbar button  or Bridge/Schematic from the menu. The following schematic will be displayed. The girders are displayed as dashed boxes since we have not yet defined what type of girder we will have.



STL8 - Pin and Hanger Rolled Beam Example

Define stiffeners to be used by the beams. Expand the Stiffener Definitions tree item and double click on Transverse. Select the stiffener type as Plate and click Ok. Define the stiffener as shown below. Click Ok to save to memory and close the window.

Transverse Stiffener Definition

Name:

Stiffener Type

Single

Pair

Plate

Thickness: in

Material:

Welds

Top:

Web:

Bottom:

Top Gap: in

Bottom Gap:

OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

Define the following bearing stiffener.

Bearing Stiffener Definition

Name:

Plate

Thickness: in

Material:

Welds

Top:

Web:

Bottom:

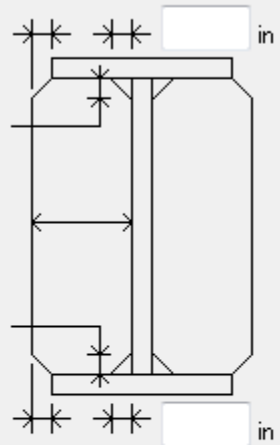
in

in

4.5000 in

in

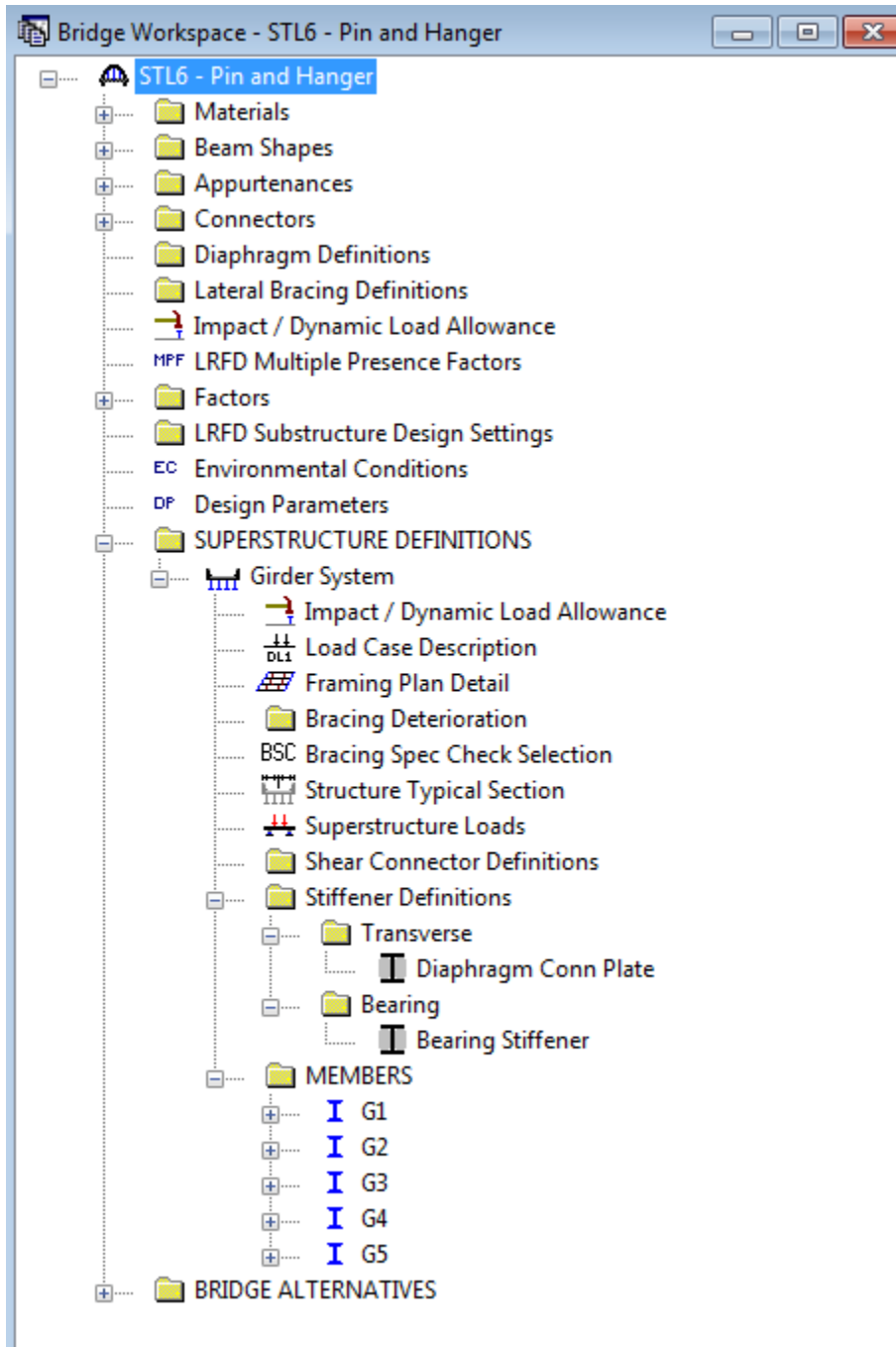
in



The diagram shows a cross-section of a bearing stiffener. It consists of a central vertical web and two horizontal plates (top and bottom) that extend outwards. The top and bottom plates are wider than the web. Dimensions are indicated with arrows and text: the top plate width is labeled as in, the bottom plate width is labeled as in, the web height is labeled as 4.5000 in, and the web thickness is labeled as in. There are also dimension lines for the distance from the web centerline to the outer edge of the top and bottom plates, both labeled as in. Weld symbols are shown at the top and bottom corners where the plates meet the web.

