AASHTOWare BrDR 7.5.0

Floor System Tutorial

FS1 – Girder Floorbeam Stringer Example

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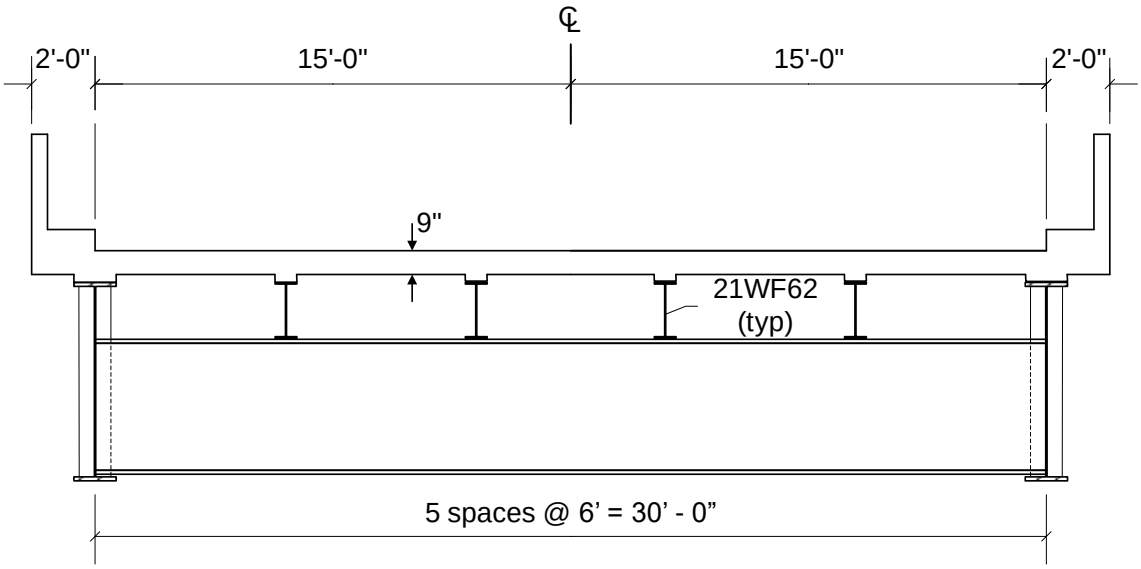
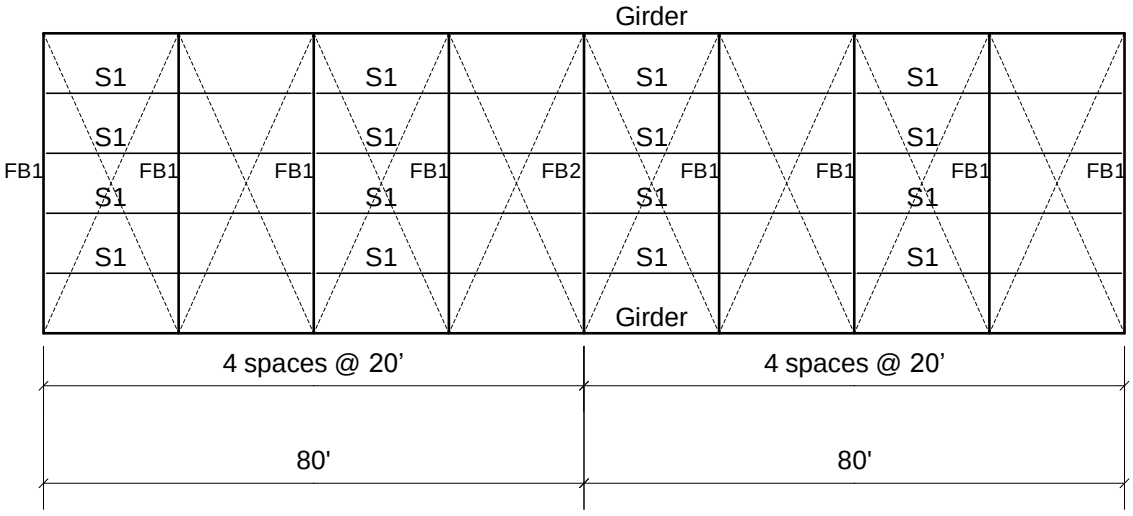


Concrete curb & railing = 0.3k/ft each side

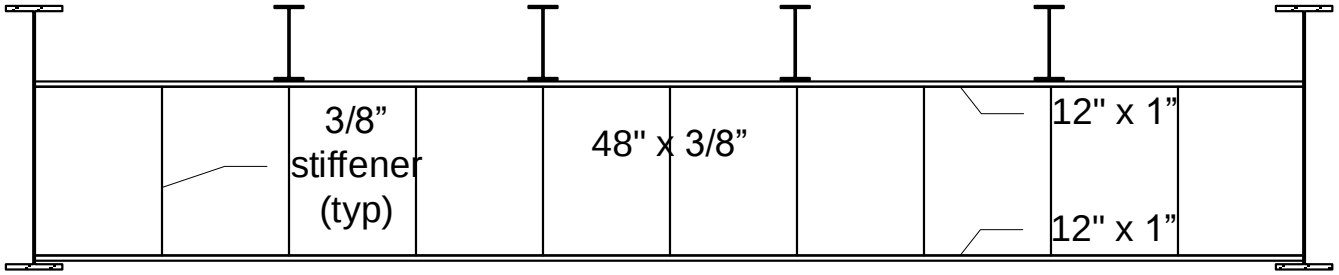
Fy = 36ksi

f’c = 3ksi

Composite stringers & girders, 8.5” effective slab thickness

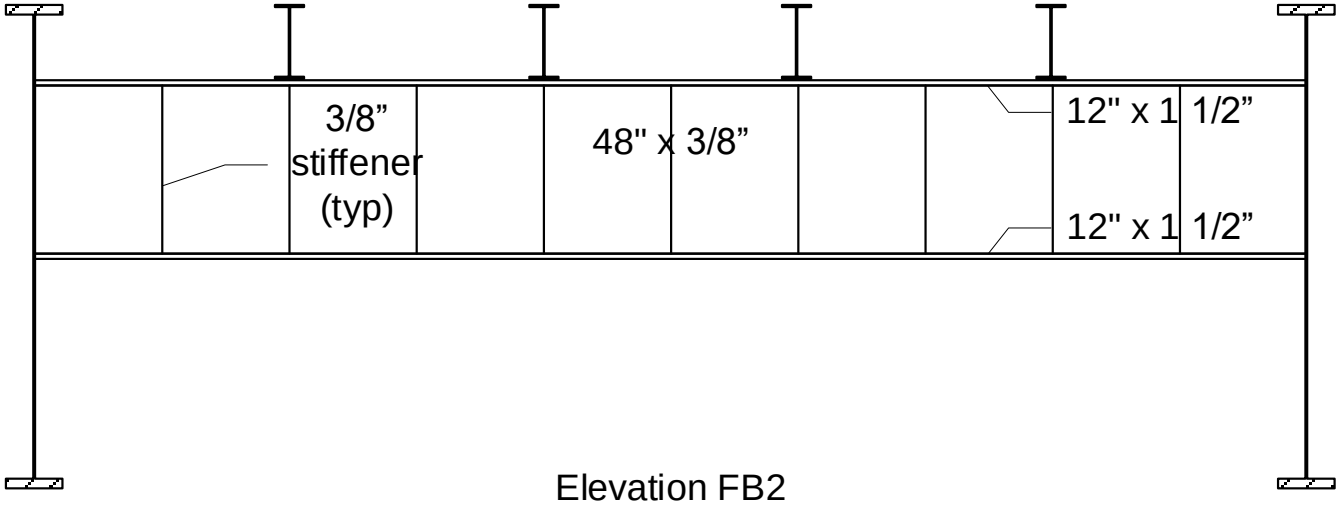


Lateral Bracing = ST 6WF20 (typ)



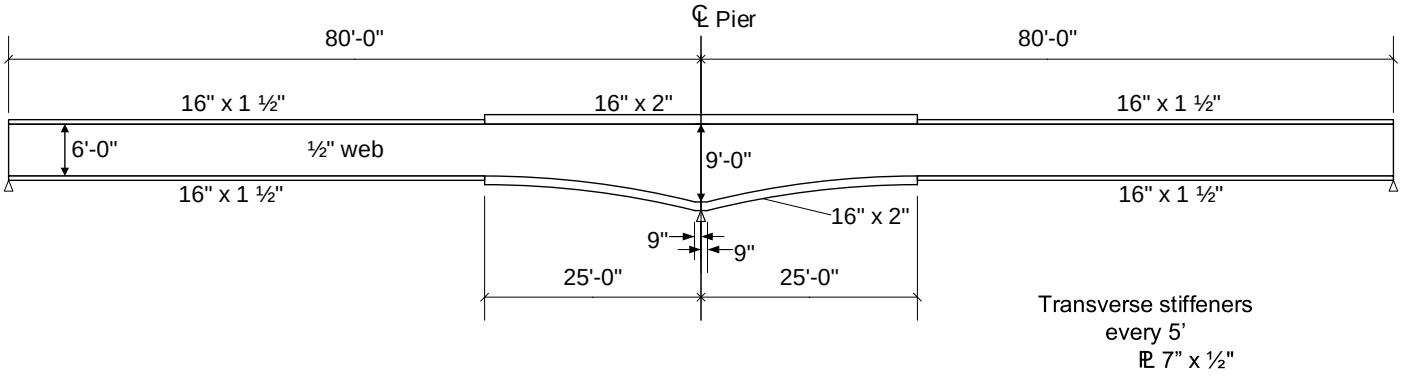
Elevation FB1

Stiffeners = 6” x 3/8”

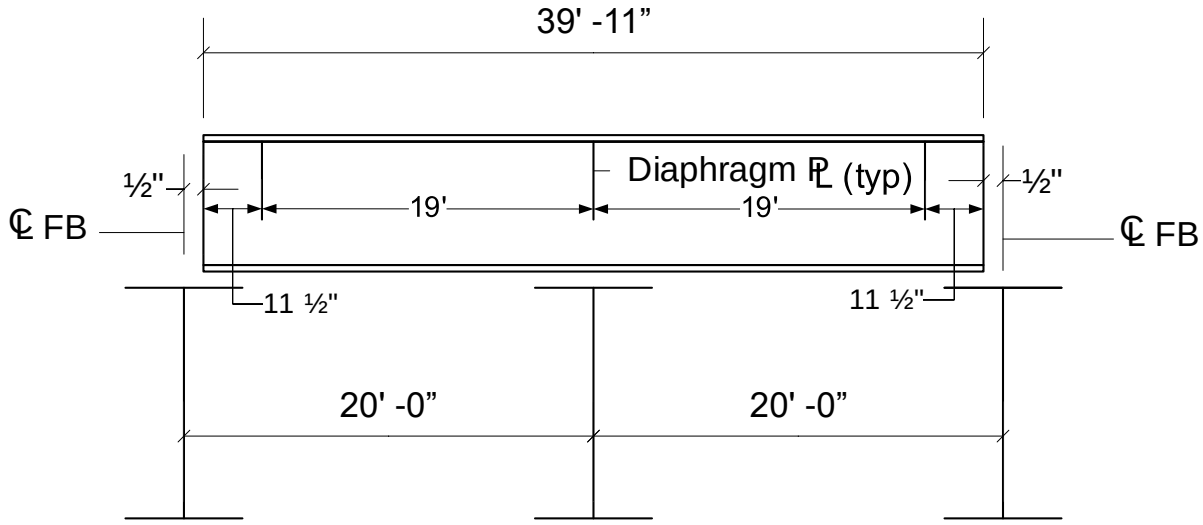


Elevation FB2

Stiffeners = 6” x 3/8”



Girder Elevation



Stringer Elevation

Diaphragms 10 [20

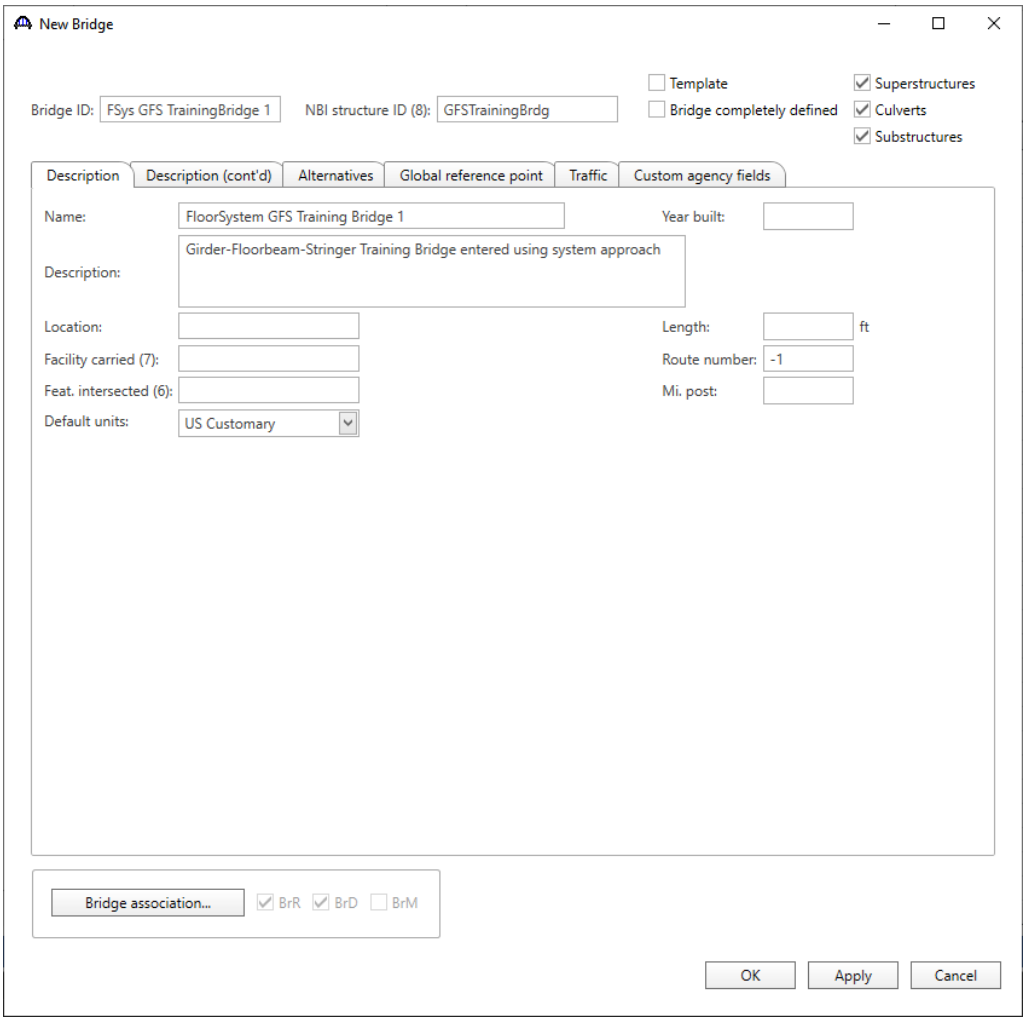
BrDR Tutorial

Topics Covered

- Superstructure composed of girders, floorbeams and stringers.
- System superstructure definition
- Rolled beam stringers.
- Plate girder floorbeams.
- Plate girder Girders.

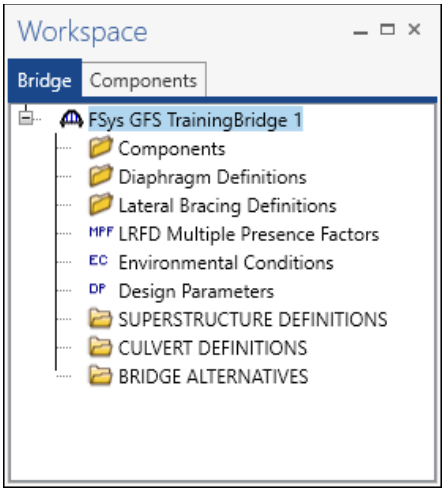
Superstructure composed of girders, floorbeams and stringers.

From the **Bridge Explorer** create a **New** bridge and enter the following description data.



Close the window by clicking **OK**.

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

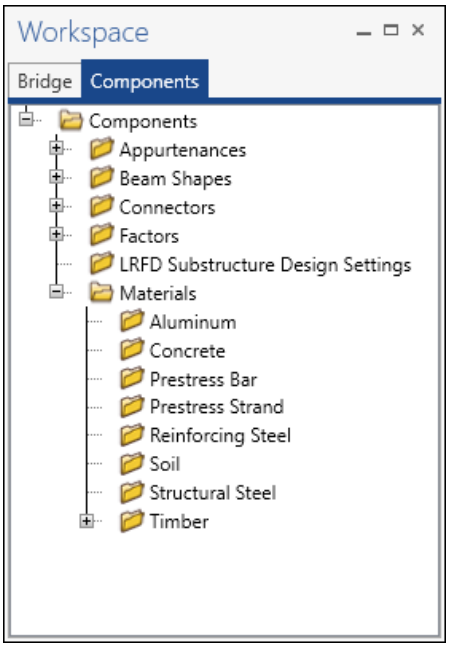


The **Bridge Workspace** tree is organized according to the definition of a bridge with data shared by many of the bridge components shown in the upper part of the tree. A bridge can be described by working from top to bottom within the **Bridge Workspace** tree.

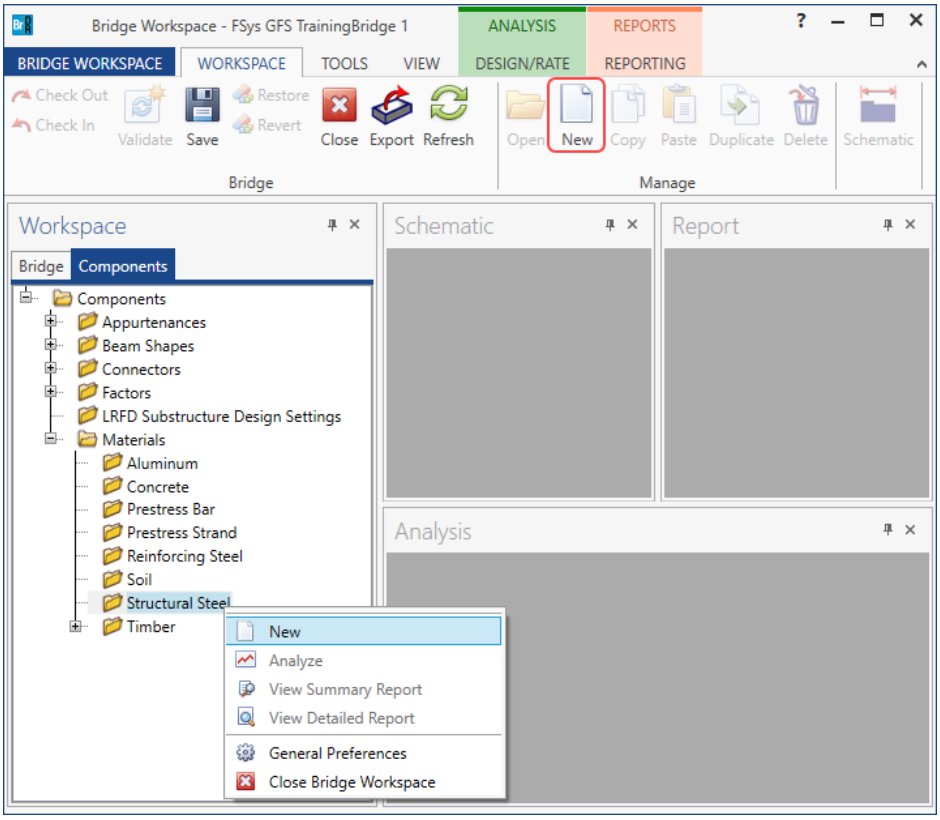
Bridge Materials

To enter the materials to be used by members of the bridge, in the **Components** tab of the **Bridge Workspace**, click on the ⊞ button to expand the tree for **Materials**.

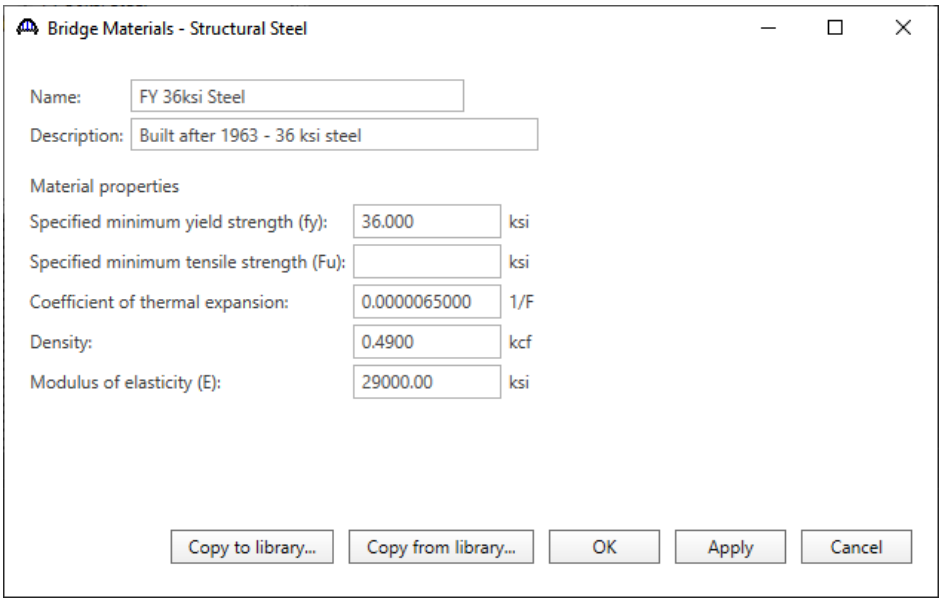
The tree with the expanded **Materials** branch is shown below.



To add a new structural steel material, in the **Components** tab of the **Bridge Workspace**, click on **Materials**, **Structural Steel,** and select **New** from the **Manage** group of the **WORKSPACE** ribbon (or right mouse click on **Structural Steel** and select **New**). The window shown below will open.

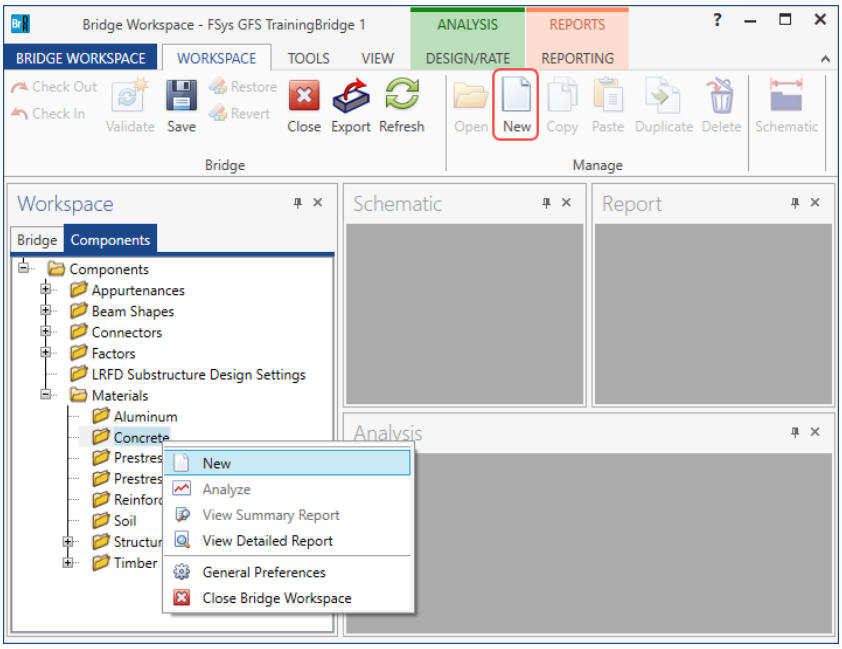


Enter the structural steel material as shown below.