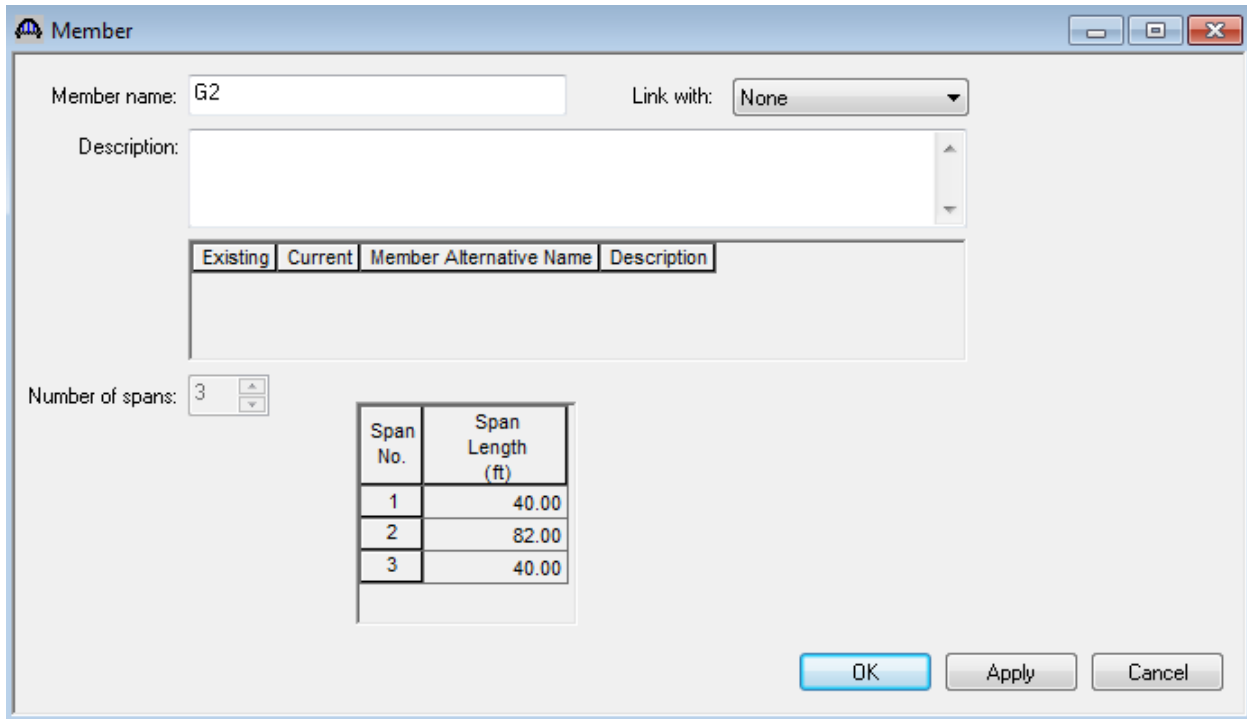
STL8 - Pin and Hanger Rolled Beam Example

The partially expanded BWS tree is shown below:



STL8 - Pin and Hanger Rolled Beam Example

Open the window for member G2 by double clicking on “G2” in the BWS tree. The member window shows the data that was generated when the structure definition was created. No changes are required at this time. The first Member Alternative that we create will automatically be assigned as the Existing and Current Member alternative for this Member.



The 'Member' dialog box displays the following information:

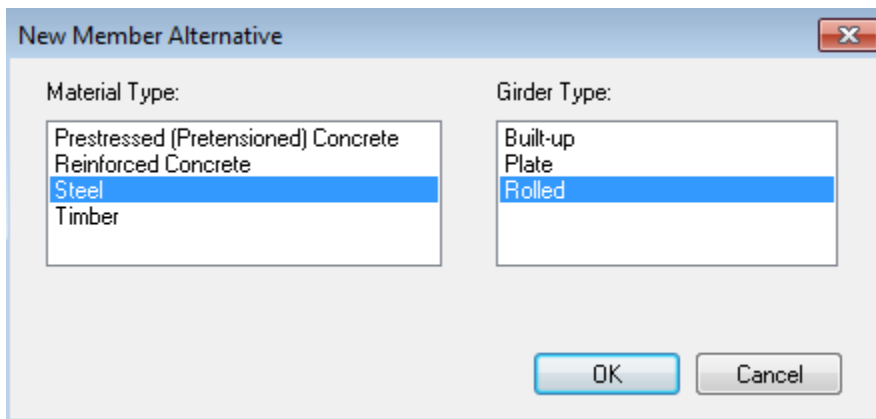
- Member name: G2
- Link with: None
- Description: (empty text area)
- Number of spans: 3
- Table of spans:

Span No.	Span Length (ft)
1	40.00
2	82.00
3	40.00

Buttons: OK, Apply, Cancel

Defining a Member Alternative:

Double-click MEMBER ALTERNATIVES in the tree to create a new alternative. The New Member Alternative dialog shown below will open. Select Steel for the Material Type and Rolled for the Girder Type.



The 'New Member Alternative' dialog box shows the following selections:

- Material Type: Steel
- Girder Type: Rolled

Buttons: OK, Cancel

Click Ok to close the dialog and create a new member alternative.

STL8 - Pin and Hanger Rolled Beam Example

The Member Alternative Description window will open. Enter the appropriate data as shown below. Select Schedule-based Girder property input method.

Member Alternative: Rolled Beam Alt

Description Specs Factors Engine Import Control Options

Description:

Material Type: Steel

Girder Type: Rolled

Default Units: US Customary

Girder property input method

Schedule based

Cross-section based

End bearing locations

Left: 6.0000 in

Right: 6.0000 in

Simple DL, continuous LL

Default rating method: LFD

Self Load

Load case: Engine Assigned

Additional self load = kip/ft

Additional self load = %

OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

Use the Compute from Typical Section button to compute the following Standard (LFD) distribution factors.

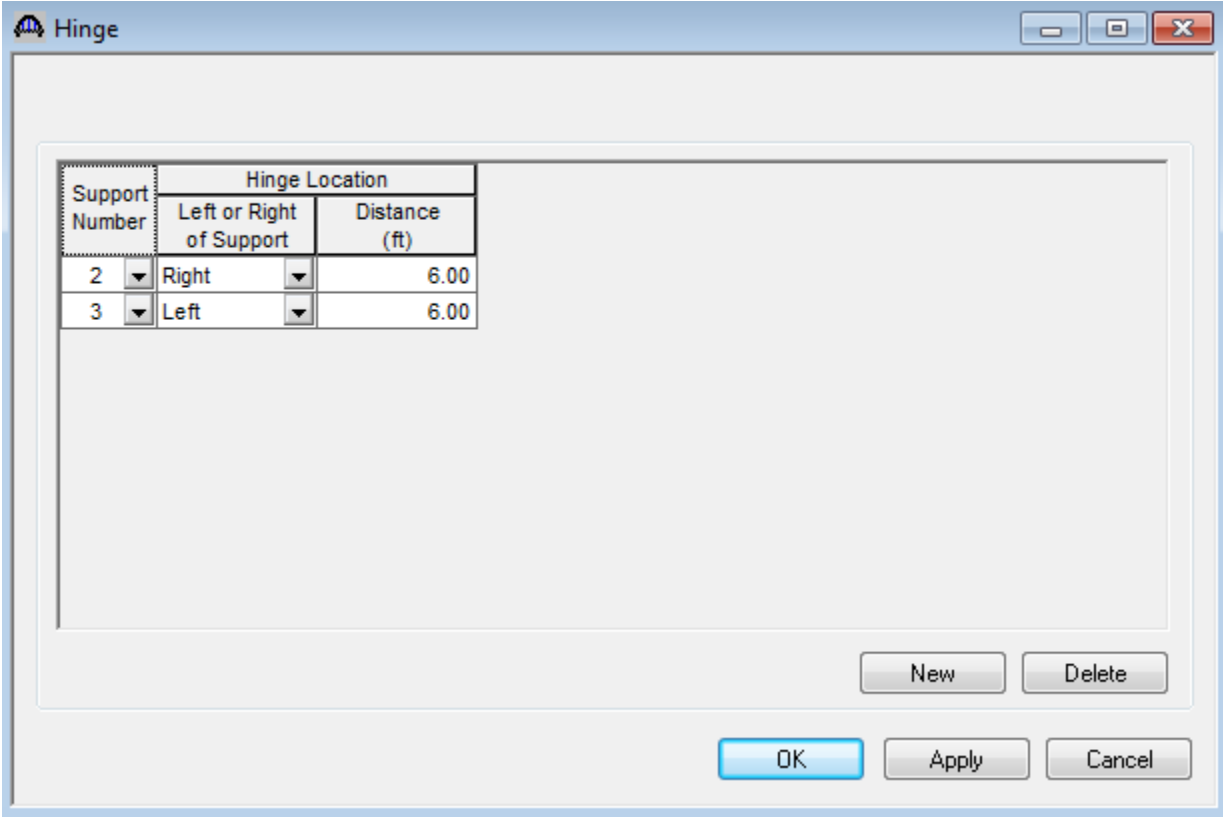
The screenshot shows a software dialog box titled "Live Load Distribution". It has two tabs: "Standard" and "LRFD", with "LRFD" selected. The dialog contains the following elements:

- Distribution Factor Input Method:** Three radio buttons are present: "Use Simplified Method" (selected), "Use Advanced Method", and "Use Advanced Method with 1994 Guide Specs".
- Checkboxes:** A checkbox labeled "Allow distribution factors to be used to compute effects of permit loads with routine traffic" is currently unchecked.
- Table:** A table with the following data:

Lanes Loaded	Distribution Factor (Wheels)			
	Shear	Shear at Supports	Moment	Deflection
1 Lane	1.250	1.314	1.250	0.400
Multi-Lane	1.591	1.800	1.591	1.080
- Buttons:** "Compute from Typical Section..." and "View Calcs" are located at the bottom left. "OK", "Apply", and "Cancel" are located at the bottom right.

STL8 - Pin and Hanger Rolled Beam Example

Next describe the pin locations on the Hinge window as shown below.



STL8 - Pin and Hanger Rolled Beam Example

Next describe the girder profile by double clicking on Girder Profile in the tree. The window is shown below with the data describing the rolled shape.

Type:

Shape

Shape	Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)	Material
W 36x135	1	0.00	46.00	46.00	Grade 36
W 36x182	2	6.00	70.00	76.00	Grade 36
W 36x135	2	76.00	46.00	122.00	Grade 36

New Duplicate Delete

OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

Describe the bottom cover plate as shown below.

The screenshot shows the 'Girder Profile' software window. The 'Type' is set to 'Rolled Shape'. The 'Bottom Cover Plate' tab is active. The configuration is set to 'Welded'. The table below shows the details for the bottom cover plate.

Relative Position	Begin Width (in)	End Width (in)	Thickness (in)	Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)	Material	Side Weld	End Weld at Right
1	10.50	10.50	1.5000	2	6.00	70.00	76.00	Grade 36	-- None	-- None

Buttons at the bottom of the window include 'Copy to Top Cover Plate', 'New', 'Duplicate', 'Delete', 'OK', 'Apply', and 'Cancel'.

STL8 - Pin and Hanger Rolled Beam Example

Next open the Deck Profile and click the “Compute from Typical Section...” button.

Enter the following data. The points of contraflexure are required for the computation of the LRFD effective flange width. Enter the hinge locations as the points of contraflexure in span 2 as shown below. Click OK.

Compute Deck Profile from Structure Typical Section

Total deck thickness entered on the Structure Typical Section window = in

Enter a structural thickness to use when computing the effective flange width: in

STL8 - Pin and Hanger Rolled Beam Example

The completed deck concrete window is shown below. Note that the distance to the top row of steel is measured from the top of the effective deck slab thickness. Enter a value for the modular ratio of the concrete. The Compute from Typical Section button could not compute this for us since we have not defined a reinforcing steel material.