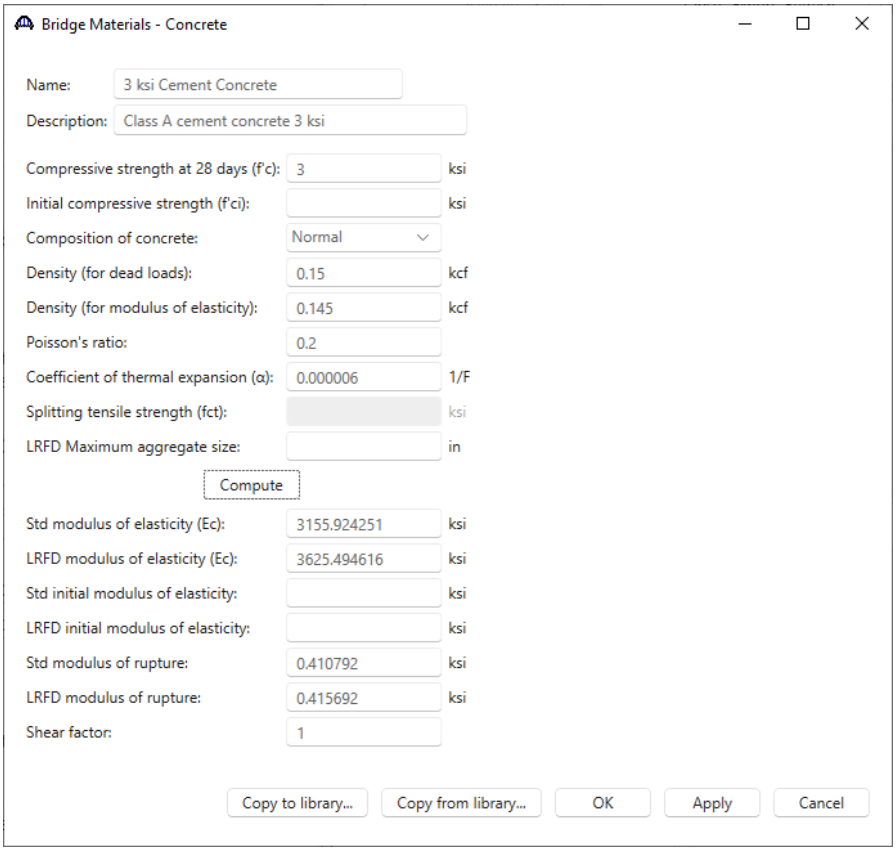


Click **OK** to apply the data and close the window.

Add a new concrete material, by clicking on **Materials**, **Concrete,** and select **New** from the **Manage** group of the **WORKSPACE** ribbon (or right mouse click on **Concrete** and select **New**). The window shown below will open.



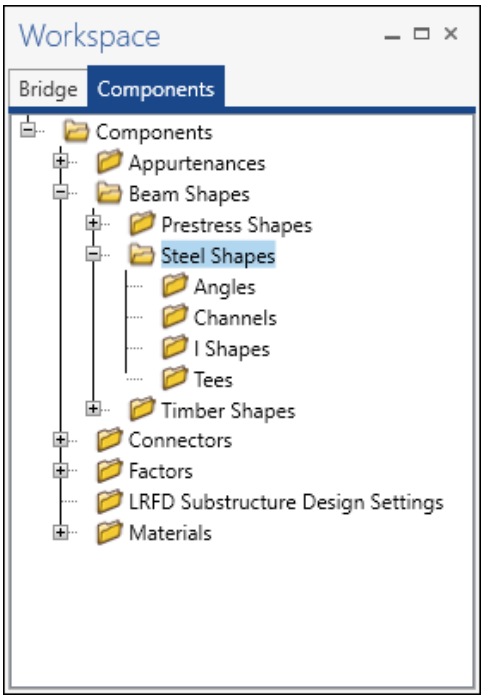
Enter the values shown above the **Compute** button and click the **Compute** button to compute the remaining values below them.



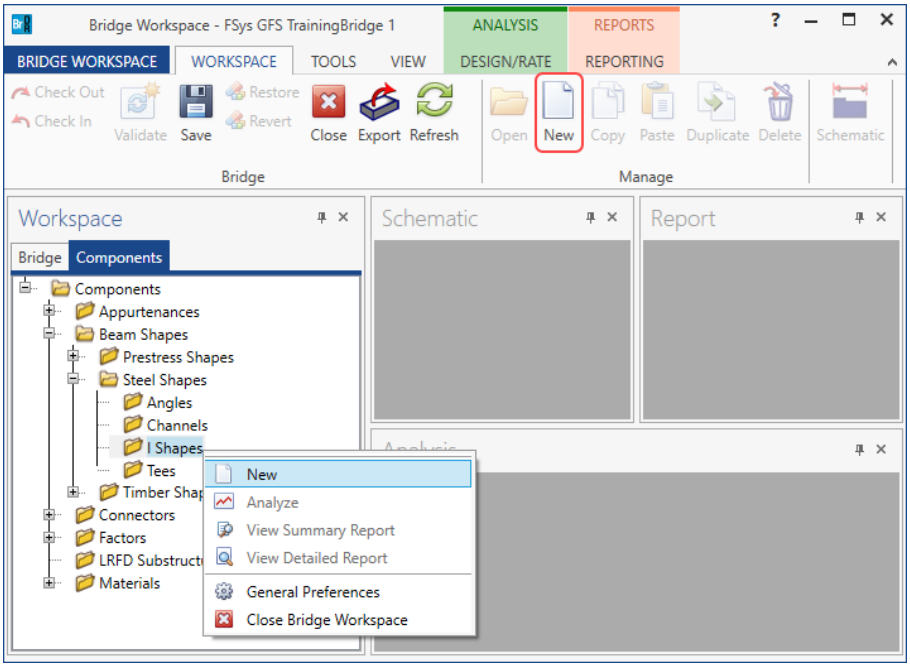
Click **OK** to apply the data and close the window

Beam Shapes

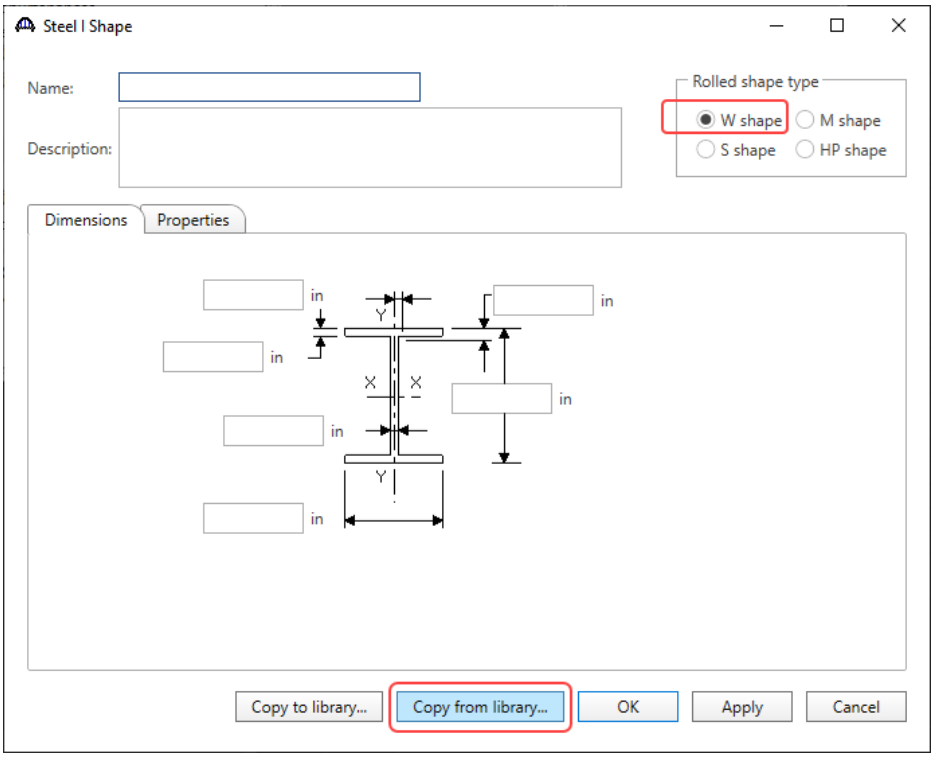
To enter a steel beam shape to be used in this bridge expand the tree labeled **Beam Shapes** and **Steel Shapes** as shown below. The partially expanded **Components** tree with the **Steel Shapes** node expanded is shown below.



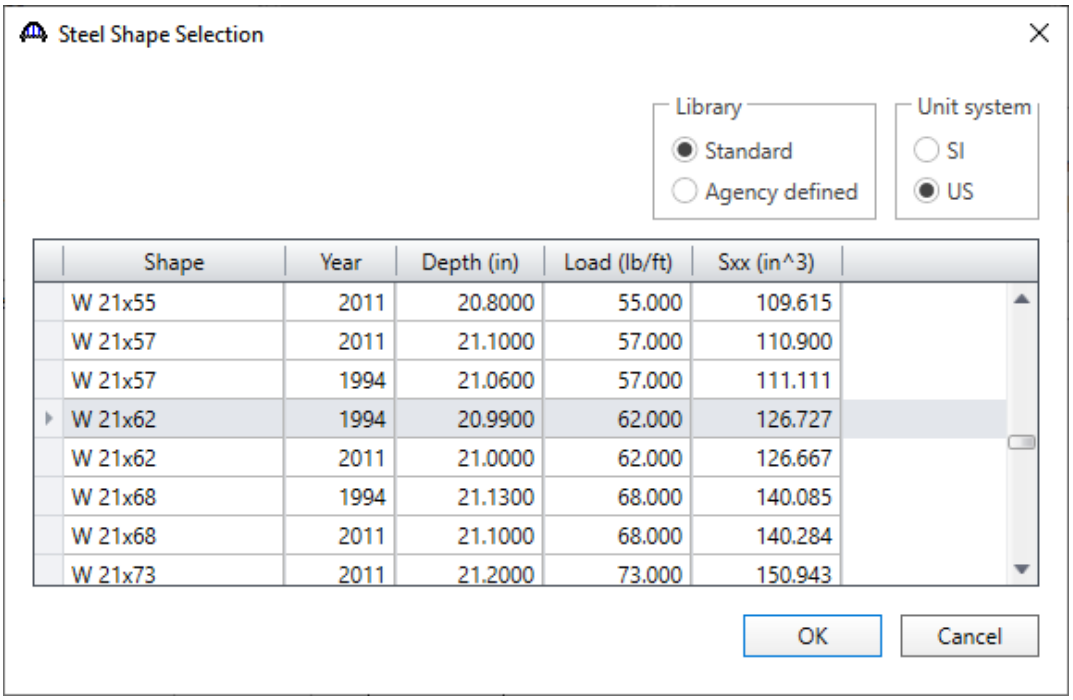
To add a new steel I shape, click on the **I Shapes** node in the **Components** tree and select **New** from the **Manage** group of the **WORKSPACE** ribbon (or right mouse click on **I Shapes** and select **New** or double click on **I Shapes** in the **Components** tree). The window shown below will open.



Select the **Rolled shape type** as **W shape** and click the **Copy from library…** button. The **Steel Shape Selection** window will appear.

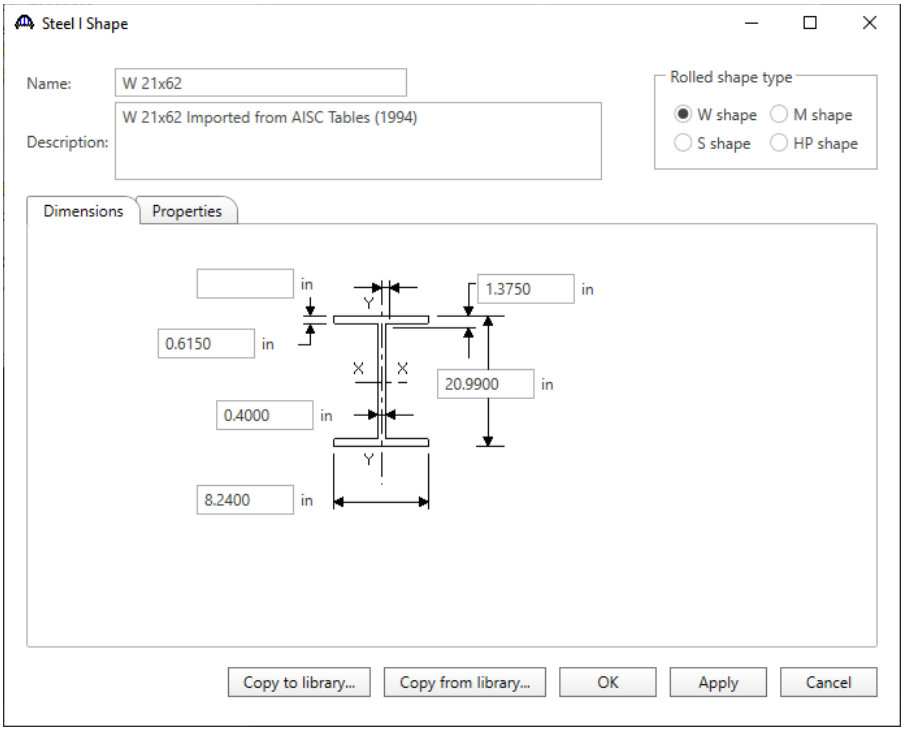


This window displays all the steel shapes available in the library. The list can be sorted by clicking on any of the column headers (e.g., **Shape**, **Year**, **Depth** etc.). Select **W26x62 (Year – 1994)** and click **OK**.



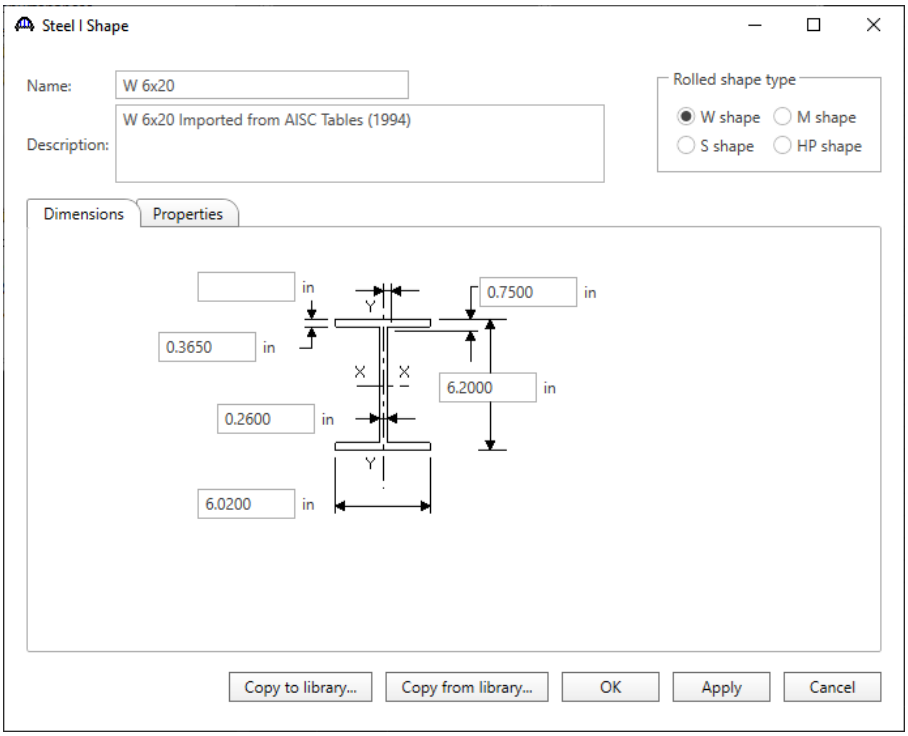
Shape	Year	Depth (in)	Load (lb/ft)	Sxx (in^3)
W 21x55	2011	20.8000	55.000	109.615
W 21x57	2011	21.1000	57.000	110.900
W 21x57	1994	21.0600	57.000	111.111
W 21x62	1994	20.9900	62.000	126.727
W 21x62	2011	21.0000	62.000	126.667
W 21x68	1994	21.1300	68.000	140.085
W 21x68	2011	21.1000	68.000	140.284
W 21x73	2011	21.2000	73.000	150.943

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



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

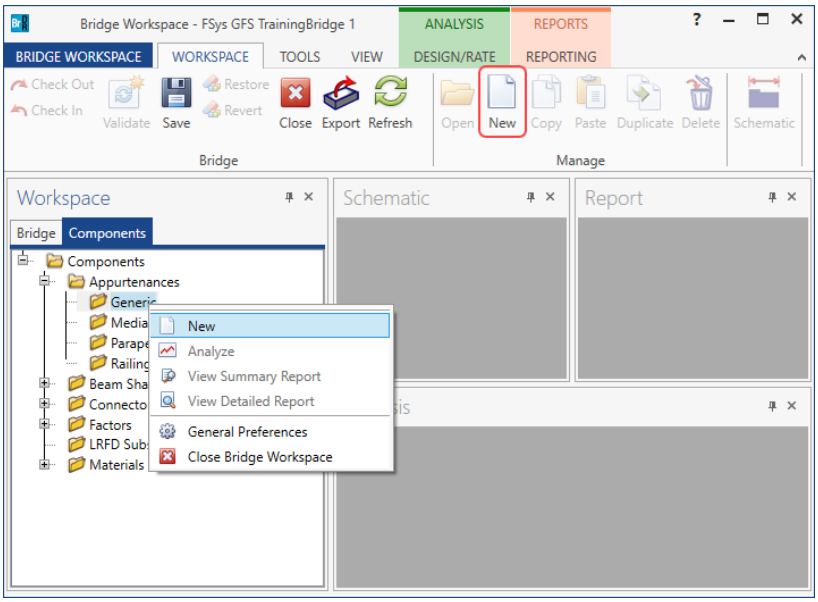
Similarly add a **W6x20 (Year – 1994)** steel I shape. The **Steel I Shape** window will be updated as shown below.



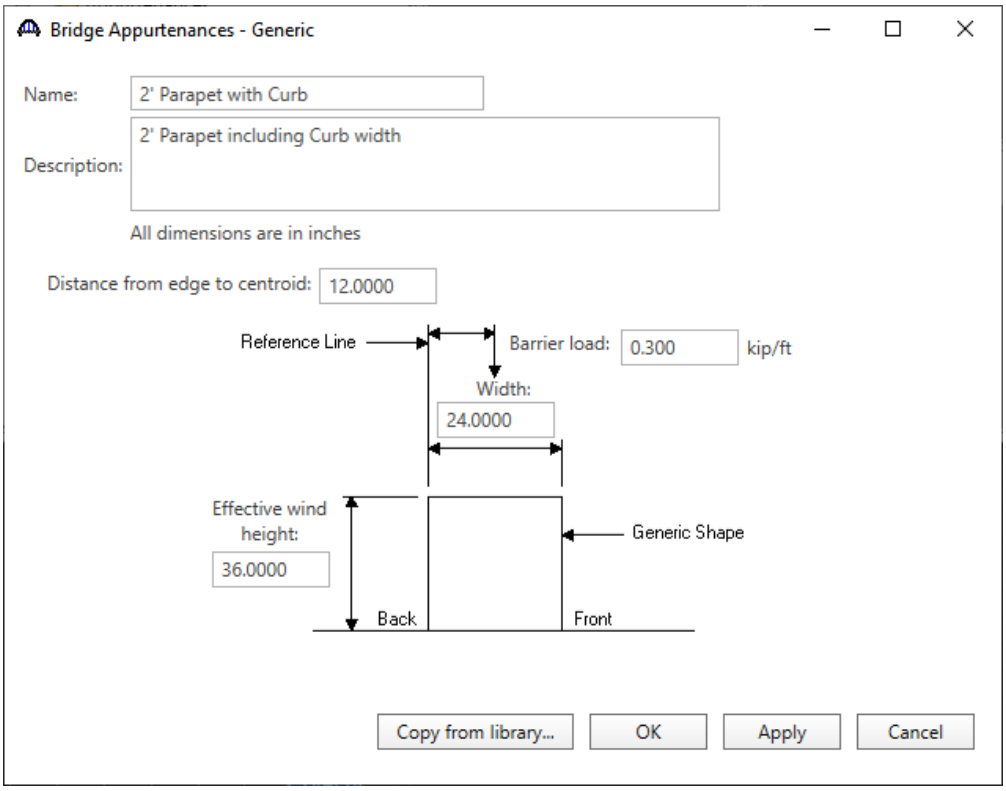
Click **OK** to apply the data and close the window

Bridge Appurtenances

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



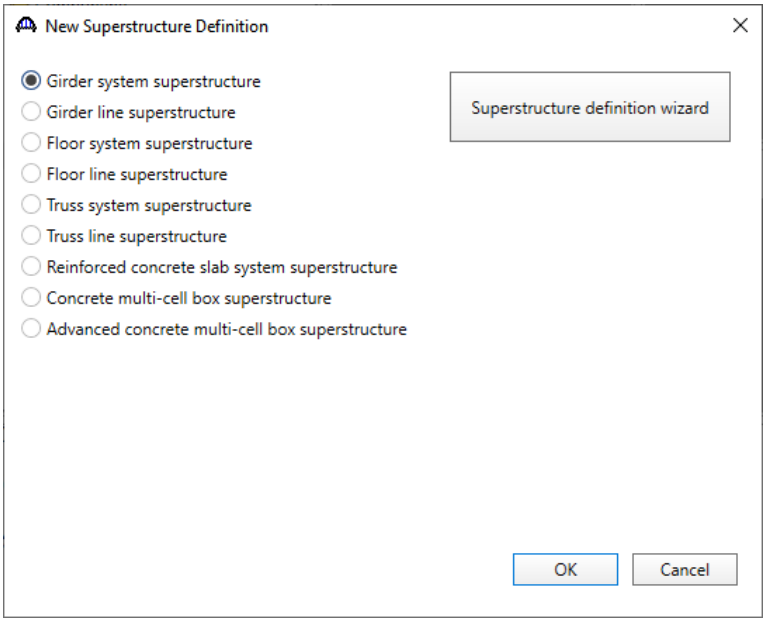
Enter the data as shown below.