Deck Profile

Type: Rolled

Deck Concrete Reinforcement Shear Connectors

Material	Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)	Structural Thickness (in)	Start Effective Flange Width (Std) (in)	End Effective Flange Width (Std) (in)	Start Effective Flange Width (LRFD) (in)	End Effective Flange Width (LRFD) (in)	n
Class A (US)	1	0.00	28.00	28.00	6.5000	78.0000	78.0000	83.9750	83.9750	8.000
Class A (US)	1	28.00	18.00	46.00	6.5000	78.0000	78.0000	54.0072	54.0072	8.000
Class A (US)	2	6.00	70.00	76.00	6.5000	78.0000	78.0000	84.0375	84.0375	8.000
Class A (US)	2	76.00	18.00	94.00	6.5000	78.0000	78.0000	54.0072	54.0072	8.000
Class A (US)	3	12.00	28.00	40.00	6.5000	78.0000	78.0000	83.9750	83.9750	8.000

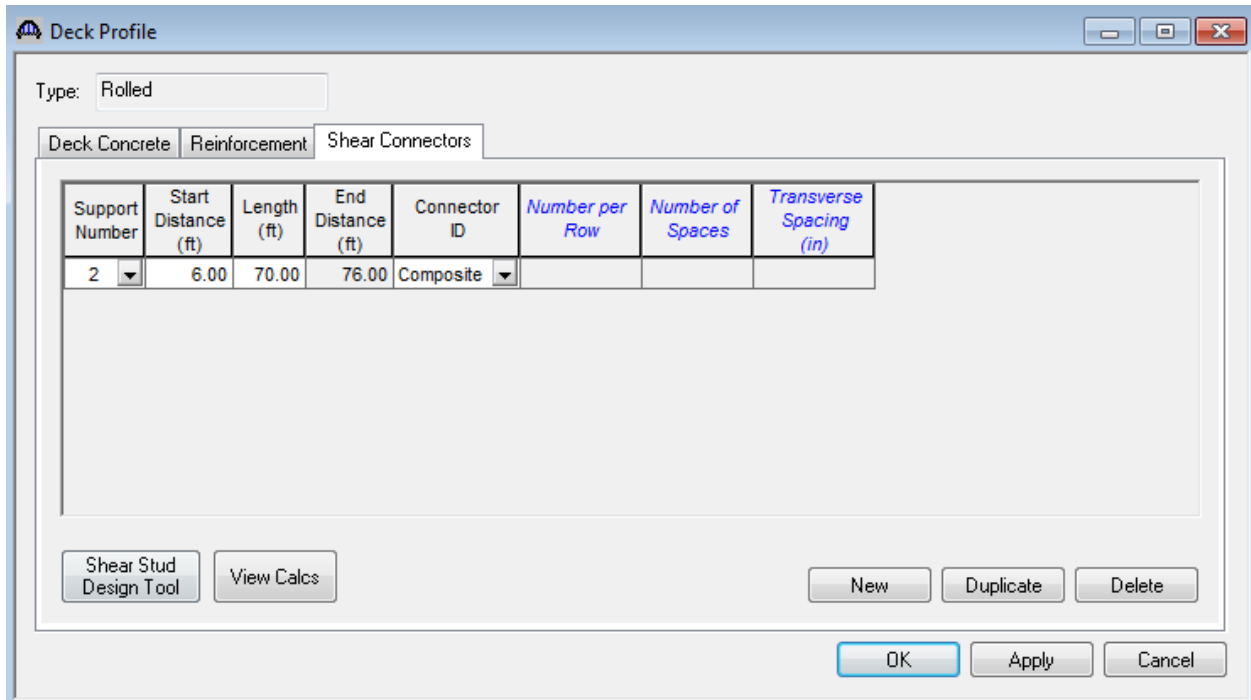
Compute from Typical Section...

New Duplicate Delete

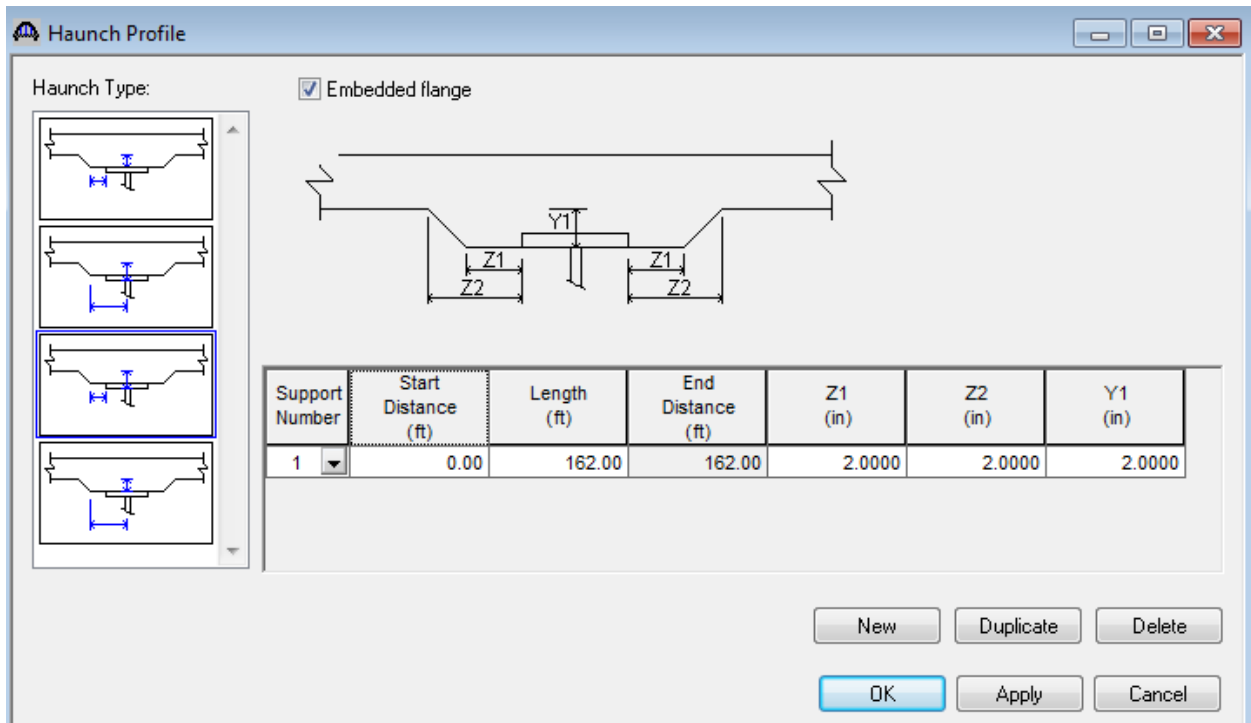
OK Apply Cancel

STL8 - Pin and Hanger Rolled Beam Example

Composite regions are described using the Shear Connectors tab as shown below.

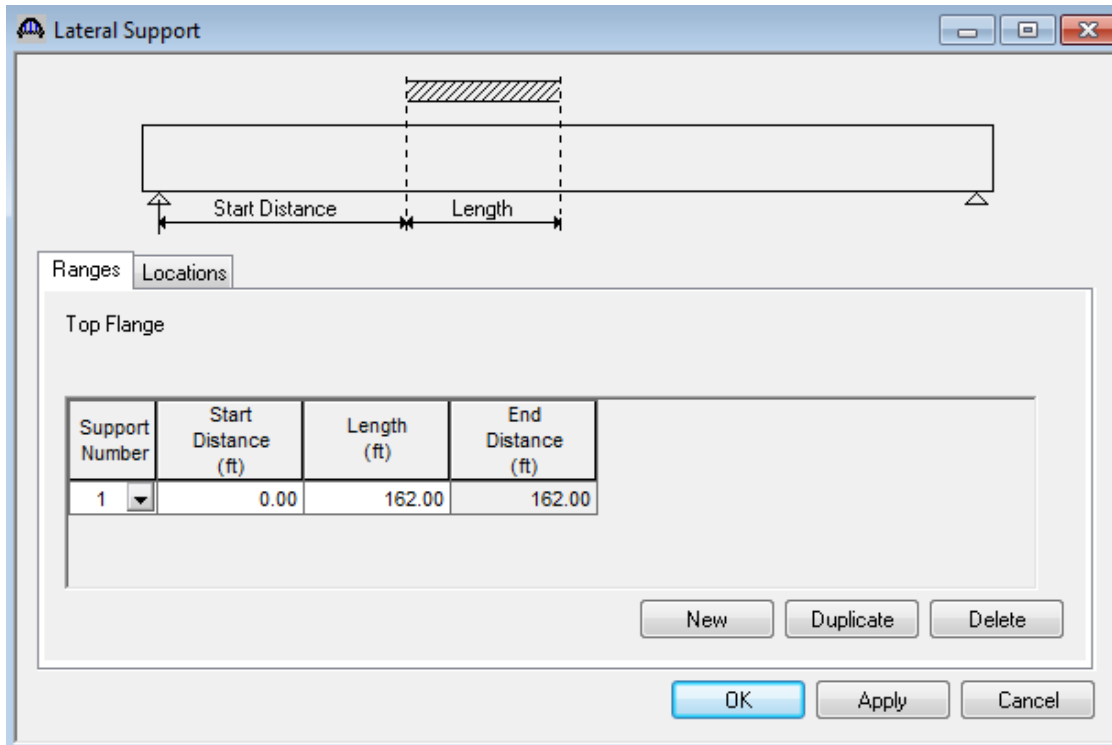


The haunch profile is defined by double clicking on Haunch Profile in the tree. The window is shown below.



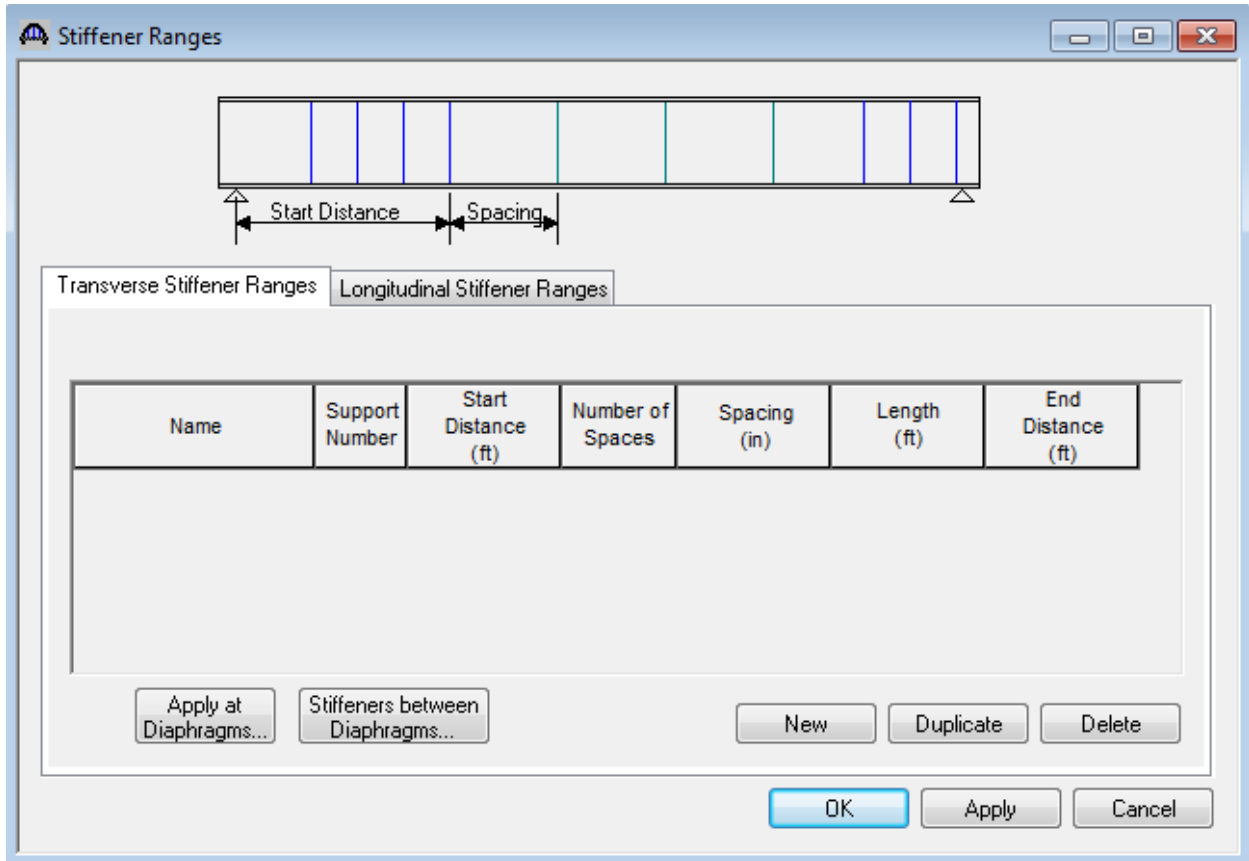
STL8 - Pin and Hanger Rolled Beam Example