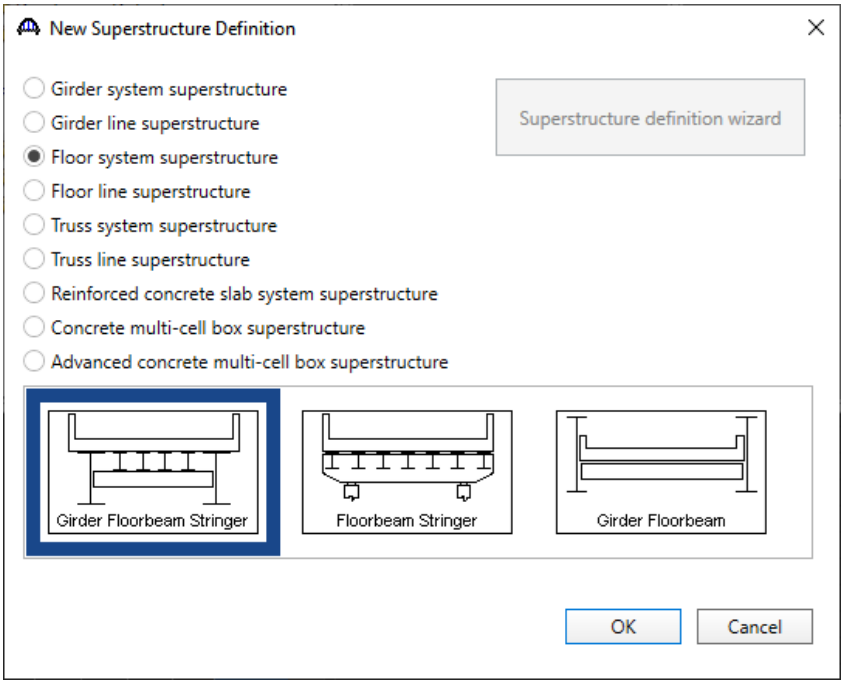
Click **OK** to apply the data and close the window

Superstructure Definition

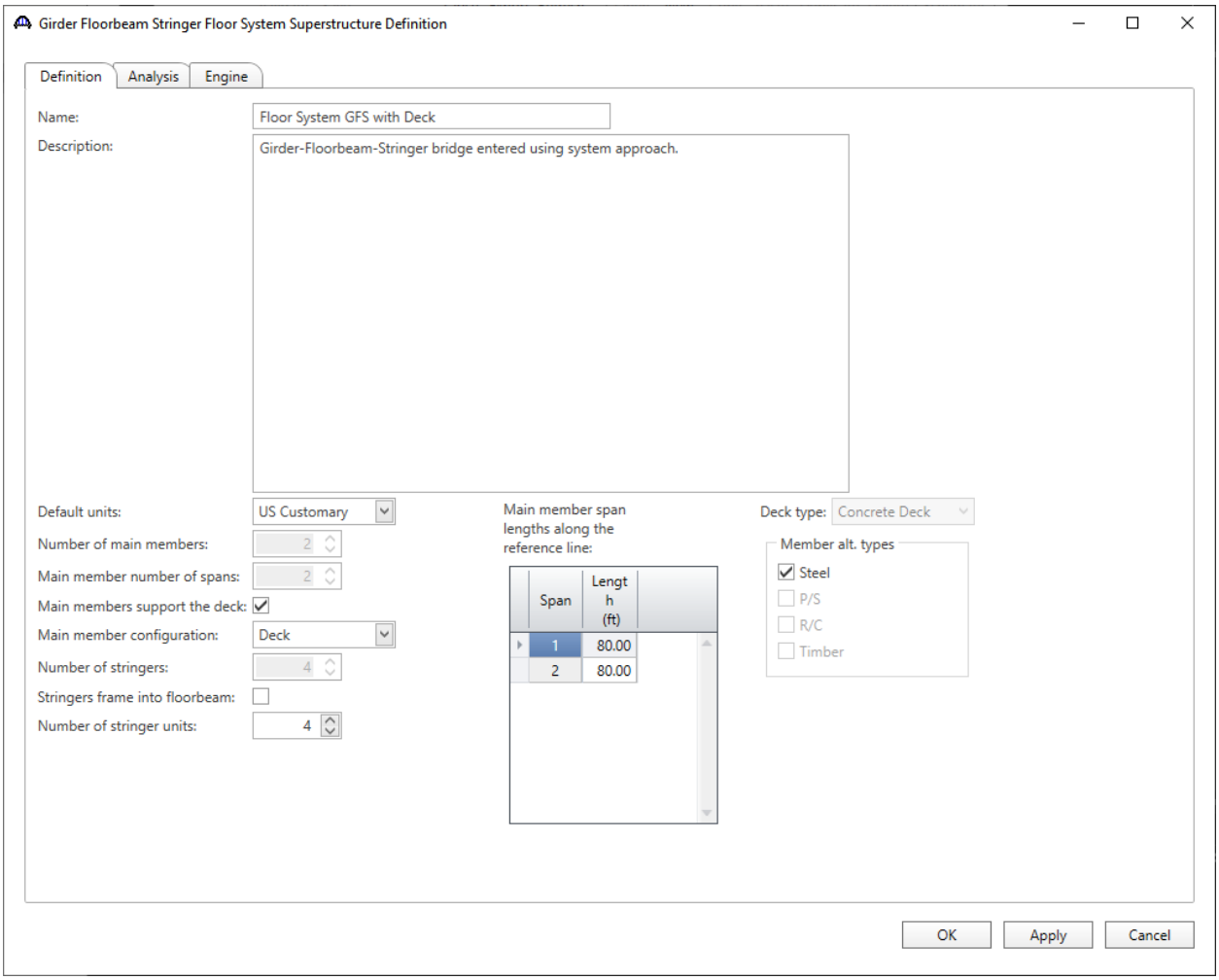
Returning to the **Bridge** tab of the **Bridge Workspace**, double click on **SUPERSTRUCTURE DEFINITIONS** (or click on **SUPERSTRUCTURE DEFINITIONS** and select **New** from the **Manage** group of the **WORKSPACE** ribbon or right mouse click on **SUPERSTRUCTURE DEFINITIONS** and select **New** from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



Selecting **Floor system superstructure** displays three types of floor system superstructure definitions. Select the **Girder Floorbeam Stringer** and click **OK.**

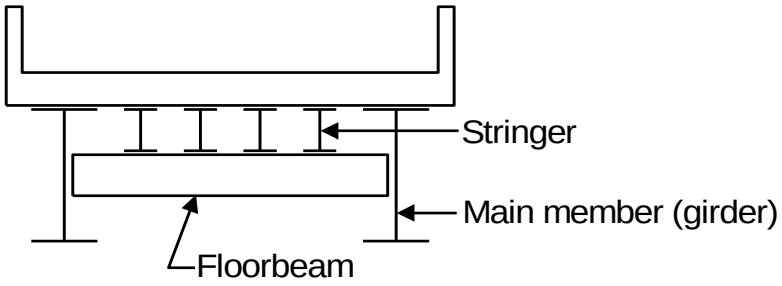


The **Girder Floorbeam Stringer Floor System Superstructure Definition** window will open. Enter the data as shown below.

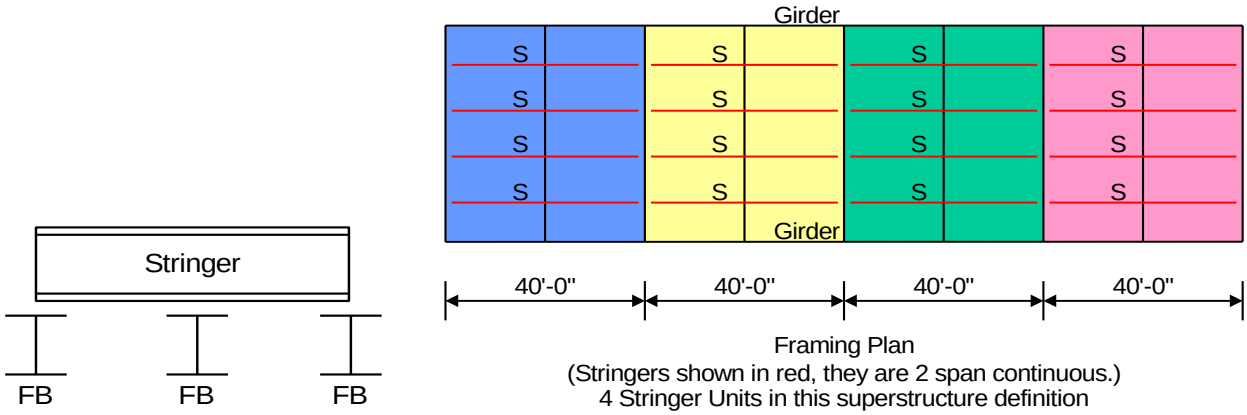


Click **OK** to apply the data and close the window.

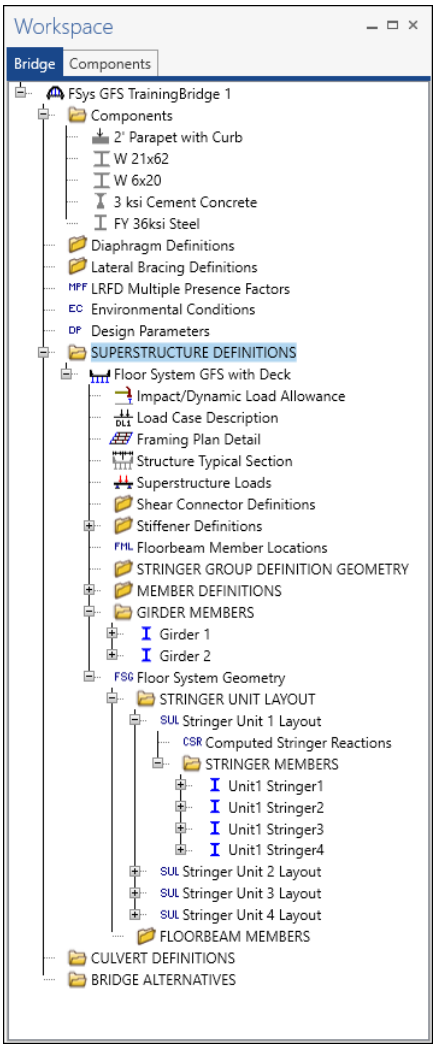
The following describes some of the terminology on this window. As shown in the sketch below, this structure has 2 main members (girders) and 4 stringers.



Stringer units are the portions of the structure where the stringers are to be analyzed as structurally continuous units. In this structure, the stringers are 2 span continuous and there are 4 stringer units.

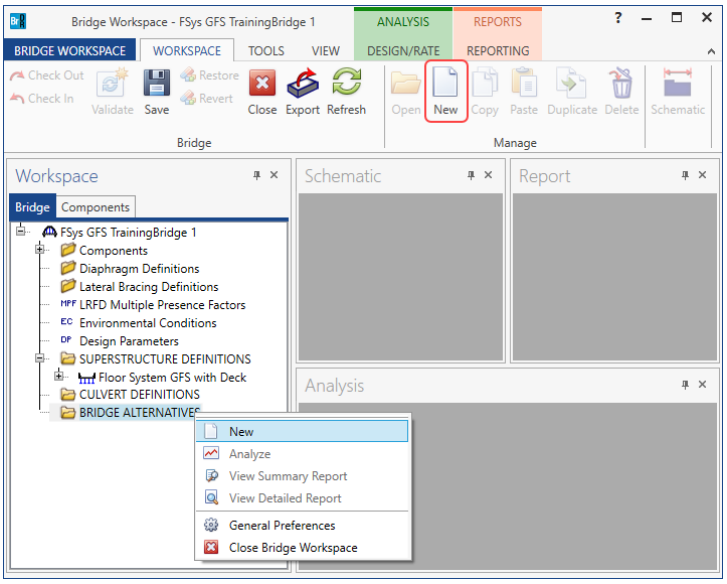


The partially expanded **Bridge Workspace** tree is shown below.

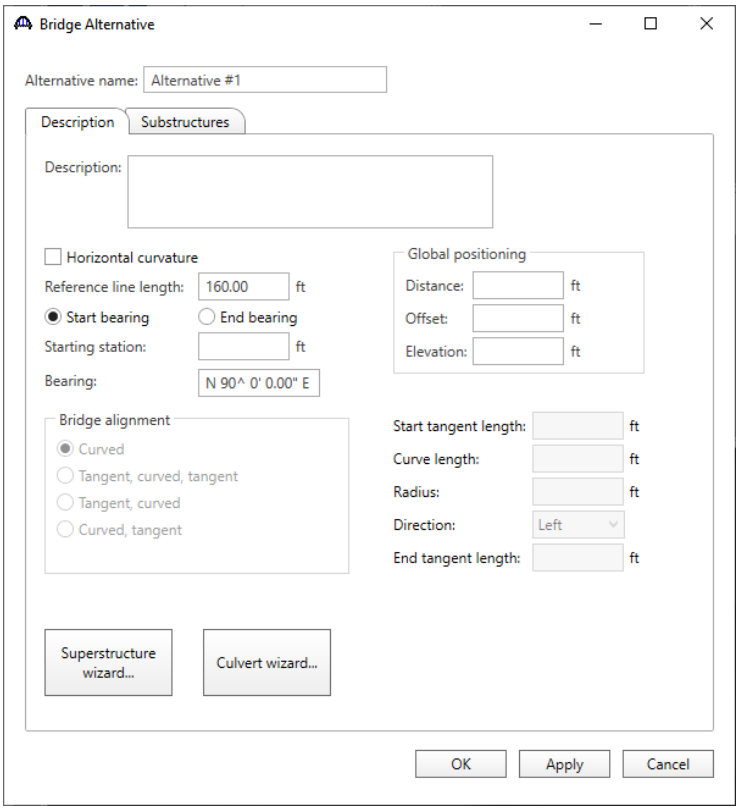


BRIDGE ALTERNATIVES

Navigate to the **BRIDGE ALTERNATIVES** node in the **Bridge Workspace** tree and create a new bridge alternative by double-clicking on **BRIDGE ALTERNATIVES** (or click on **BRIDGE ALTERNATIVES** and select **New** from the **Manage** group of the **WORKSPACE** ribbon).

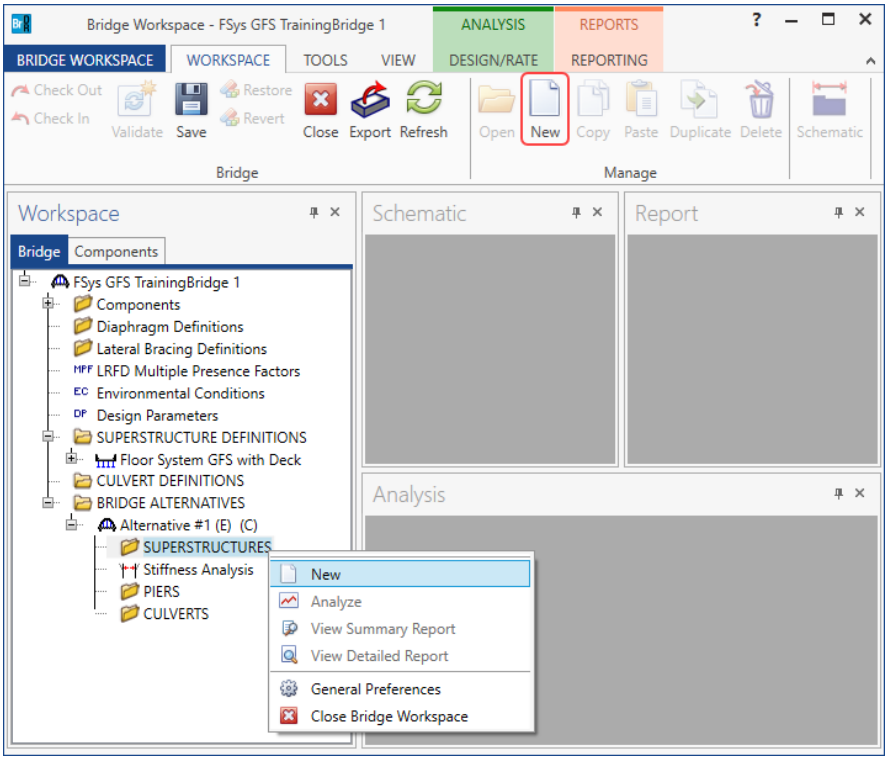


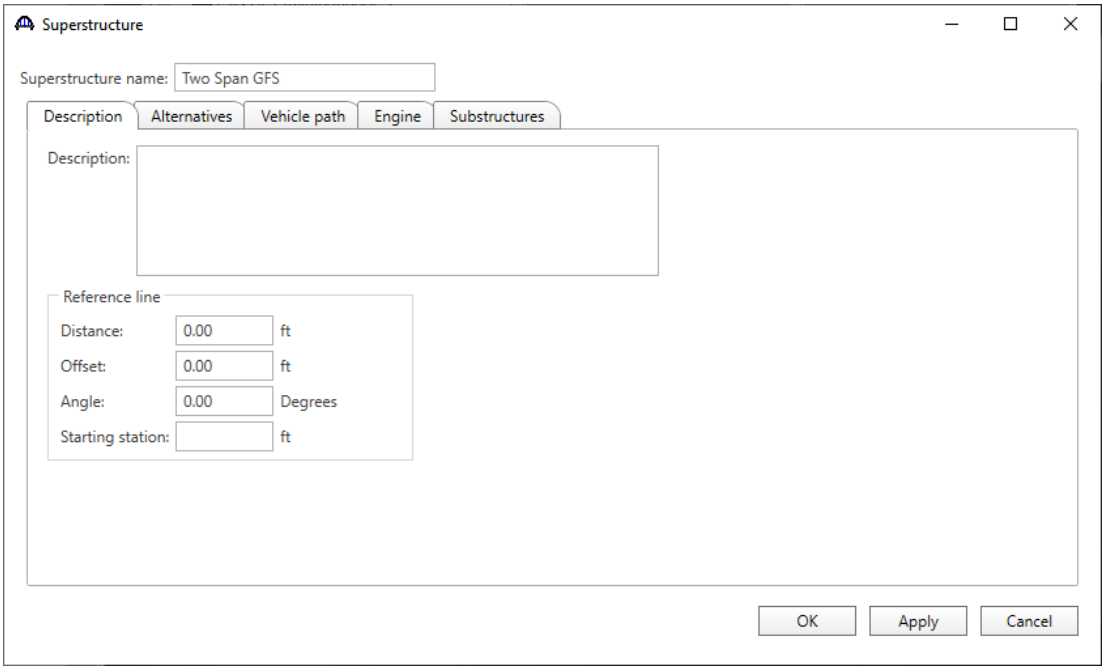
Enter the following data.



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

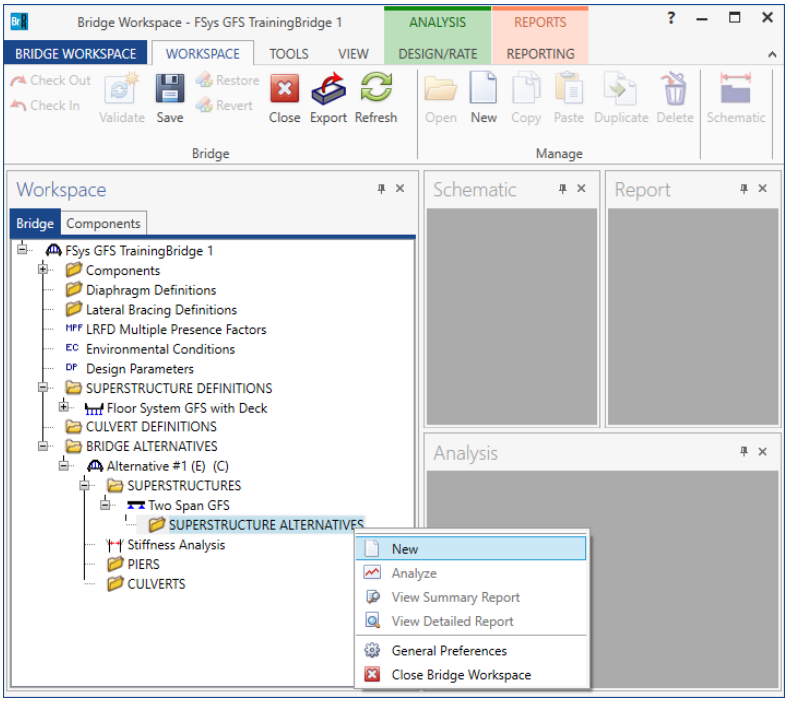
Expand the **Alternative #1** node in the **Bridge Workspace** tree by clicking the ⊞ button. Double-click on the **SUPERSTRUCTURES** node (or select **SUPERSTRUCTURES** and click **New** from the **Manage** group of the **WORKSPACE** ribbon) and enter the following new superstructure.



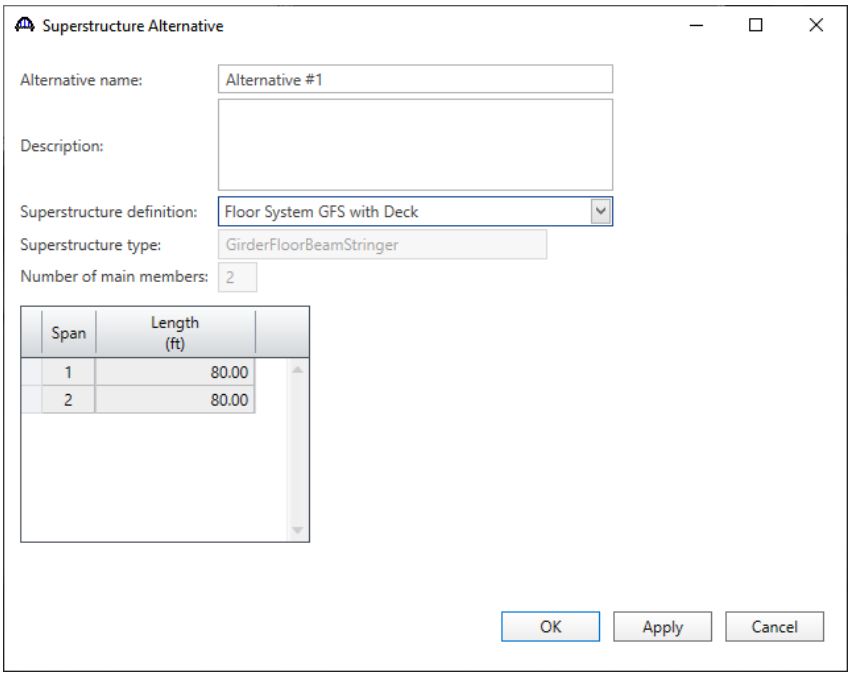


Click **OK** to apply the data and close the window.

Expand the **Two Span GFS** node in the **Bridge Workspace** tree by clicking the ⊞ button. Double-click on the **SUPERSTRUCTURE ALTERNATIVES** node (or select **SUPERSTRUCTURE ALTERNATIVES** and click **New** from the **Manage** group of the **WORKSPACE** ribbon) and enter the following new superstructure alternative.

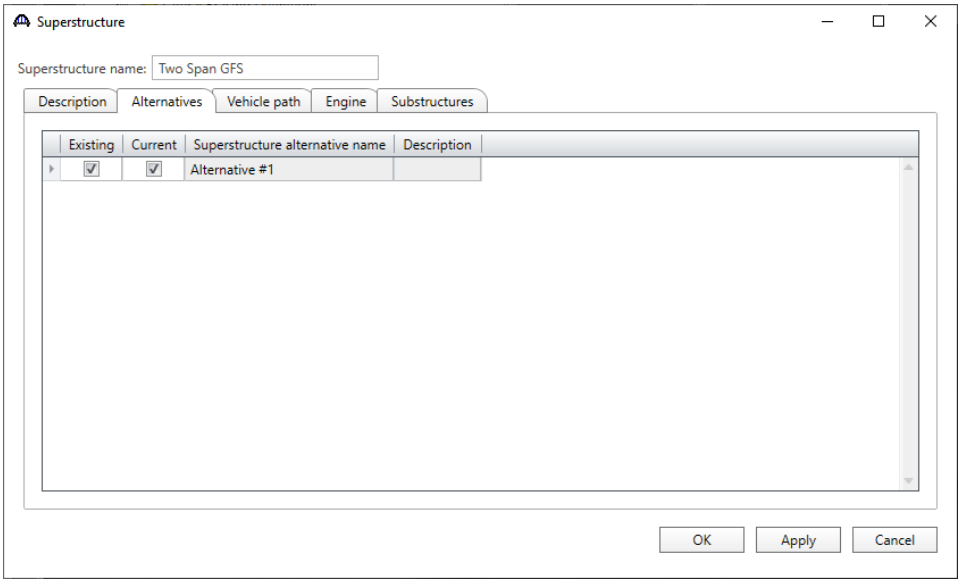


Select the **Superstructure definition Floor System GFS with Deck** as the current superstructure definition for this Superstructure Alternative.



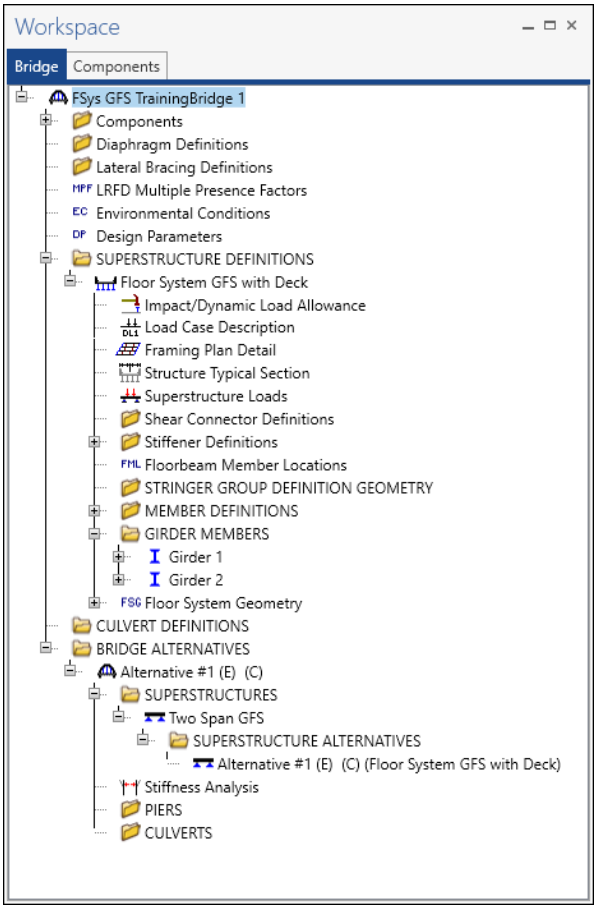
Click **OK** to apply the data and close the window

Re-open the **Two Span GFS** window and navigate to the **Alternatives** tab. The **Alternative #1** will be shown as the **Existing** and **Current** alternative for **Two Span GFS**.