Regions where the slab is considered to provide lateral support for the top flange are defined using the Lateral Support window shown below. It can be opened by double clicking on Lateral Support in the tree.



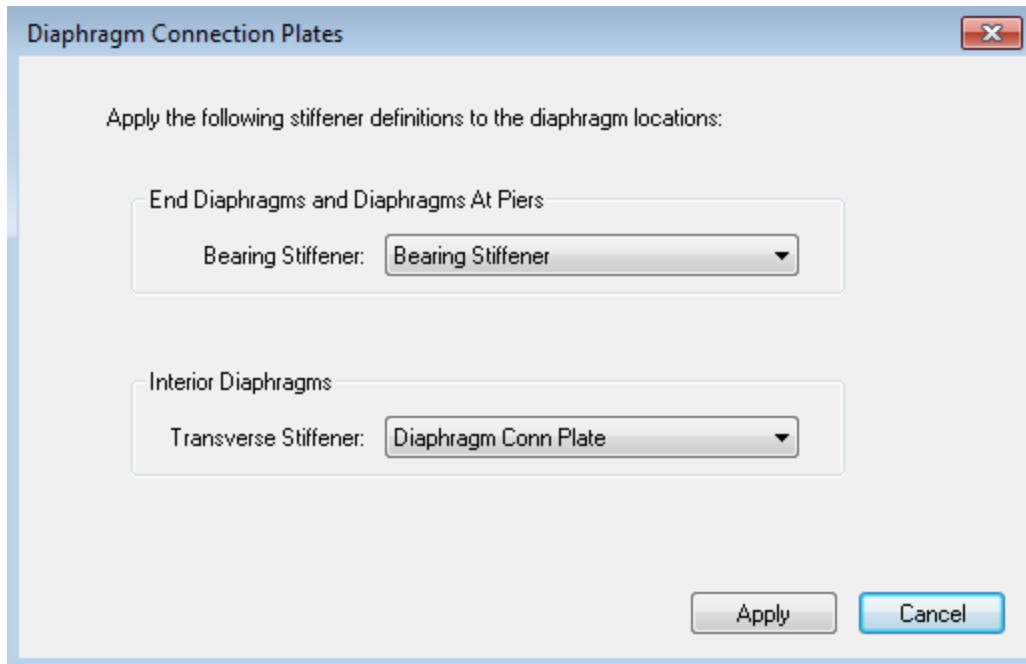
STL8 - Pin and Hanger Rolled Beam Example

Stiffener locations are described using the Stiffener Ranges window shown below.



STL8 - Pin and Hanger Rolled Beam Example

Click on the Apply at Diaphragms... button to open the following dialog.



STL8 - Pin and Hanger Rolled Beam Example

Selecting Apply will create the following transverse stiffener locations.

Stiffener Ranges

Transverse Stiffener Ranges Longitudinal Stiffener Ranges

Name	Support Number	Start Distance (ft)	Number of Spaces	Spacing (in)	Length (ft)	End Distance (ft)
Diaphragm Conn Plate	1	20.00	1	0.0000	0.00	20.00
Diaphragm Conn Plate	2	5.25	1	0.0000	0.00	5.25
Diaphragm Conn Plate	2	7.25	1	0.0000	0.00	7.25
Diaphragm Conn Plate	2	7.25	4	202.5000	67.50	74.75
Diaphragm Conn Plate	2	76.75	1	0.0000	0.00	76.75
Diaphragm Conn Plate	3	20.00	1	0.0000	0.00	20.00