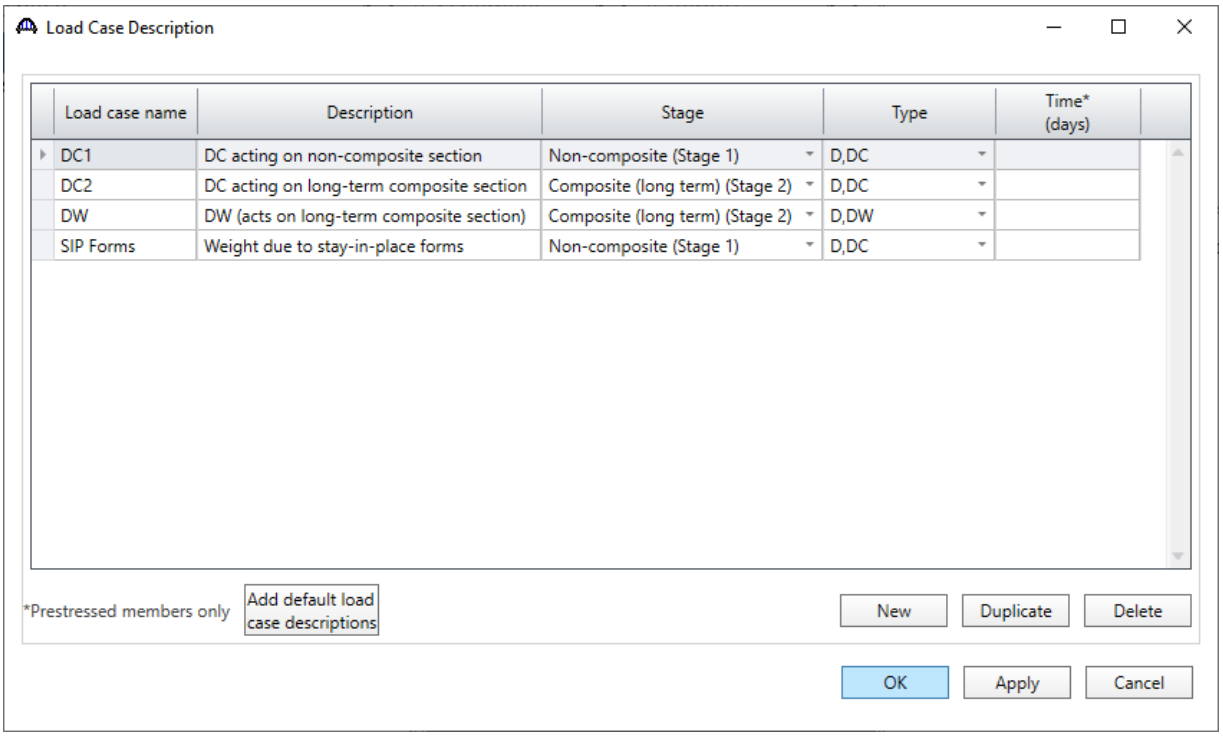
Click **Cancel** to close the window.

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



Load Case Description

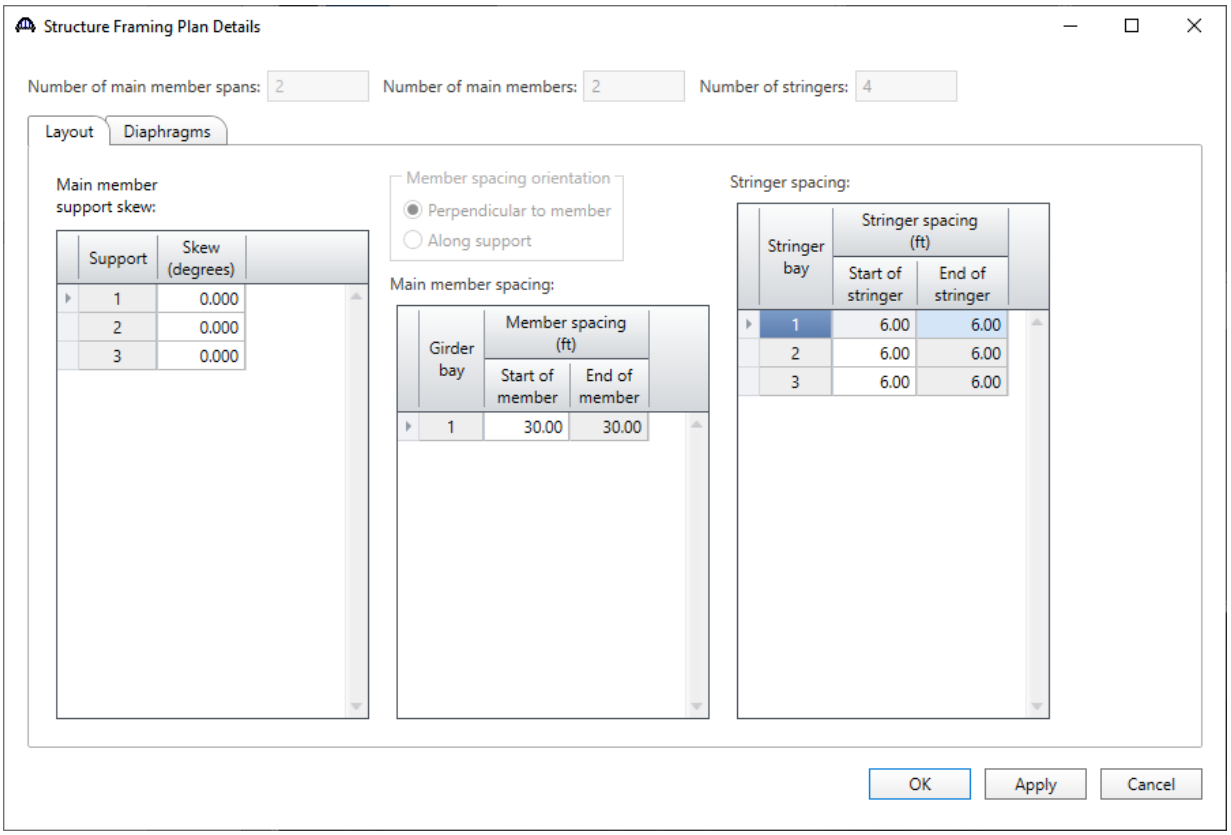
Navigate to the **Floor System GFS with Deck** superstructure definition and double-click on the **Load Case Description** node in the **Bridge Workspace** tree to open the **Load Case Description window.** Click on the **Add default load case description** button to create the following load cases.



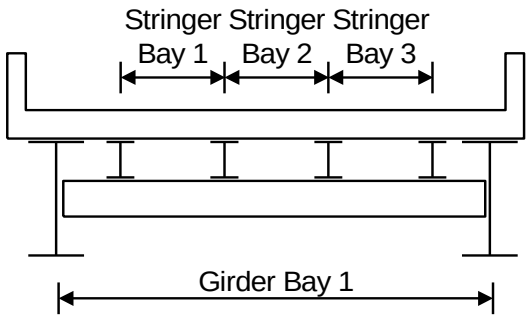
Click **OK** to apply the data and close the window.

Structure Framing Plan Detail – Layout

Double-click on **Framing Plan Detail** in the **Bridge Workspace** tree to describe the framing plan in the **Structure Plan Details** window. Enter the data as shown below.

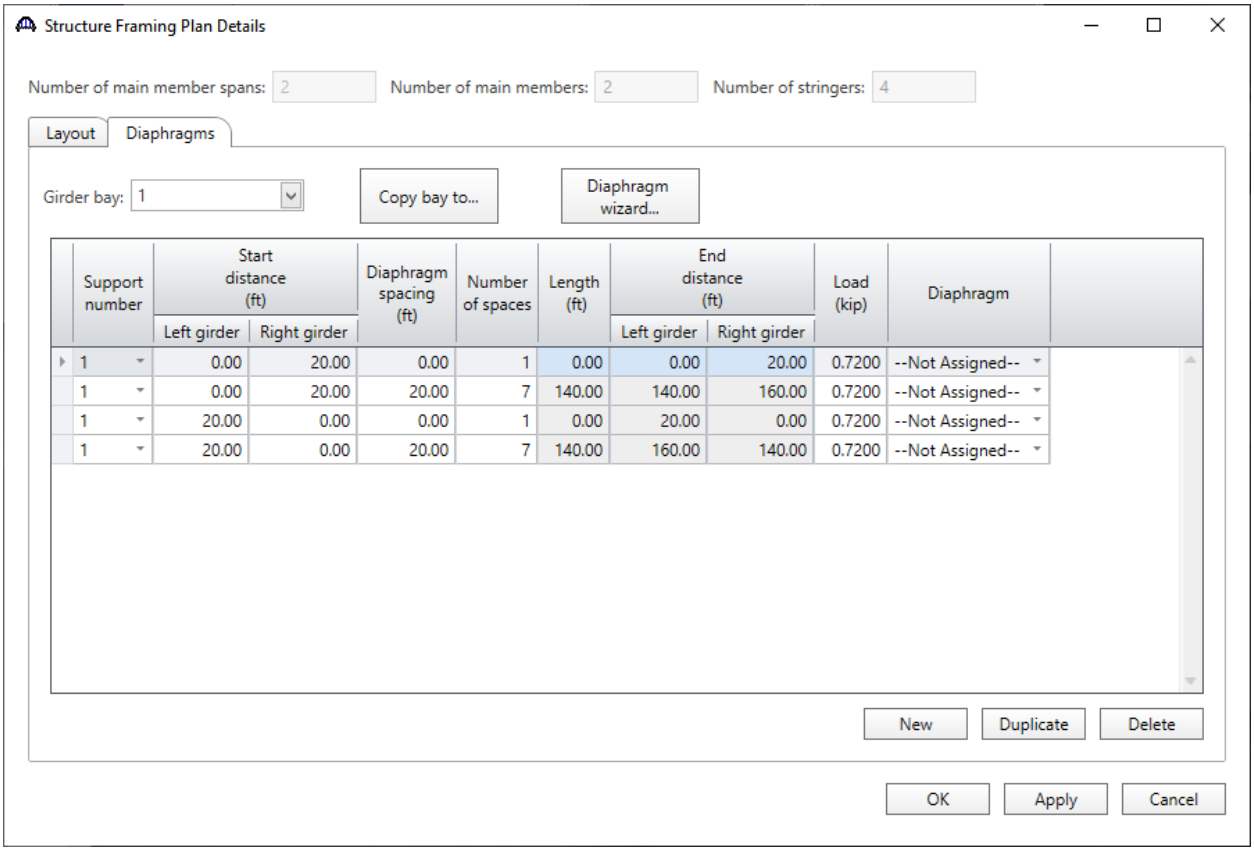


The Main Member and Stringer Bays are labeled as follows.

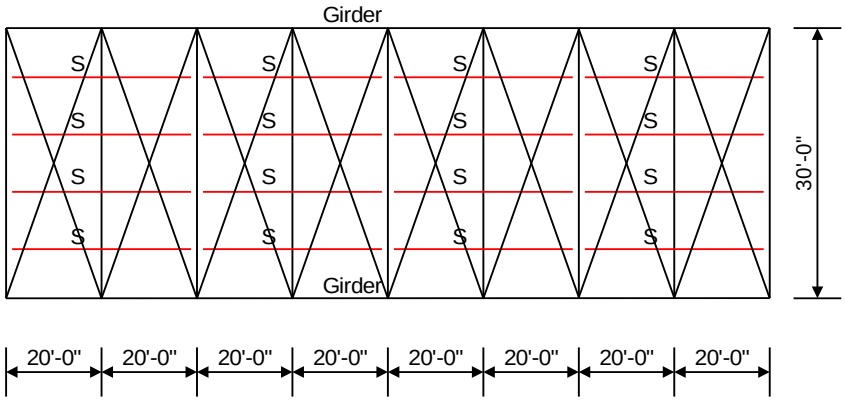


Structure Framing Plan Detail – Diaphragms

Switch to the **Diaphragms** tab to enter the lateral bracing between the girders. Enter the data as shown below.



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



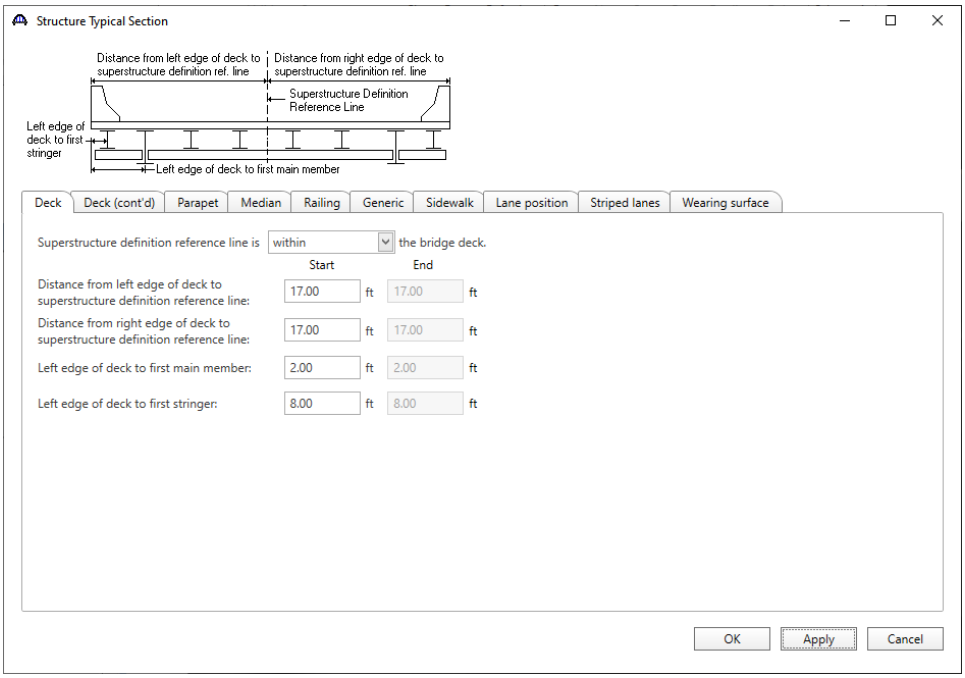
The load of each brace is computed as follows.

Length $= \sqrt{20^2 + 30^2} = 36'$

Load of each brace $=$ 36'*20 lb/ft $=$ 720 lb

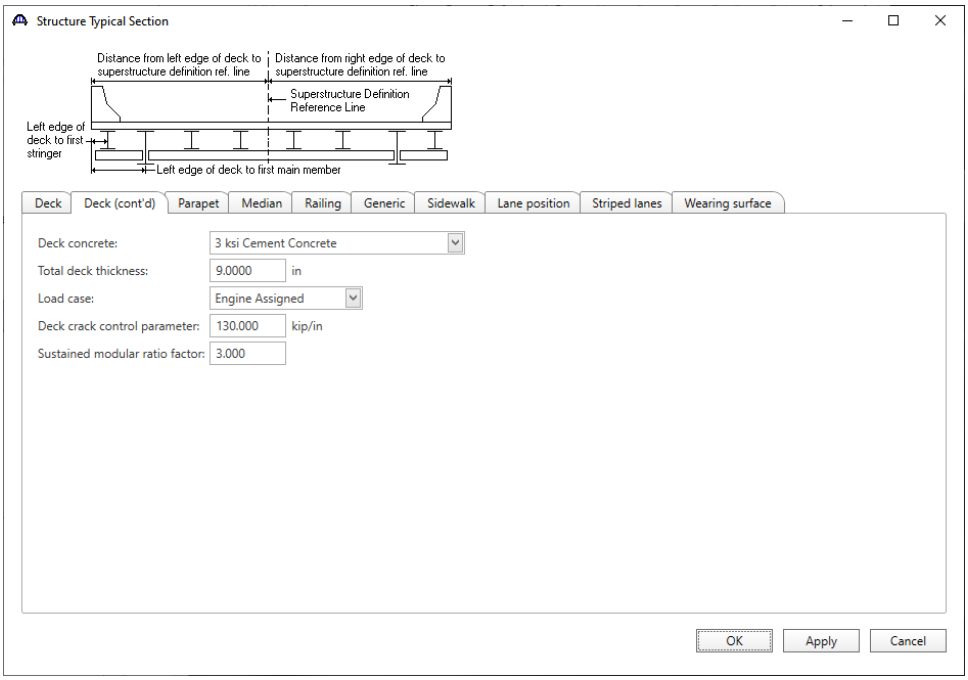
Structure Typical Section - Deck

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



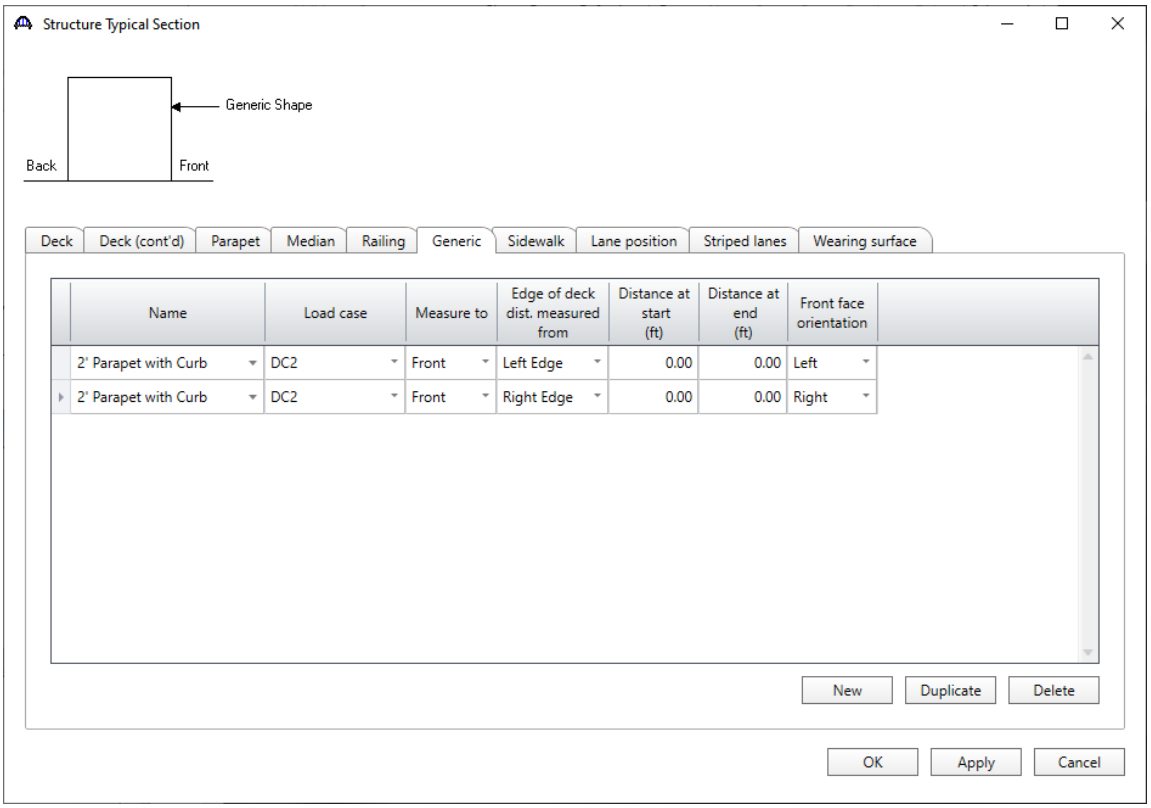
Structure Typical Section – Deck (cont'd)

The **Deck (cont'd)** tab is used to enter information about the **Deck concrete** and the **Total deck thickness**. The material to be used for the deck concrete is selected from the list of bridge materials. Enter the data as shown below.



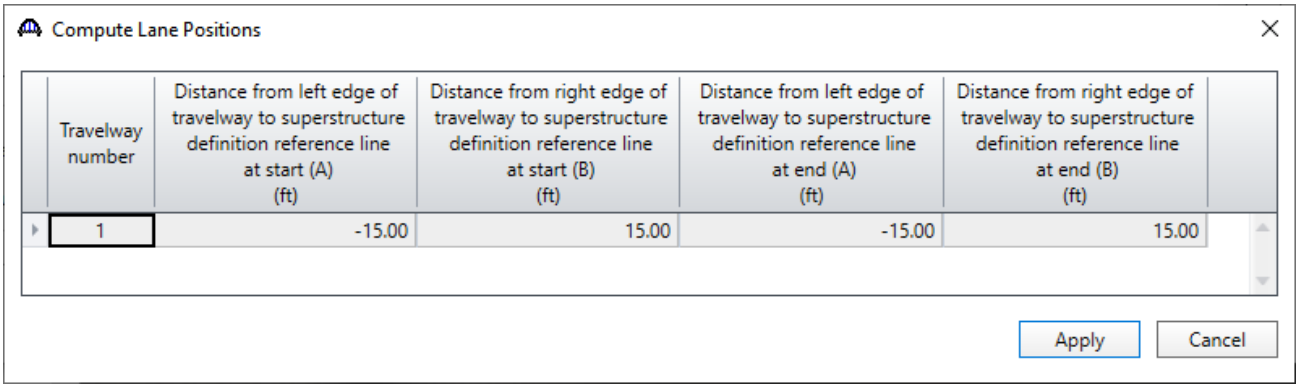
Structure Typical Section – Generic

Click the **New** button to add a row to the table. The **Name** of the generic barrier defaults to the only barrier described for the bridge. The competed tab is shown below.

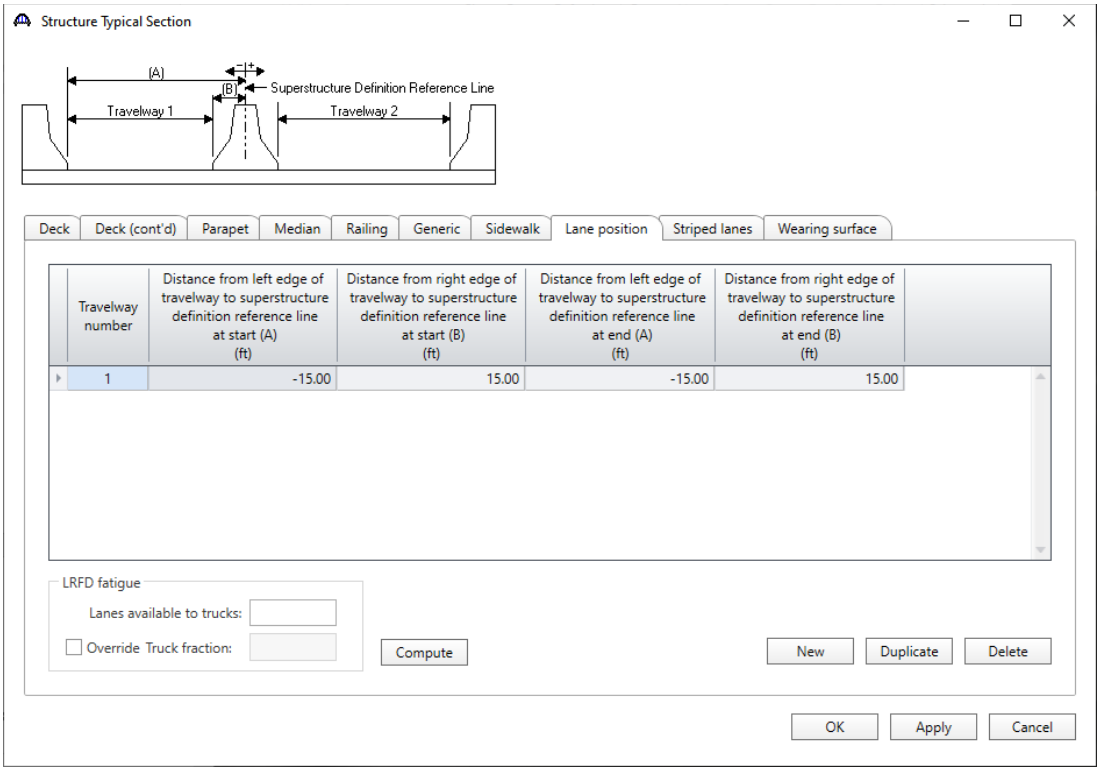


Structure Typical Section – Lane Positions

Select the **Lane position** tab. This tab defines the locations that the vehicles can move or travelways . Use the **Compute…** button to compute the lane positions. A window showing the results of the computation opens. Click **Apply** to apply the computed values.