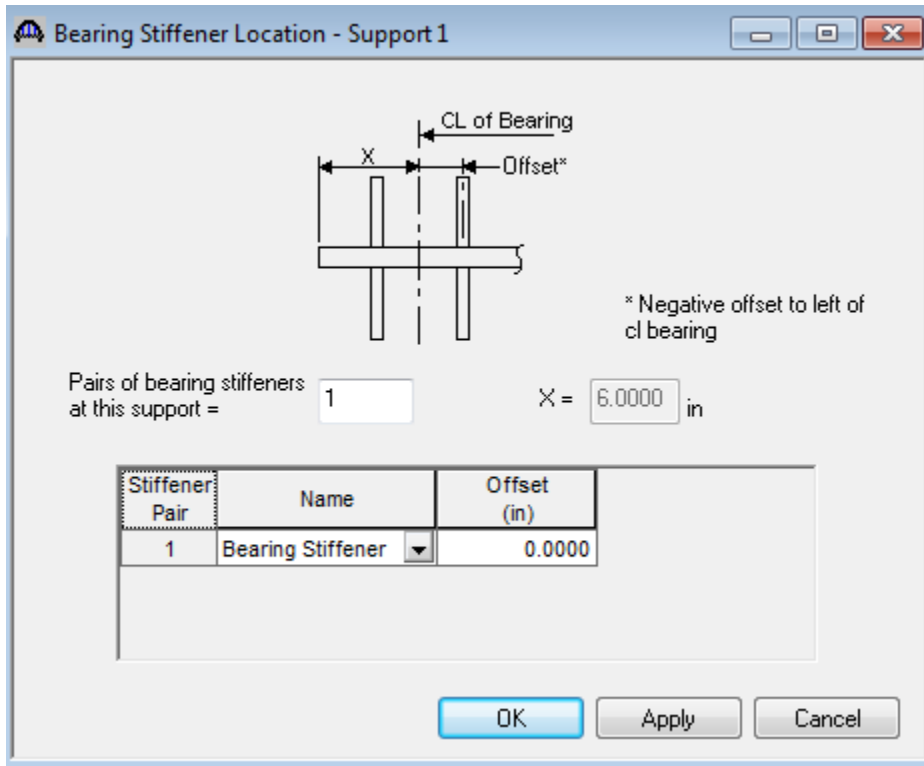
Apply at Diaphragms... Stiffeners between Diaphragms... New Duplicate Delete

OK Apply Cancel

This example does not have any intermediate transverse stiffeners so we can click Ok to close this window

STL8 - Pin and Hanger Rolled Beam Example

Bearing stiffener definitions were assigned to locations when we used the Apply at Diaphragms... button on the Transverse Stiffener Ranges window. The Bearing Stiffener Location window is opened by expanding the Bearing Stiffener Locations branch in the tree and double clicking on each support. The assignment for Support 1 is shown below.



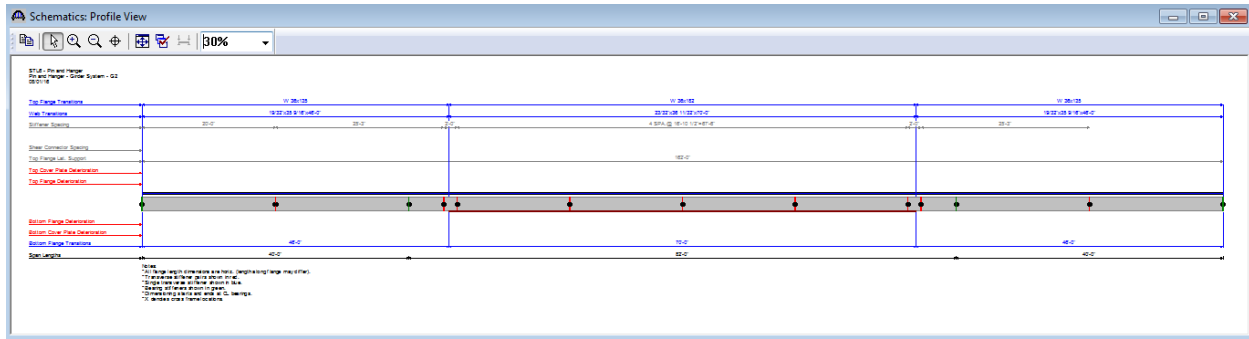
STL8 - Pin and Hanger Rolled Beam Example

The description of an interior beam for a structure definition is complete.

While “Rolled Beam Alt” is selected in the BWS tree, open the schematic for the girder profile by selecting the



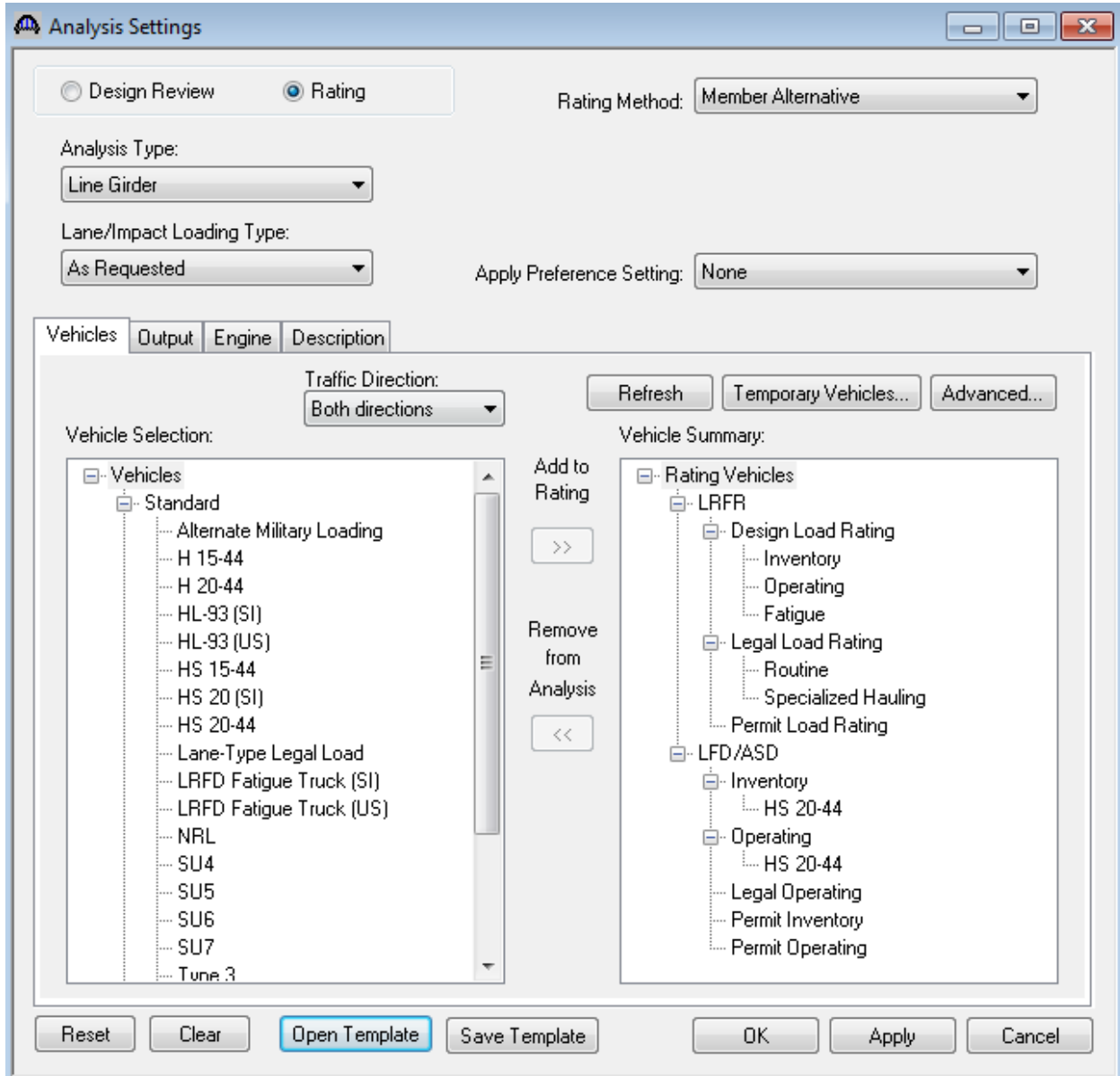
View Schematic toolbar button or Bridge/Schematic from the menu. The following schematic will be displayed.