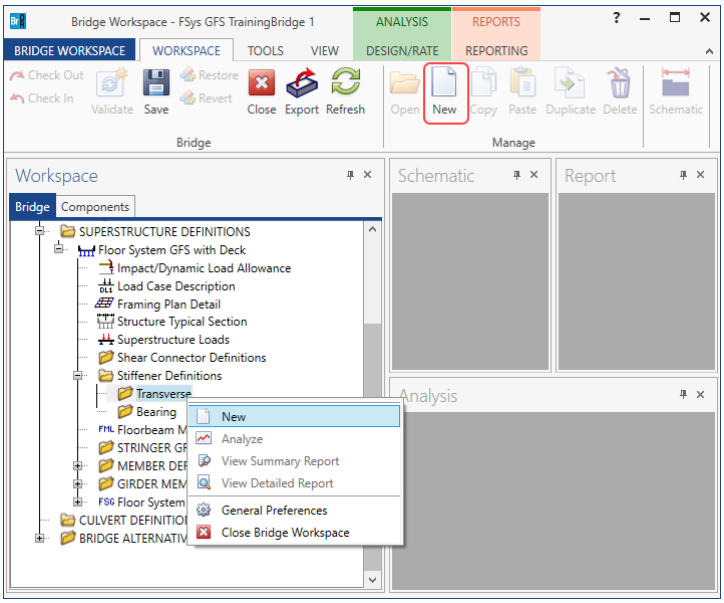
The **Lane Position** tab is populated as shown below.



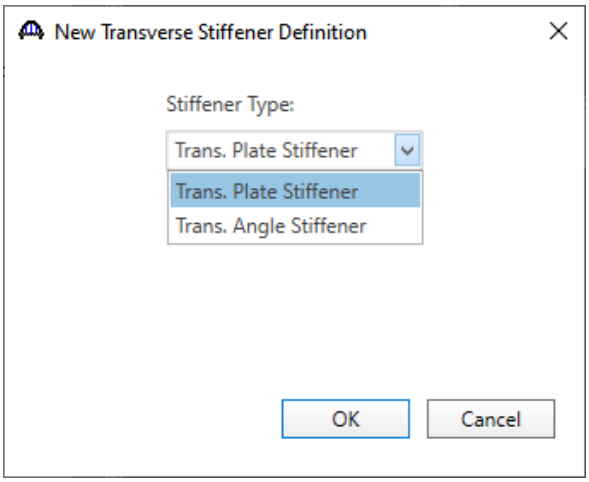
Click **OK** to apply the data and close the window

Stiffener Definitions – Transverse

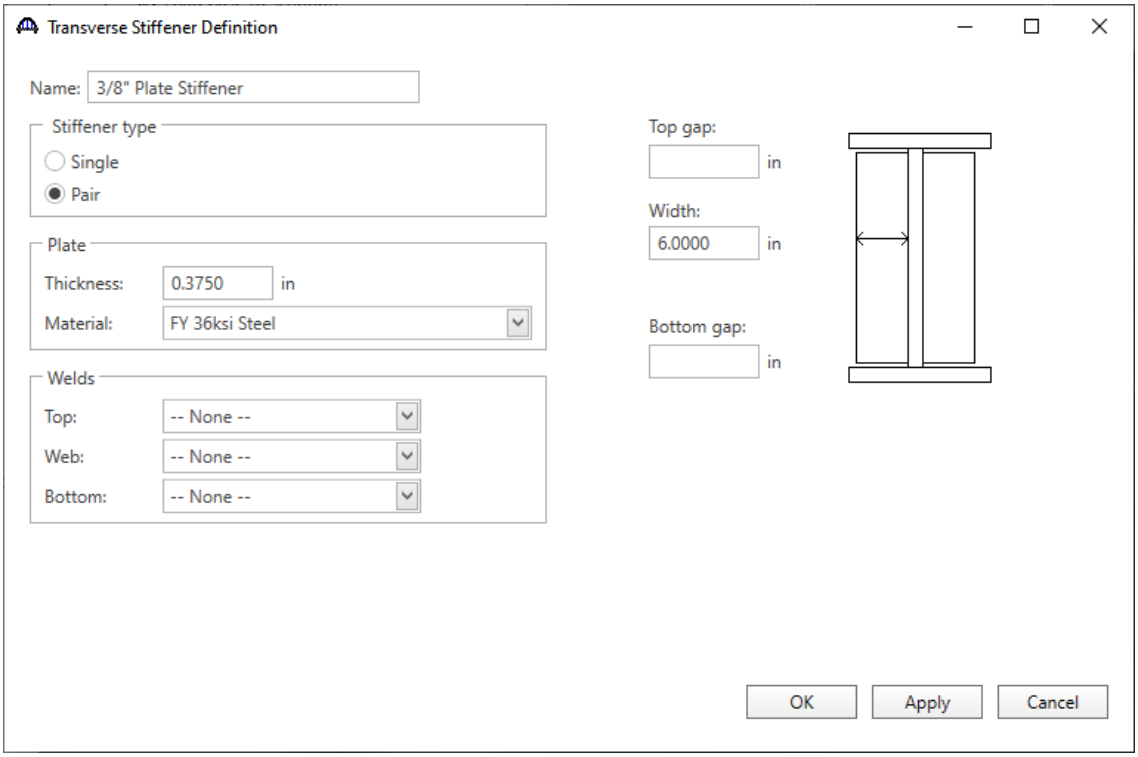
Define the transverse stiffeners to be used by the girders. Expand the **Stiffener Definitions** node in the **Bridge Workspace** tree, select **Transverse** and click on the **New** button from the **Manage** group of the **WORKSPACE** ribbon (or right click and select **New** from the drop-down menu) as shown below.



Select **Trans. Plate Stiffener** for **Stiffener Type** in the **New Transverse Stiffener Definition** window and click **OK** to open the **Transverse Stiffener Definition** window as shown below.

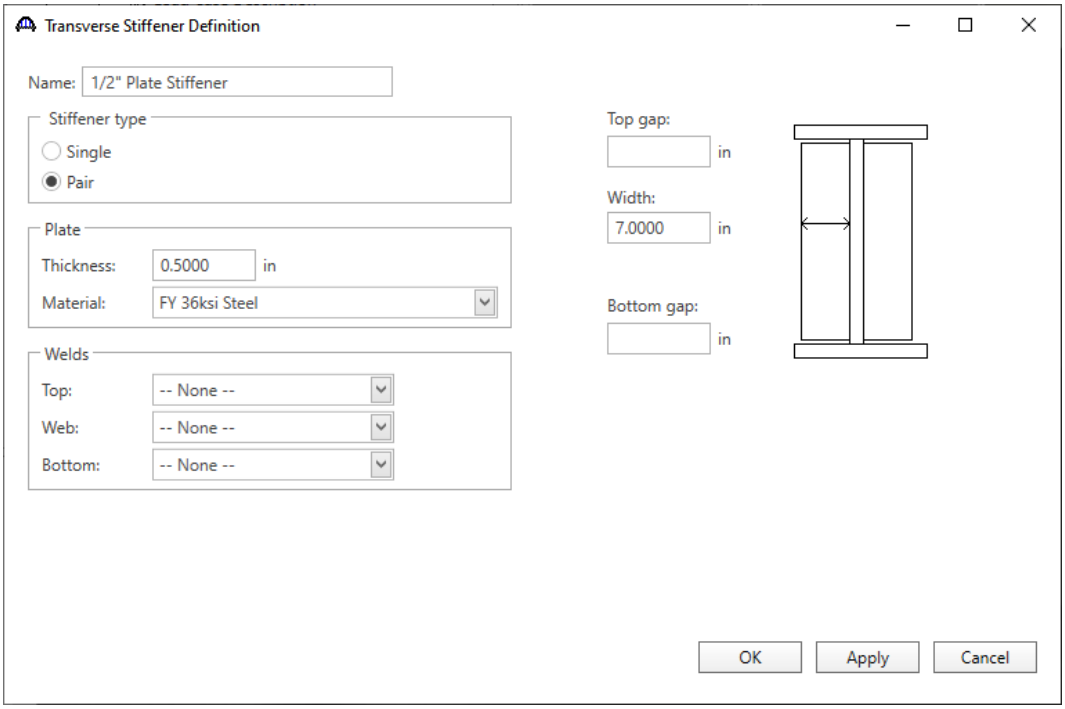


Define the stiffener as shown below.



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

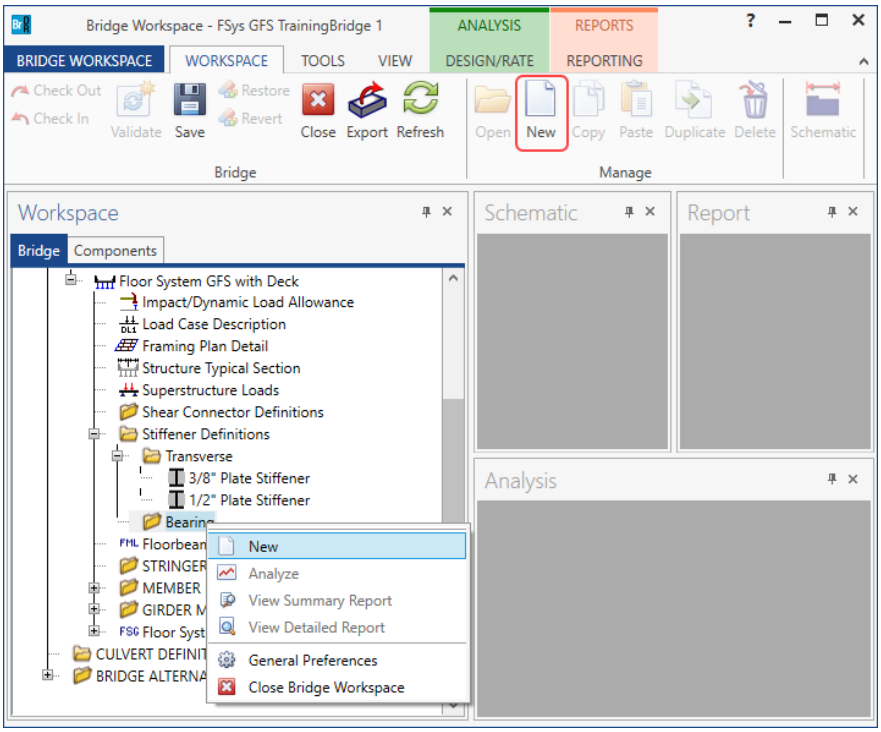
Repeat this process to define another stiffener as shown below.



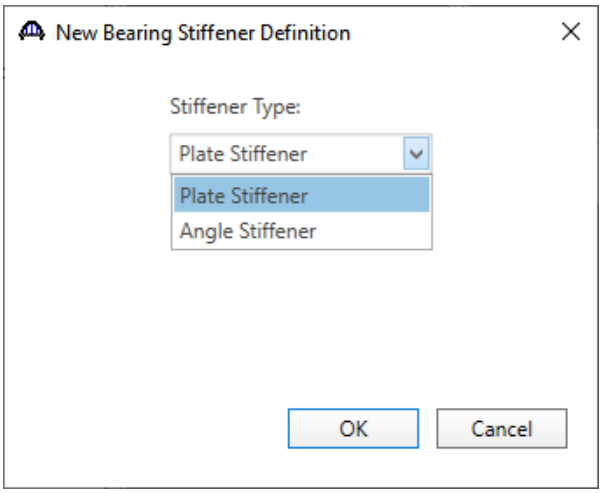
Click **OK** to apply the data and close the window.

Stiffener Definitions – Bearing

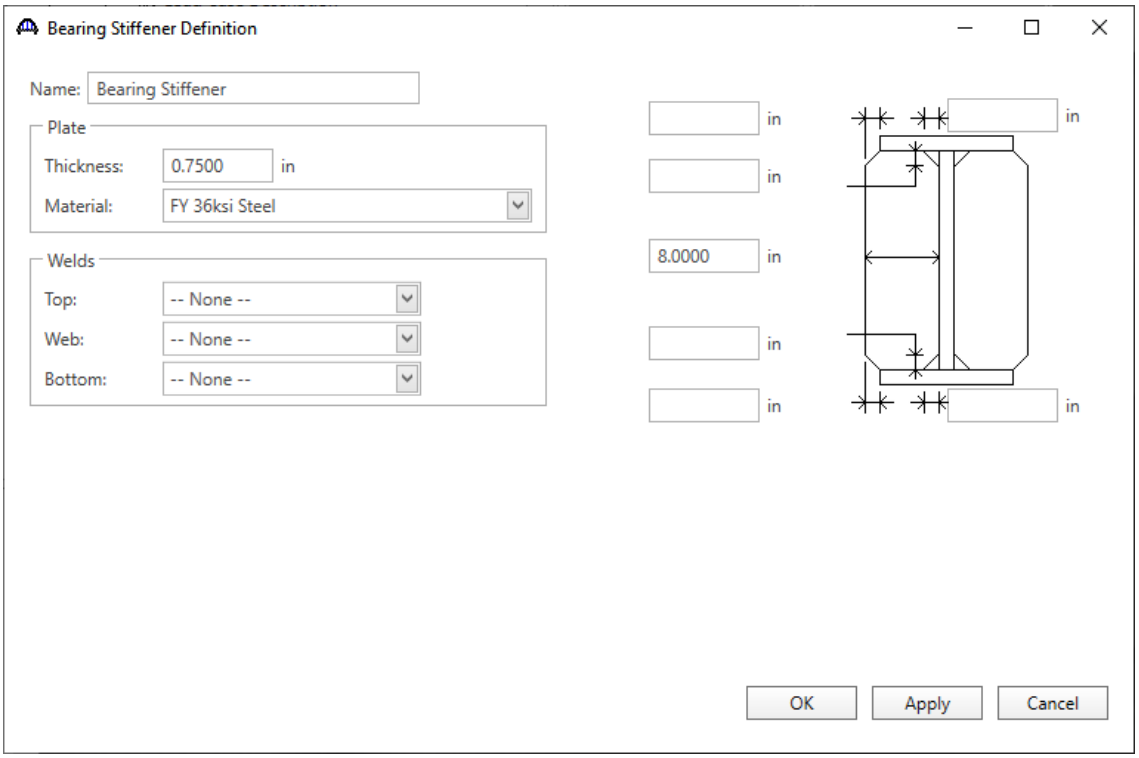
Define the bearing stiffeners to be used by the girders. Expand the **Stiffener Definitions** node in the **Bridge Workspace** tree, select **Bearing** and click on the **New** button from the **Manage** group of the **WORKSPACE** ribbon (or right click and select **New** from the drop-down menu) as shown below.



Select **Plate Stiffener** for **Stiffener type** in the **New Transverse Stiffener Definition** window and click **OK** to open the **Transverse Stiffener Definition** window as shown below.



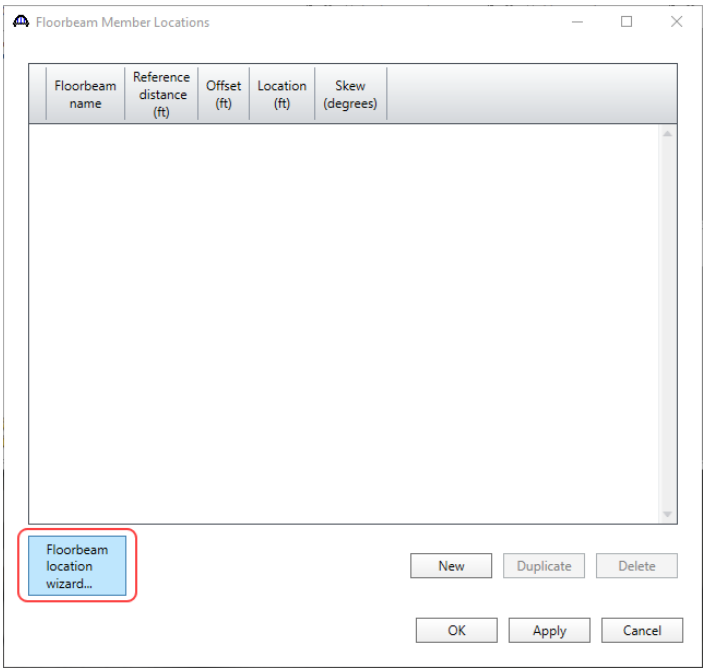
Define the stiffener as shown below.



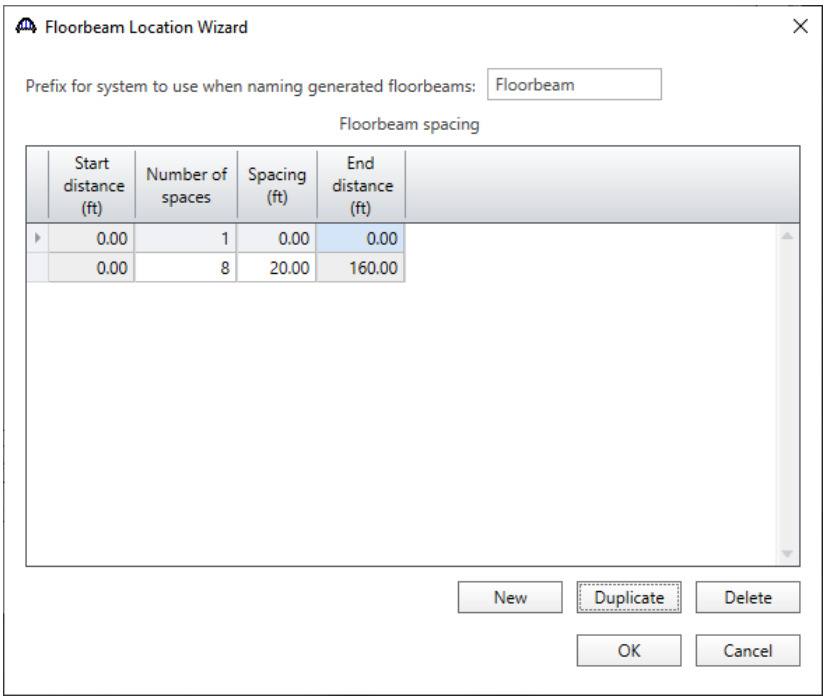
Click **OK** to apply the data and close the window.

Floorbeam Member Locations

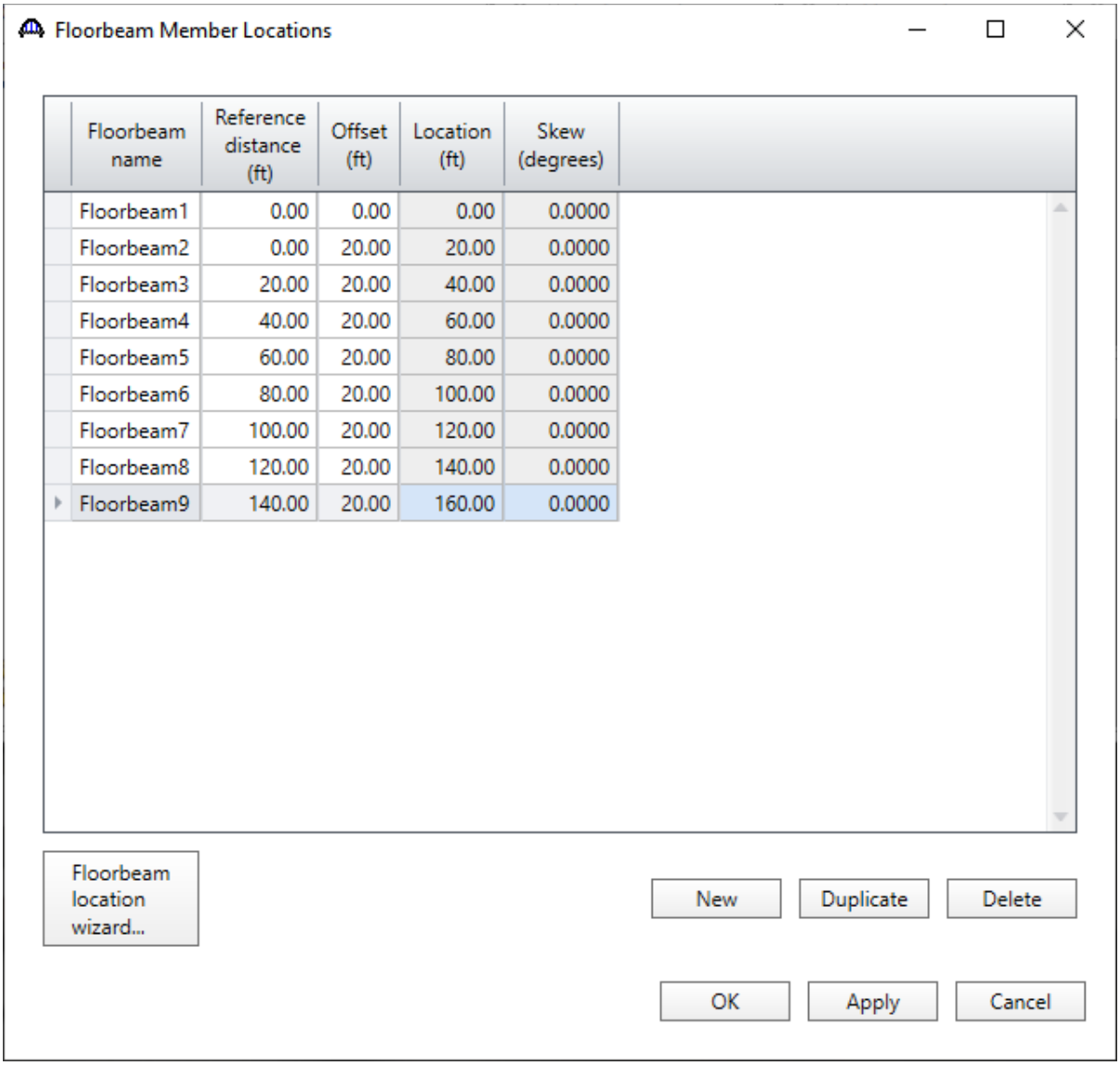
Double click on the **Floorbeam Member Locations** node in the **Bridge Workspace** tree to open the **Floorbeam Member Locations** window as shown below.



Click the **Floorbeam location wizard…** button and enter the following spacing to add floorbeams for the entire structure. Click **OK** to add the floorbeams.



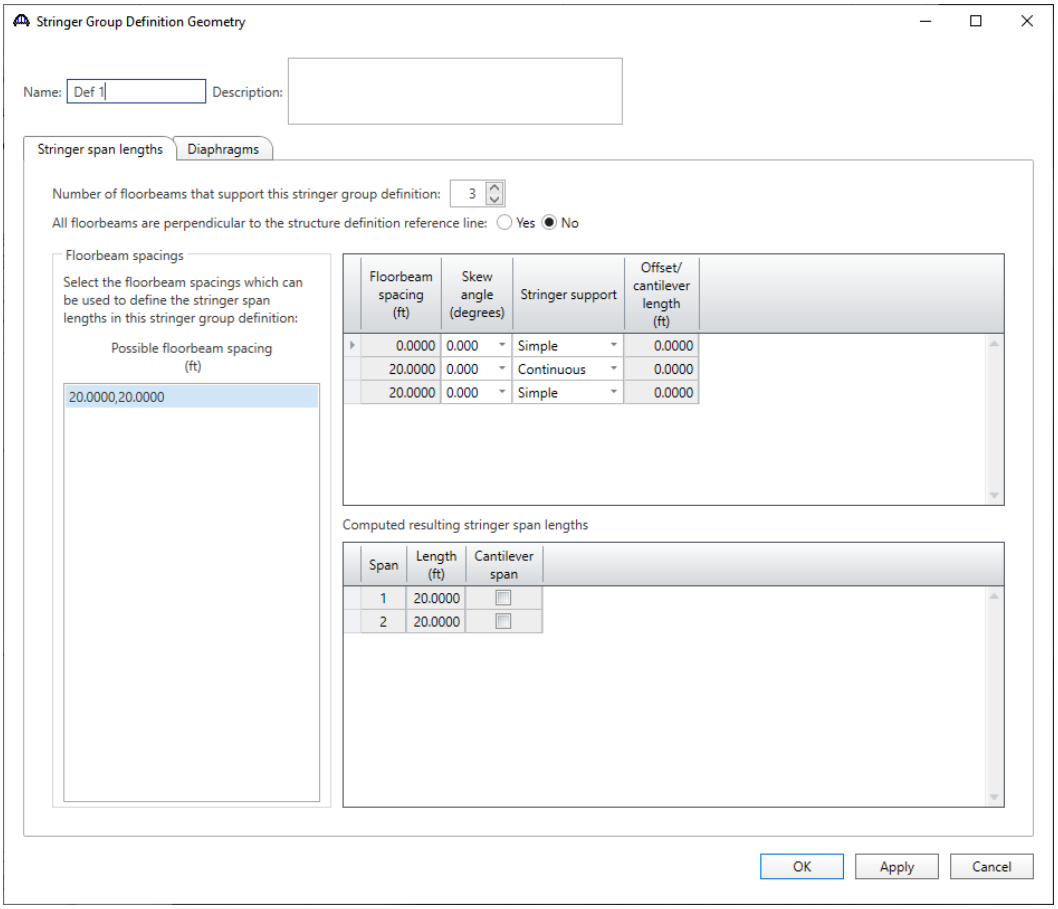
The floorbeam member locations created for the structure are shown below.