STL8 - Pin and Hanger Rolled Beam Example

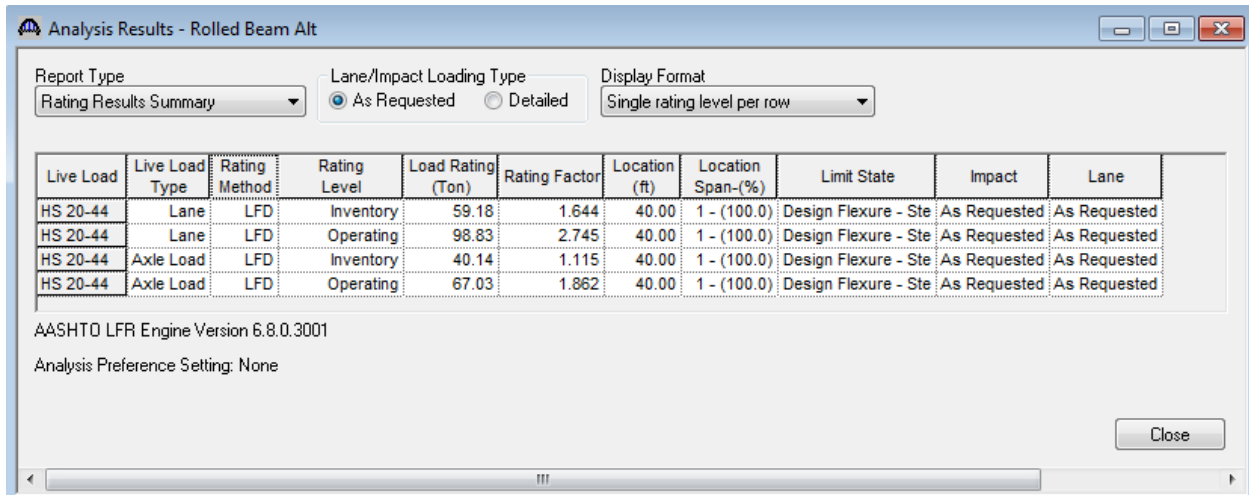
To perform a rating, select the name of the “Rolled Beam Alt” member alternative in the tree. Click the View Analysis Settings button on the toolbar. The Analysis Settings window will open. Select the “Open Template” button to open the following window. Select the HS20 rating template and click the Open button.

The Analysis Settings window with the selected vehicles is shown below. Click Ok to close the window.



STL8 - Pin and Hanger Rolled Beam Example

Next click the Analyze button on the toolbar to perform the rating. When the rating is finished you can review the results by clicking the View Analysis Report button on the toolbar. The window shown below will open.



The screenshot shows a software window titled "Analysis Results - Rolled Beam Alt". At the top, there are three dropdown menus: "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". Below these is a table with 11 columns: Live Load, Live Load Type, Rating Method, Rating Level, Load Rating (Ton), Rating Factor, Location (ft), Location Span-%, Limit State, Impact, and Lane. The table contains four rows of data for HS 20-44 live loads. Below the table, the text "AASHTO LFR Engine Version 6.8.0.3001" and "Analysis Preference Setting: None" is displayed. A "Close" button is located in the bottom right corner of the window.

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	Lane	LFD	Inventory	59.18	1.644	40.00	1 - (100.0)	Design Flexure - Ste	As Requested	As Requested
HS 20-44	Lane	LFD	Operating	98.83	2.745	40.00	1 - (100.0)	Design Flexure - Ste	As Requested	As Requested
HS 20-44	Axle Load	LFD	Inventory	40.14	1.115	40.00	1 - (100.0)	Design Flexure - Ste	As Requested	As Requested
HS 20-44	Axle Load	LFD	Operating	67.03	1.862	40.00	1 - (100.0)	Design Flexure - Ste	As Requested	As Requested

AASHTO LFR Engine Version 6.8.0.3001
Analysis Preference Setting: None

Close