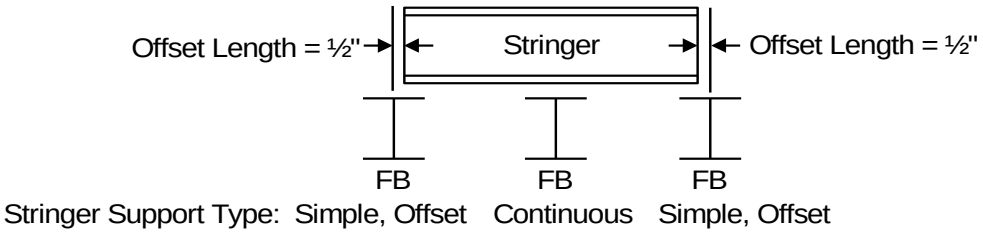


Click **OK** to apply the data and close the window.

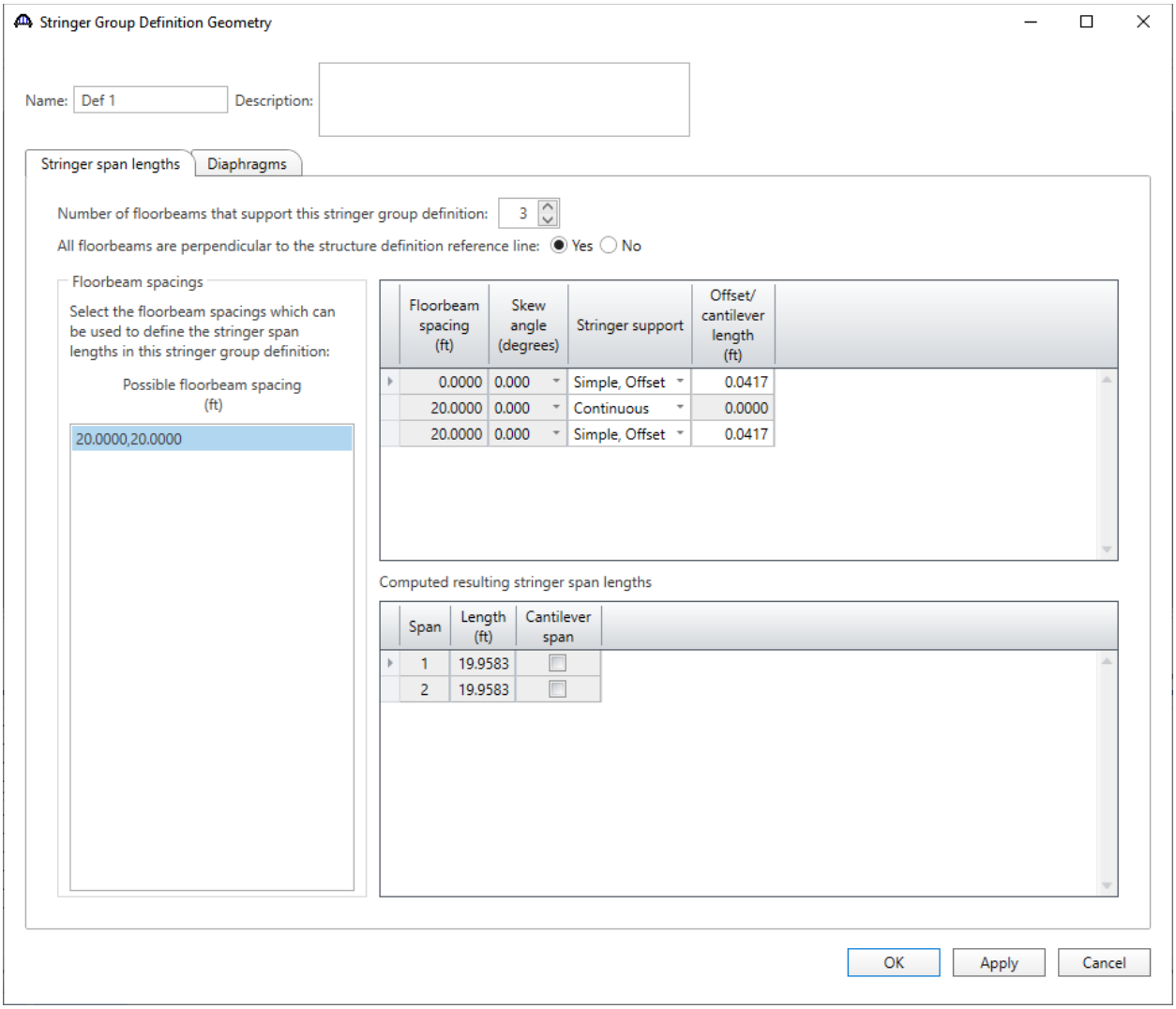
Stringer Group Definition Geometry – Stringer span lengths

A stringer group definition contains data regarding a portion of the structure where the stringers are structurally continuous. The stringers in this structure all have the same span data. They are 2 span continuous and are supported by 3 floorbeams. Create one stringer group definition containing this geometry data and then apply this stringer group definition to all the 4 stringer units in this structure. Double click on the **STRINGER GROUP DEFINITION GEOMETRY** in the **Bridge Workspace** tree to define the geometry for a stringer group definition as shown below.





Enter the following data in the **Floorbeam spacings** grid to describe the span lengths of the stringer members that will be in the stringer units to which this stringer group definition is assigned in the **Floor System Geometry** window later. In this example, define the lengths of the stringers in detail, including the ½" offset between the end of the stringer and the centerline of the floorbeam. If the user wishes to not enter all the details, the end Stringer support type can be selected as **Simple** and the offset length in the grid will default to zero.

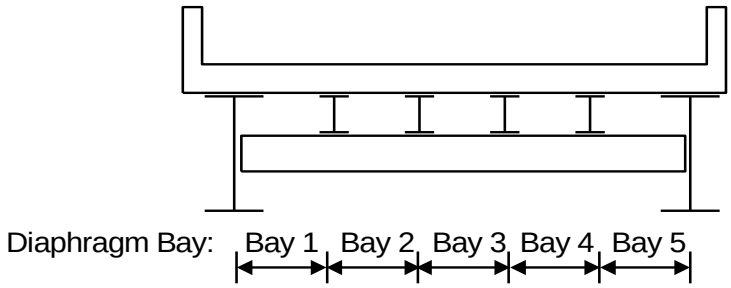


Click **Apply** to compute and save the stringer span length data before navigating to the **Diaphragms** tab.

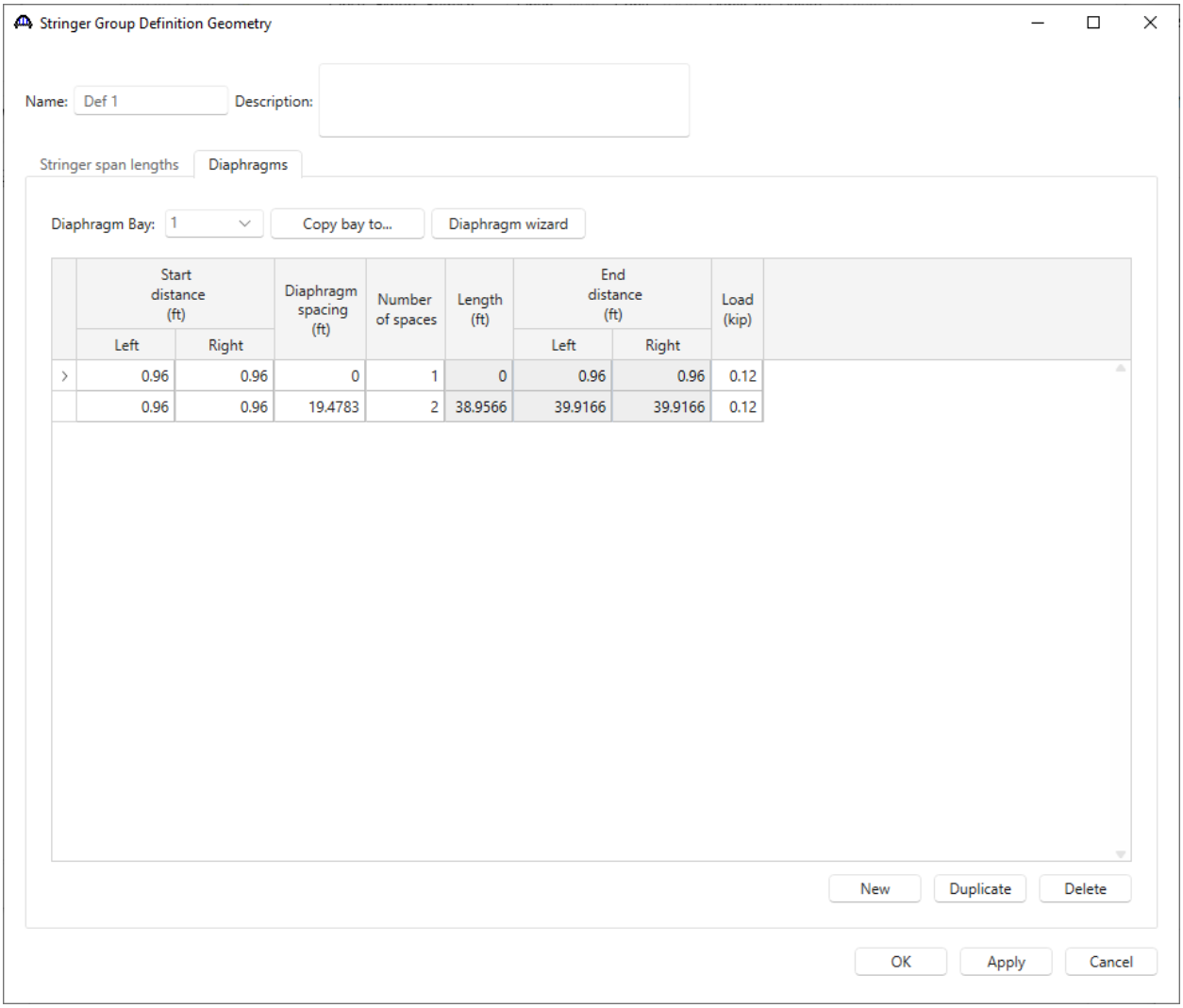
Click **F1** on this window to open the **AASHTOWare BrDR Help** for this window to view some examples illustrating how to define stringer group definitions.

Stringer Group Definition Geometry – Diaphragms

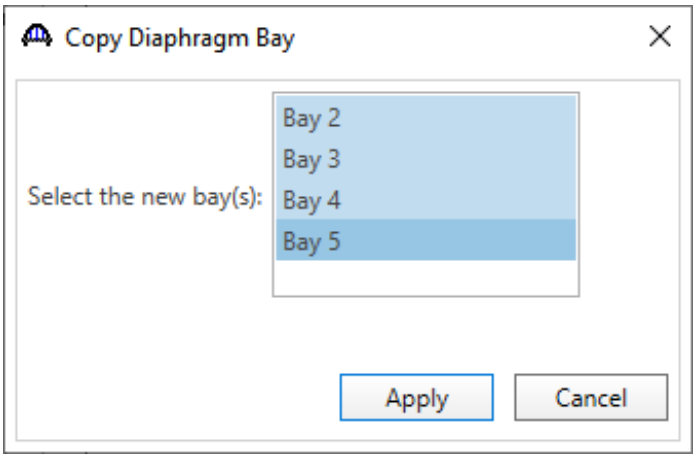
Navigate to the **Diaphragms** tab to enter the diaphragm spacing for the stringer group definition. **Diaphragm Bay 1** is the bay between the left most girder and the first stringer.



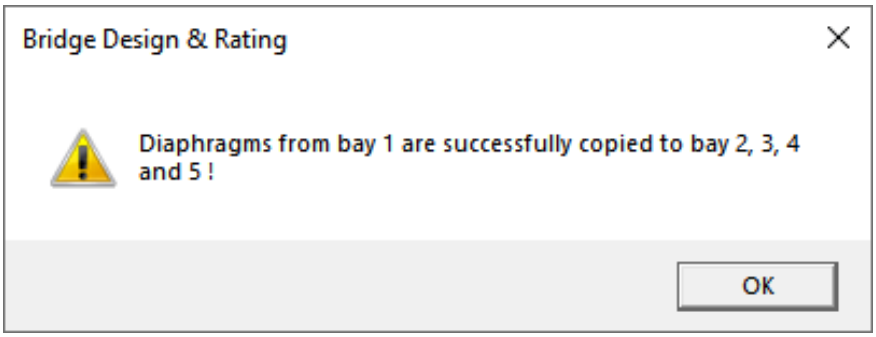
Enter the following diaphragms for **Diaphragm Bay 1**.



Click the **Copy bay to…** button to copy the diaphragms entered for Bay 1 to the other bays. The following window appears. Select all the bays by holding the **Shift** key and Click **Apply** as shown below.



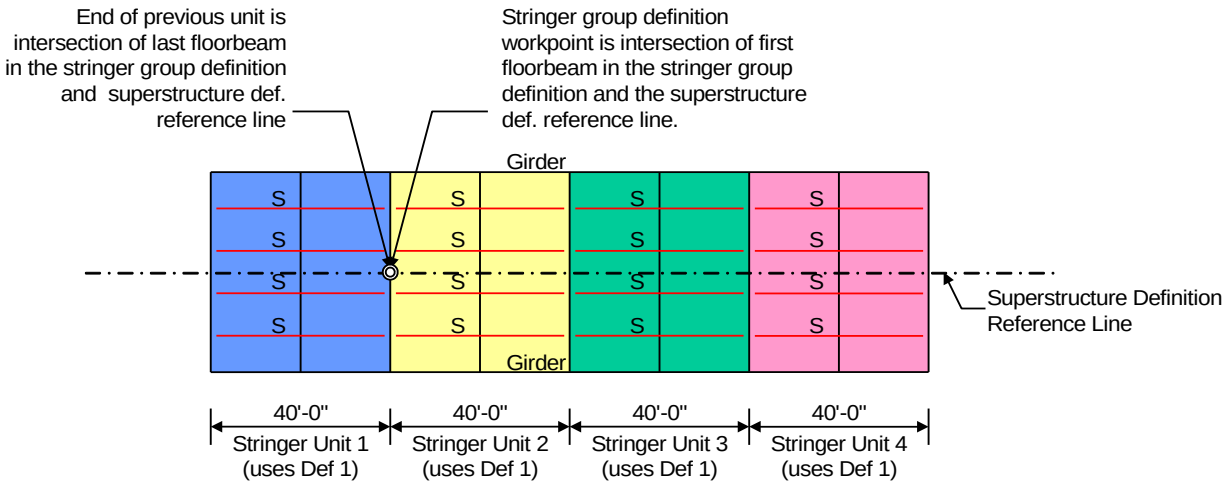
The following message appears indicating that the diaphragms have been copied. Click **OK** to close this window and update the diaphragms for each bay.



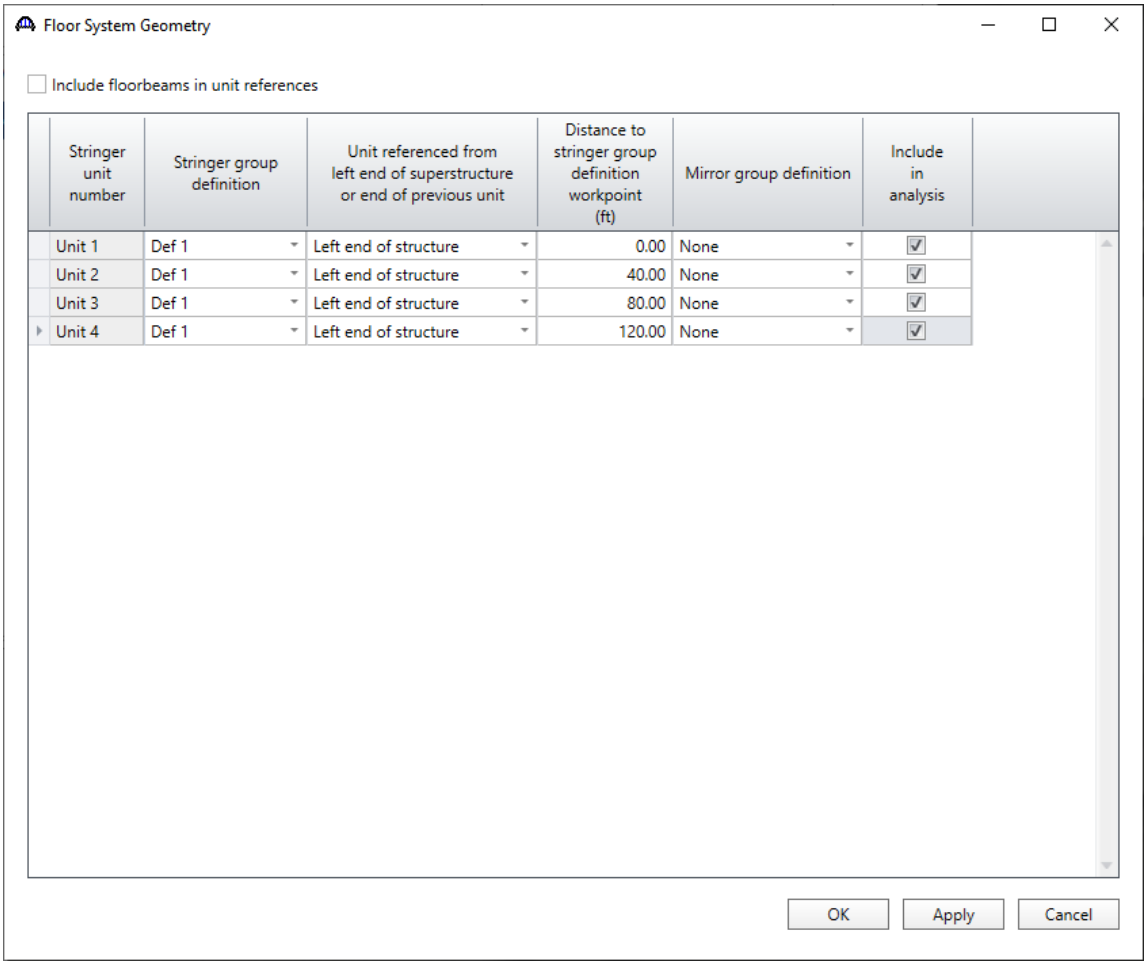
Assigning Stringer Group Definitions to Stringer Units – Floorbeam Member Locations

Double click on the **Floor System Geometry** node in the **Bridge Workspace** tree to assign stringer group definitions to stringer units in the floor system superstructure definition.

Before opening this window, the total number of stringers in this structure is known i.e., 16 since there are 4 stringer units and each unit contains 4 stringers. However, the location of these stringer members along the length of the structure and the length of the stringer is not known. The stringer members in the structure are all located at the beginning of the structure and do not have any length to them until a stringer group definition is assigned to the stringer units. The stringer group definition defines the stringer span lengths. Assigning stringer group definitions to the stringer units also locates the stringer members along the length of the structure. Click **F1** while this window is open to open the **AASHTOWare BrDR Help** to view examples illustrating how to assign stringer group definitions to stringer units.



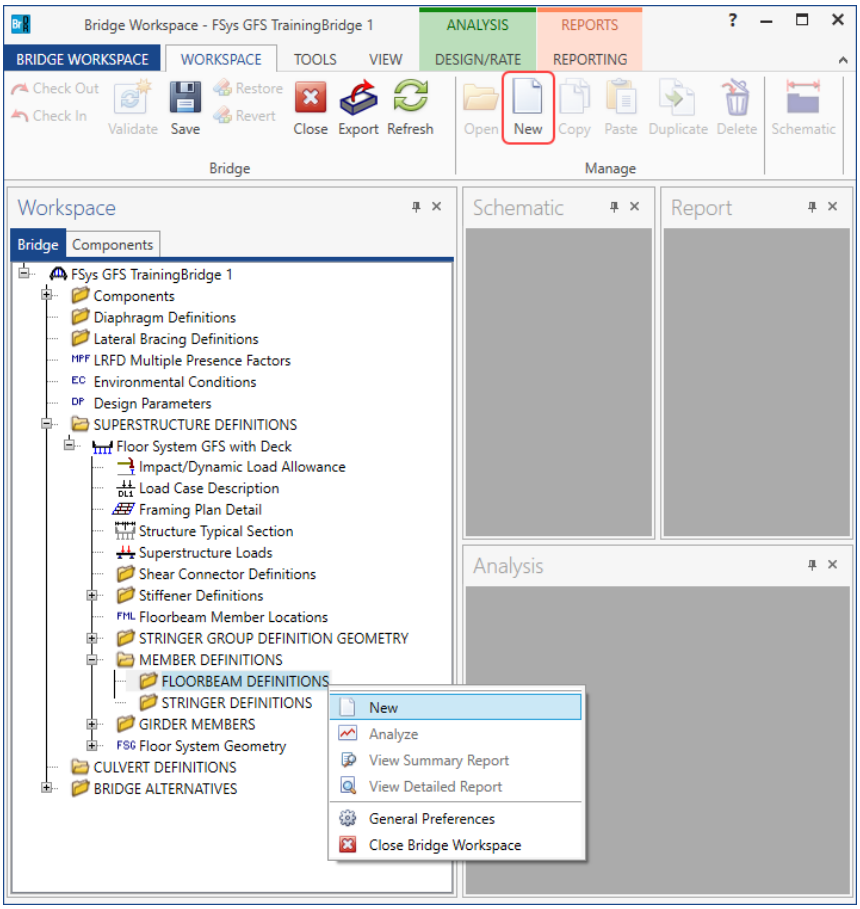
Enter the data as shown below.



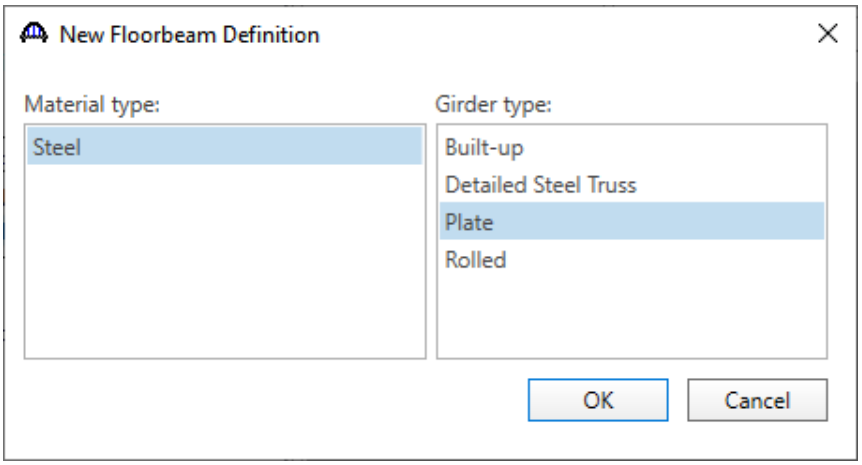
Click **OK** to apply the data and close the window

Describing a Floorbeam Member Definition – Floorbeam Definition (FB1) (Plate girder floorbeams)

Expand the **MEMBER DEFINITION** node in the **Bridge Workspace** tree and double click on the **FLOORBEAM DEFINITIONS** node (or select **FLOORBEAM DEFINITIONS** and click **New** from the **Manage** group of the **WORKSPACE** ribbon) to open the **New Floorbeam Definition** window as shown below.

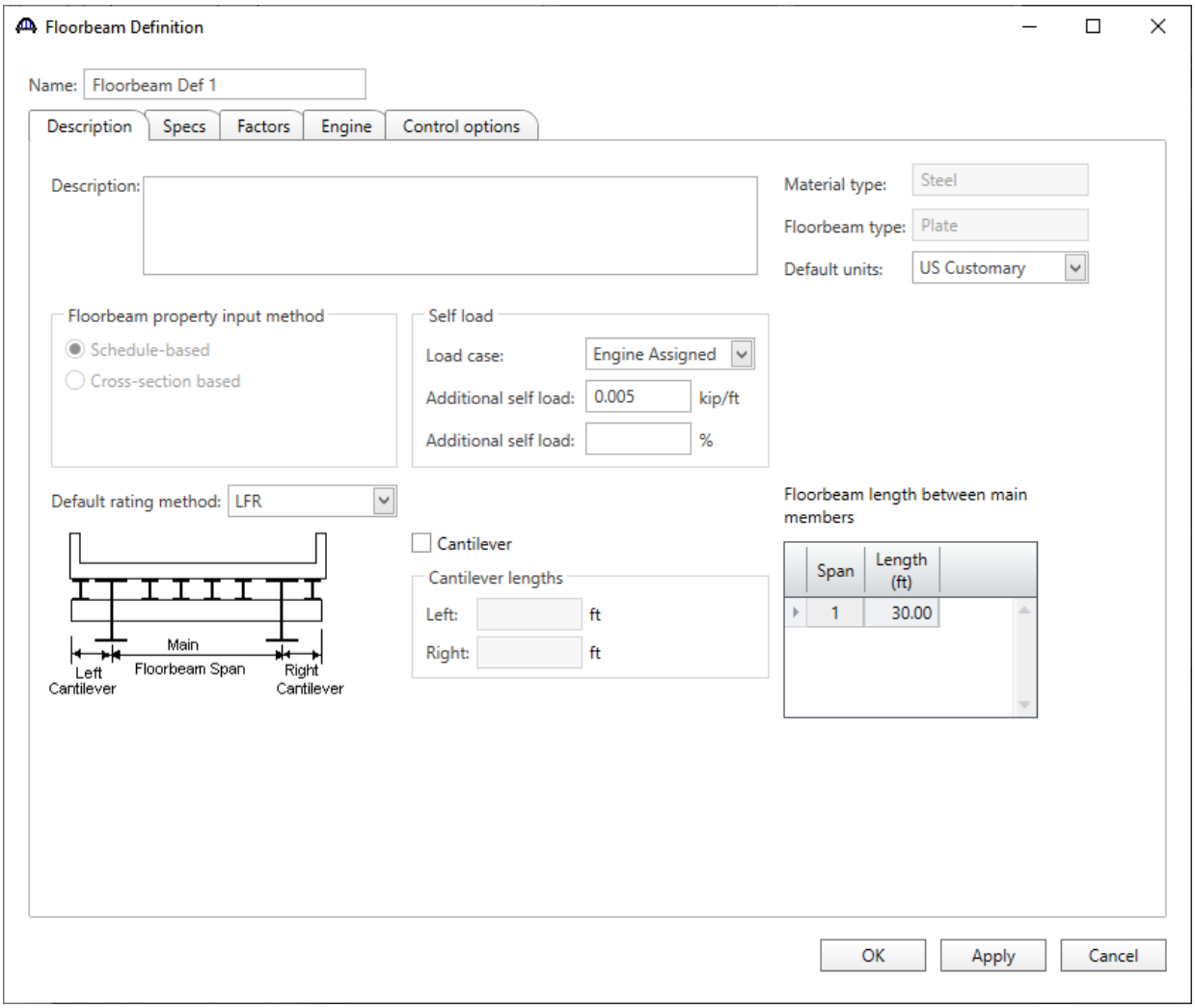


Select **Steel** as the **Material type** and **Plate** for **Girder type** as shown below.



Click **OK** to close the window and create a new member definition.

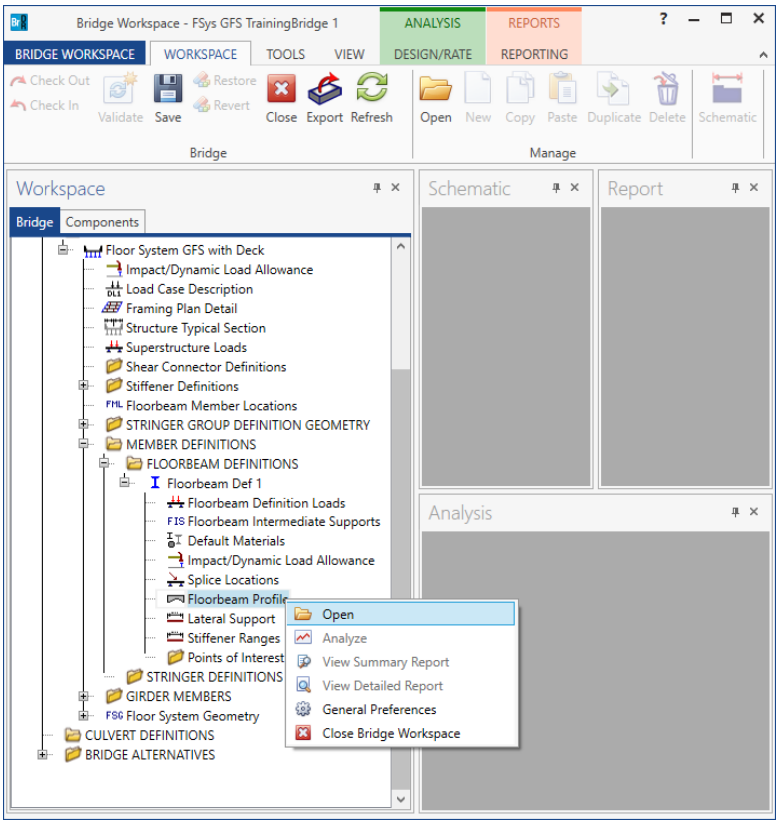
The **Floorbeam Definition** window will open. Enter the data as shown below. Select **Schedule-based** as the **Floorbeam property input method**. This definition is used to describe **FB1** in the structure.



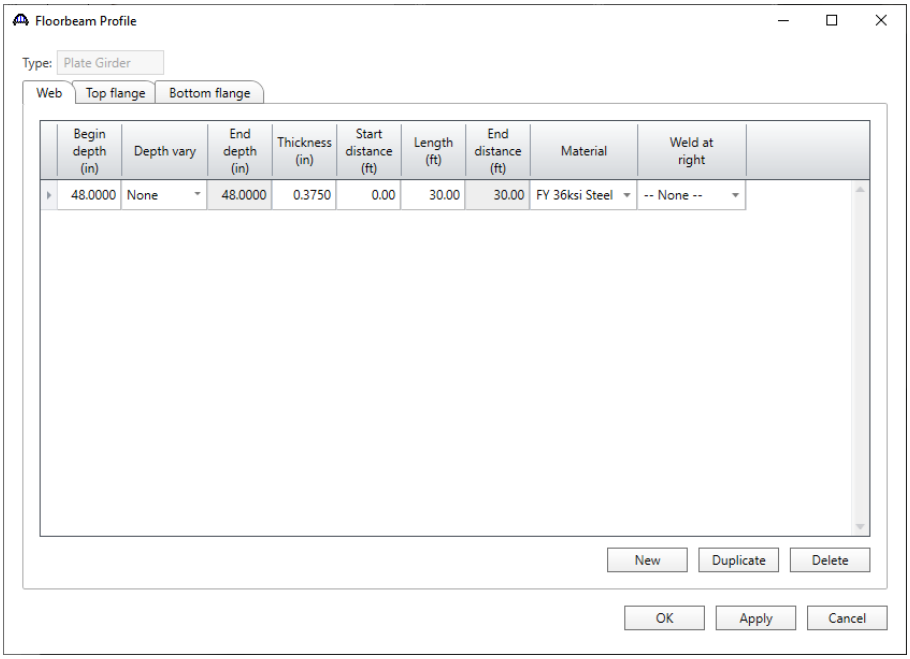
Click **OK** to apply the data and close the window.

Floorbeam Profile

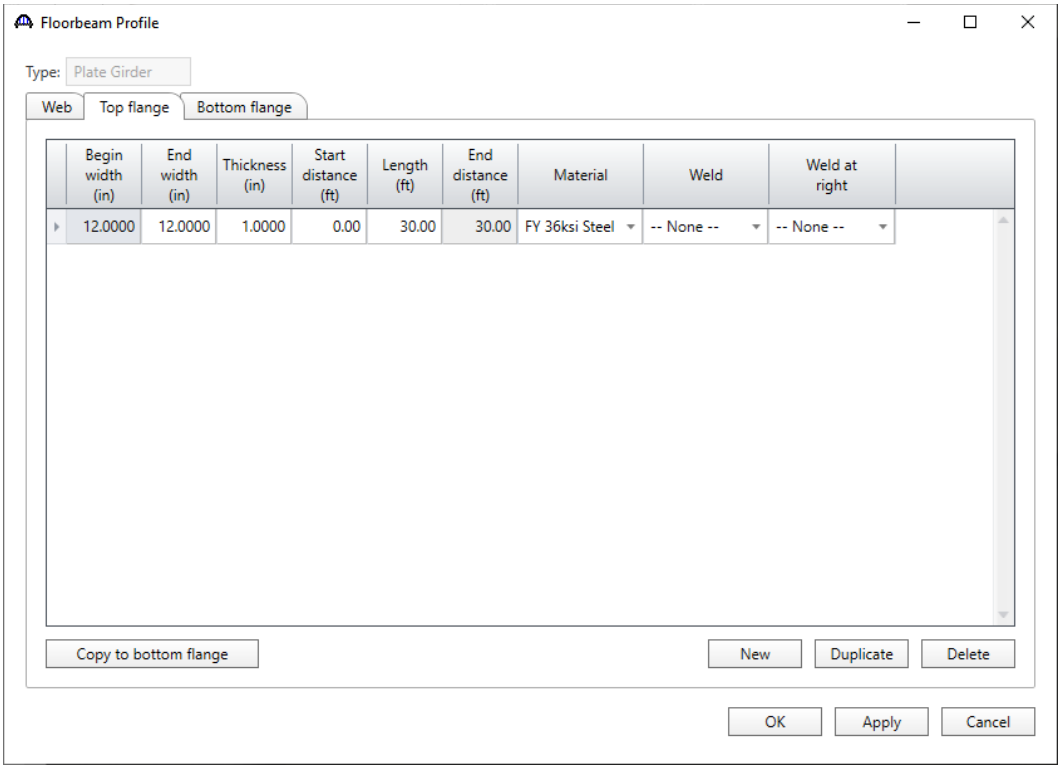
Expand the **Floorbeam Def 1** node in the **Bridge Workspace** tree and double click on the **Floorbeam Profile** node in the **Bridge Workspace** tree to open the **Floorbeam Profile** window as shown below.

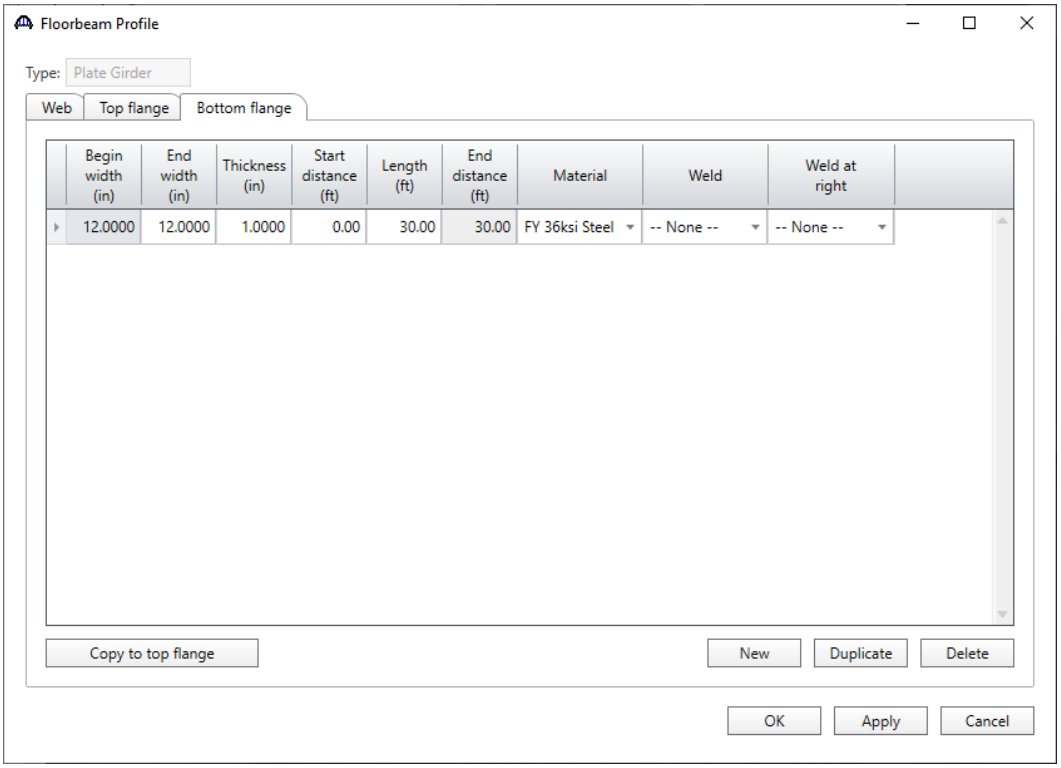


Describe the web as shown below.



Describe the flanges as shown below.

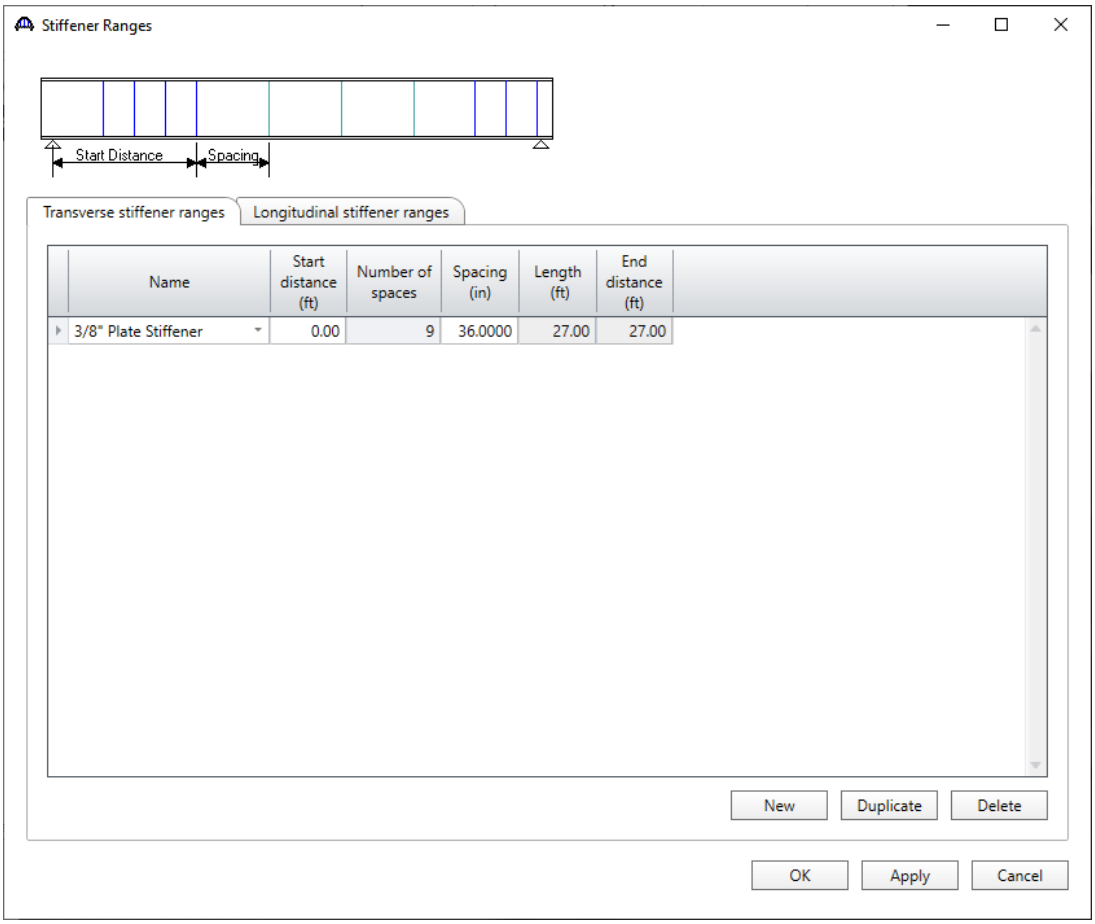




Click **OK** to apply the data and close the window

Stiffener Ranges

Double click on the **Stiffener Ranges** node in the **Bridge Workspace** to open the **Stiffener Ranges** window. Enter the transverse stiffener range as shown below.

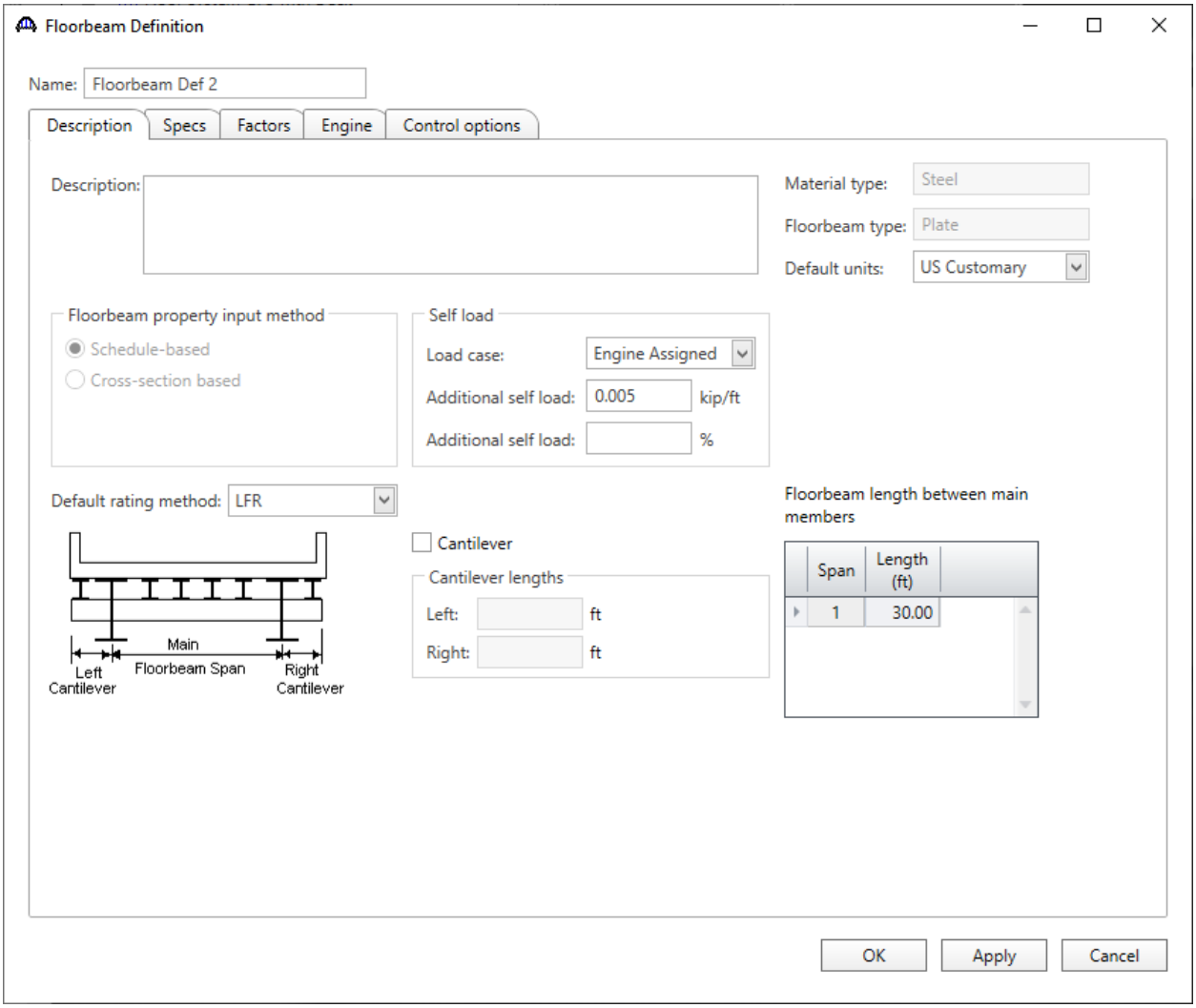


Click **OK** to apply the data and close the window

The description of the floorbeam definition is complete. Repeat the process for another floorbeam definition.

Describing a Floorbeam Member Definition – Floorbeam Definition (FB2)

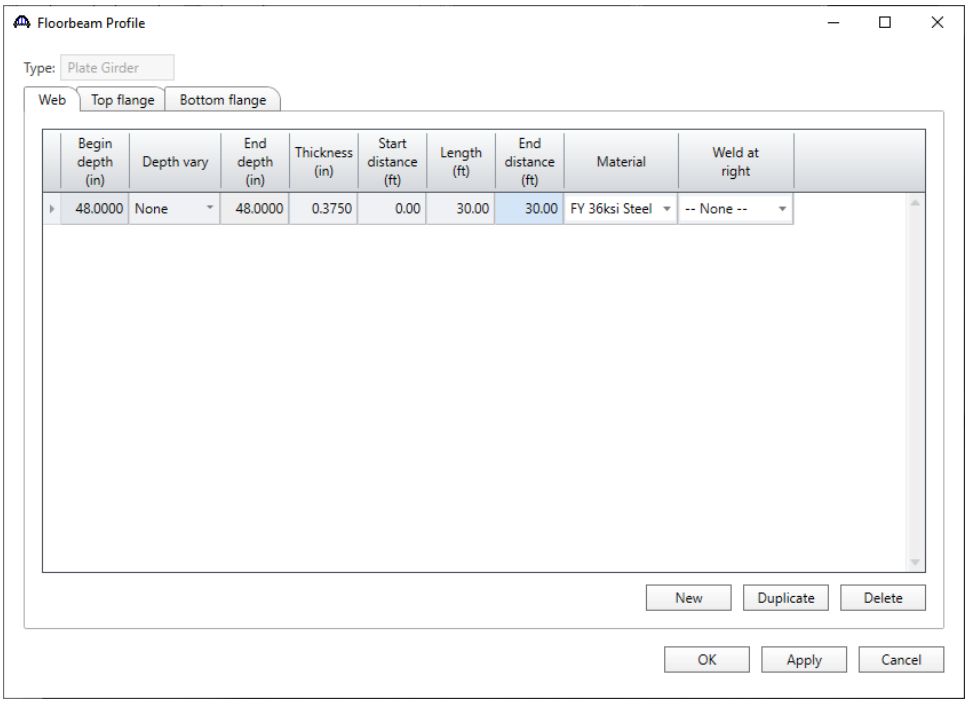
Double click on the **FLOORBEAM DEFINITIONS** node in the **Bridge Workspace** tree. Select **Steel** for the **Material type** and **Plate** for the **Girder type**. Click **OK** to create a new member definition. The **Floorbeam Definition** window will open. Enter the data as shown below. Select **Schedule-based Floorbeam property input method**. This definition is used to describe **FB2** in the structure.



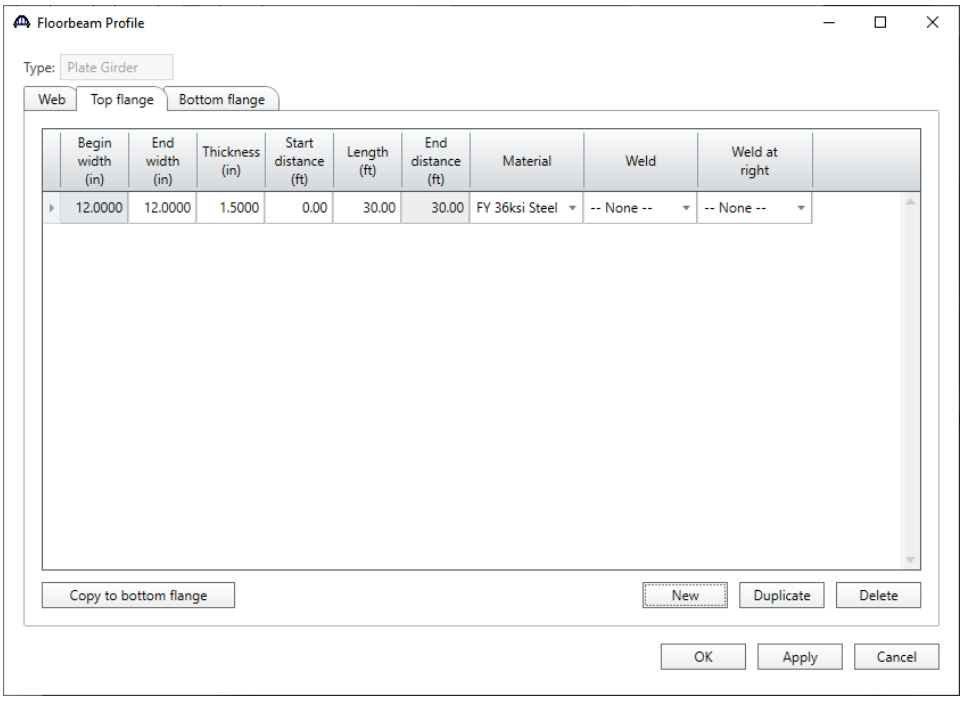
Click **OK** to apply the data and close the window.

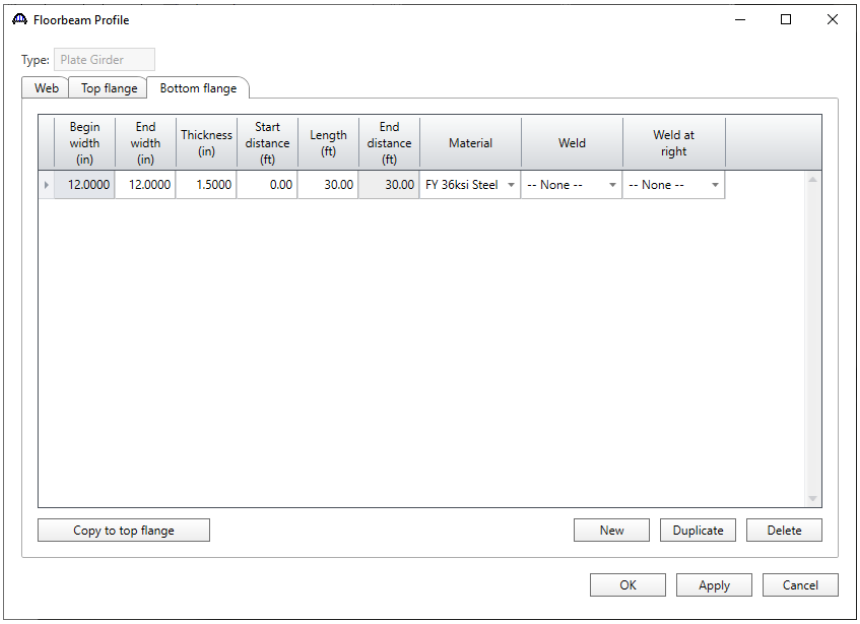
Floorbeam Profile

Expand the **Floorbeam Def 2** node in the **Bridge Workspace** tree and double click on the **Floorbeam Profile** node in the **Bridge Workspace** tree to open the **Floorbeam Profile** window. Describe the web as shown below.



Describe the flanges as shown below.

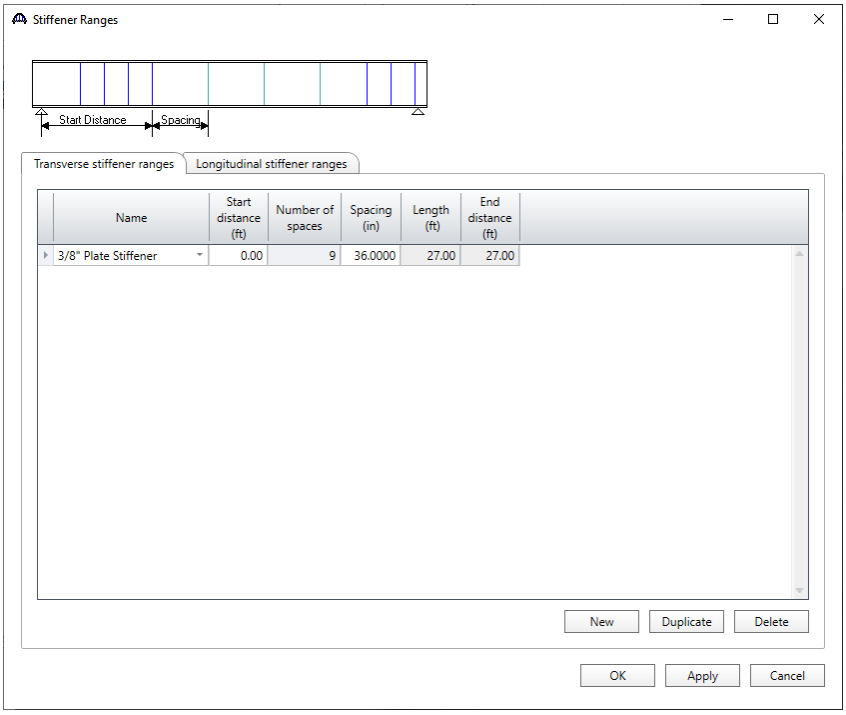




Click **OK** to apply the data and close the window

Stiffener Ranges

Double click on the **Stiffener Ranges** node in the **Bridge Workspace** to open the **Stiffener Ranges** window. Enter the transverse stiffener range as shown below.

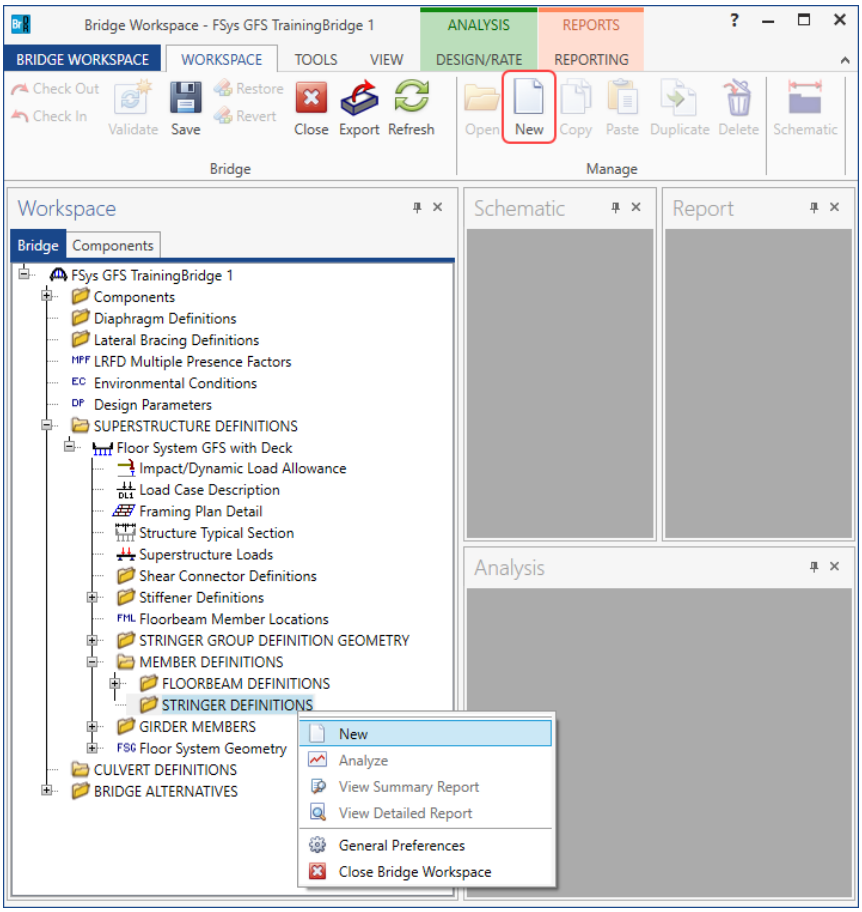


Click **OK** to apply the data and close the window

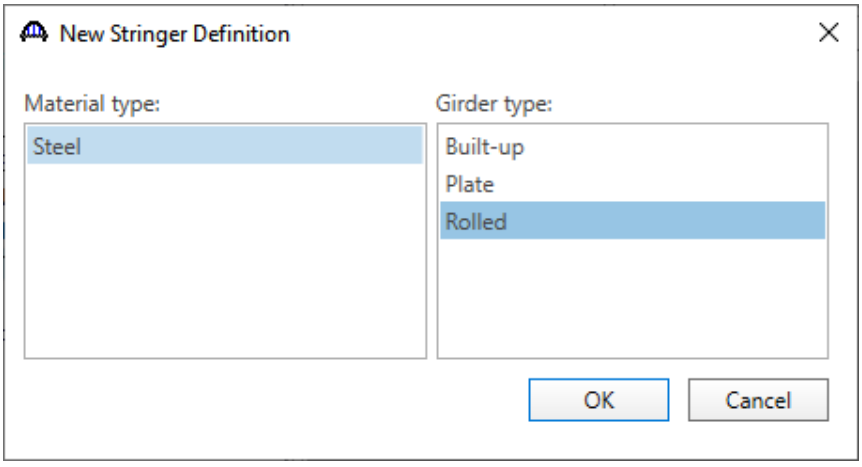
The description of the second floorbeam definition is complete.

Describing a Stringer Member Definition – Stringer Definition (Rolled beam stringers)

Expand the **MEMBER DEFINITION** node in the **Bridge Workspace** tree and double click on the **STRINGER DEFINITIONS** node (or select **STRINGER DEFINITIONS** and click **New** from the **Manage** group of the **WORKSPACE** ribbon) to open the **New Stringer Definition** window as shown below.

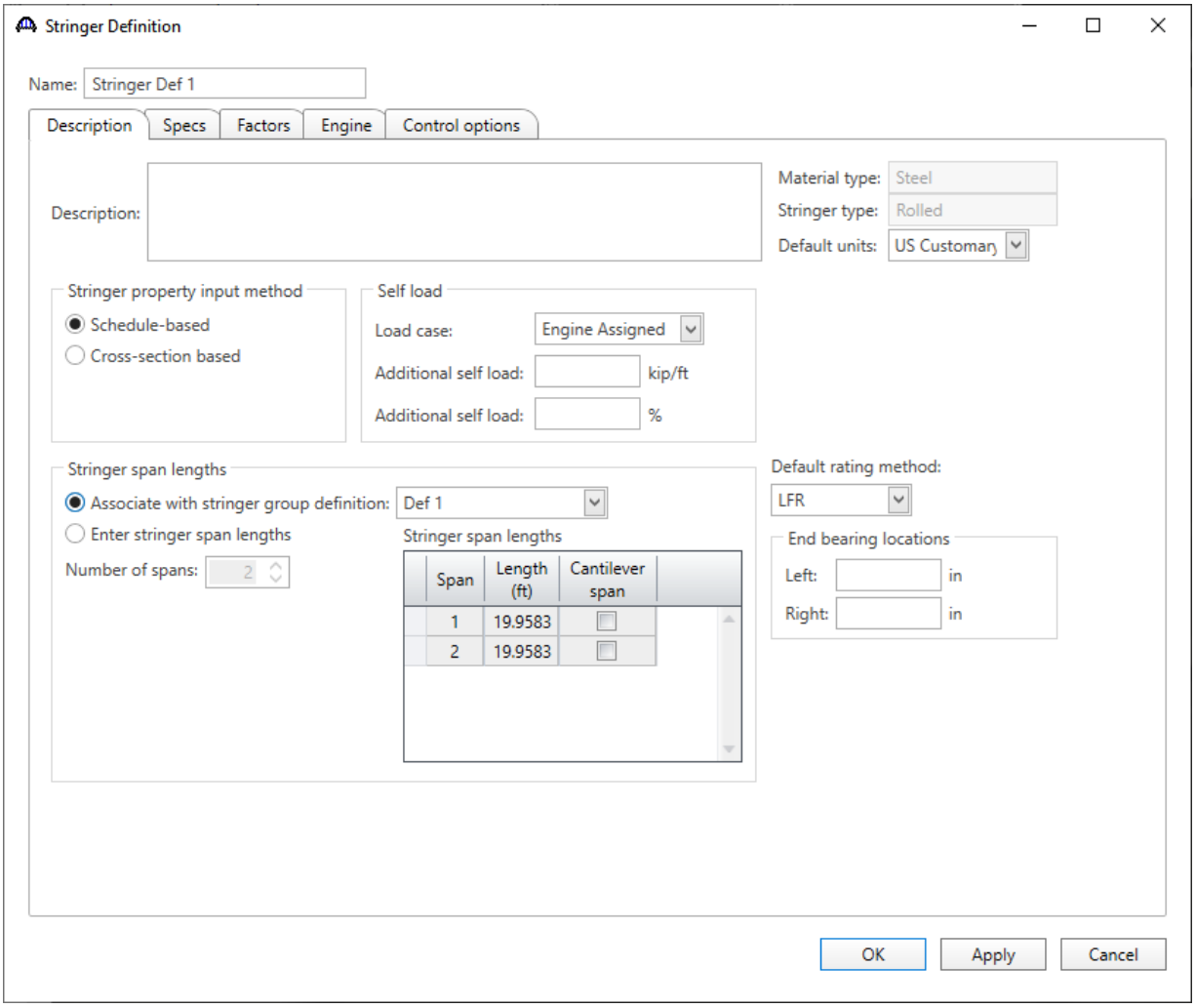


Select **Steel** as the **Material type** and **Rolled** for **Girder type** as shown below.



Click **OK** to close the window and create a new member definition.

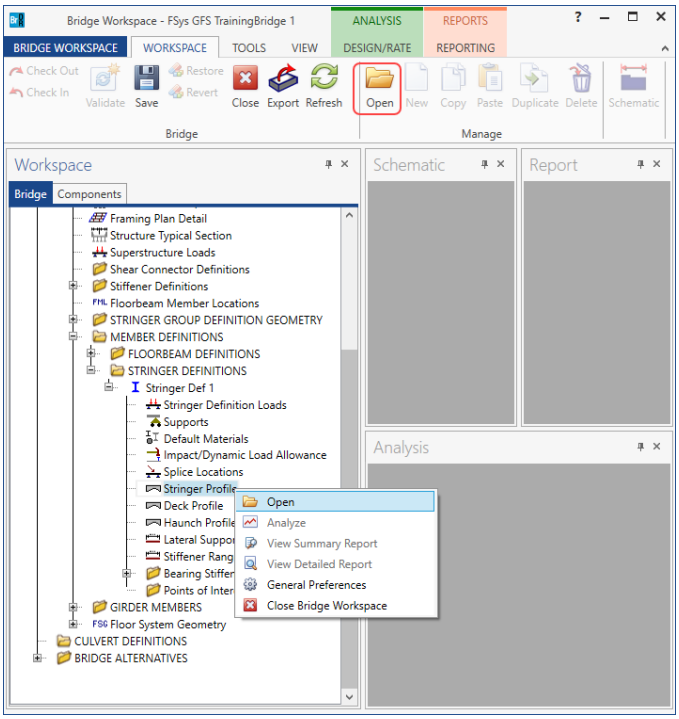
The **Stringer Definition** window will open. Enter the data as shown below. Select **Schedule-based** as the **Stringer property input method**. Select the **Associate with stringer group definition** button so that the stringer span lengths will be populated based on the stringers span lengths specified in the **Stringer Group Definition Geometry** window.



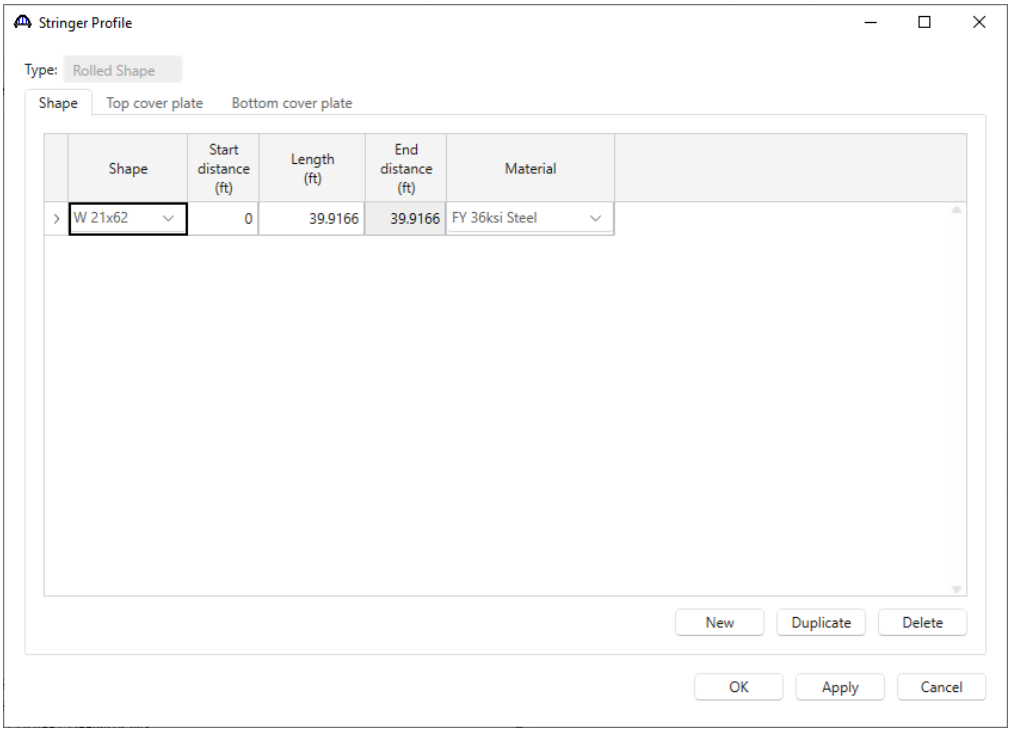
Click **OK** to apply the data and close the window.

Stringer Profile

Expand the **Stringer Def 1** node in the **Bridge Workspace** tree and double click on the **Stringer Profile** node in the **Bridge Workspace** tree to open the **Stringer Profile** window as shown below.



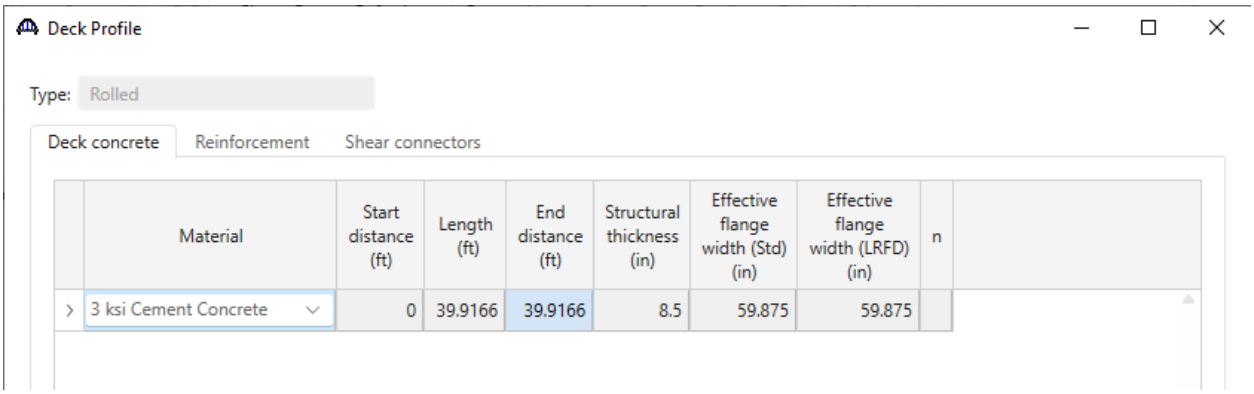
Describe the shape as shown below.



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

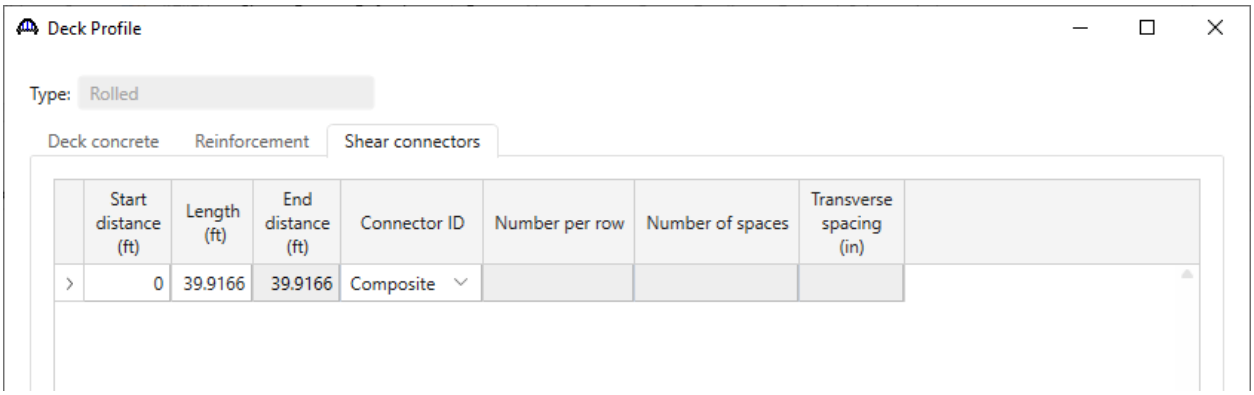
Deck Profile

Next open the **Deck Profile** window by double clicking the **Deck Profile** node in the **Bridge Workspace** tree. Enter the data describing the structural properties of the deck.



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

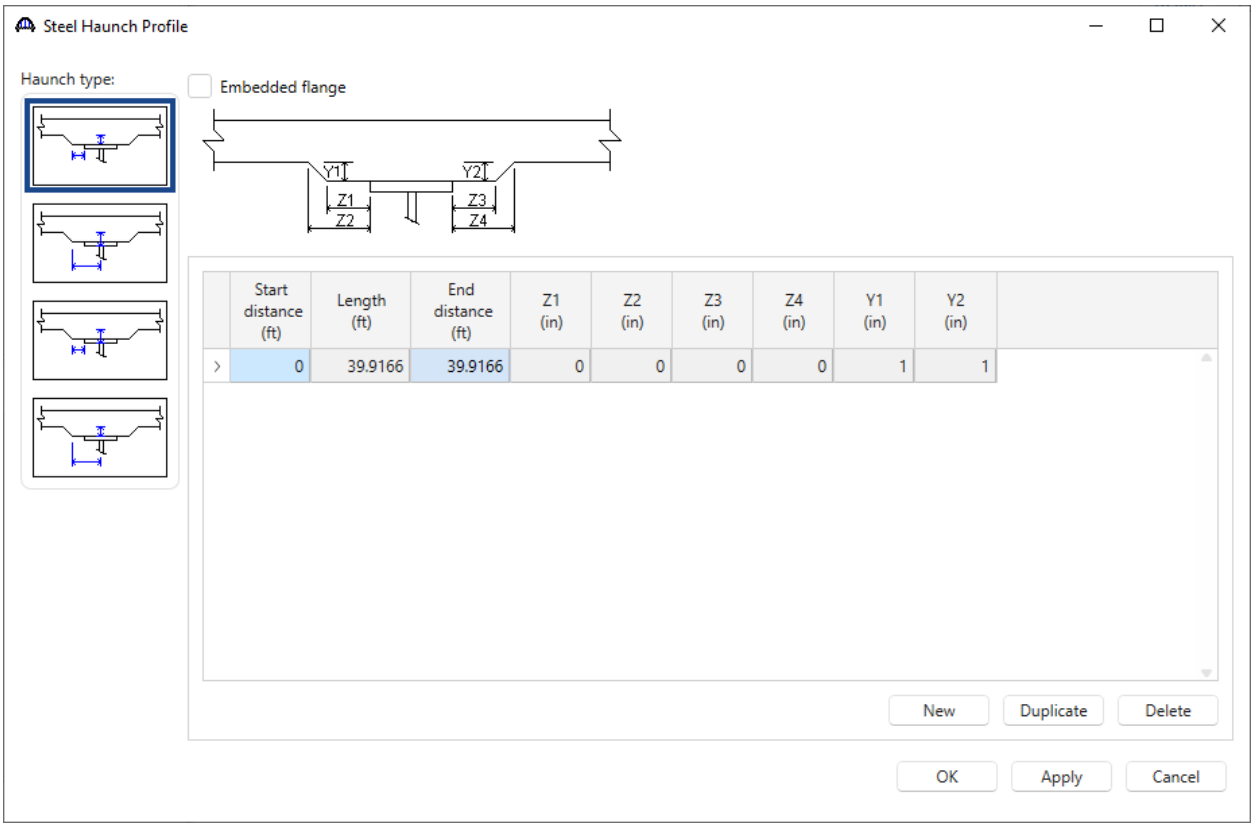
No reinforcement is described. Composite regions are described using the **Shear connectors** tab as shown below.



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

Haunch Profile

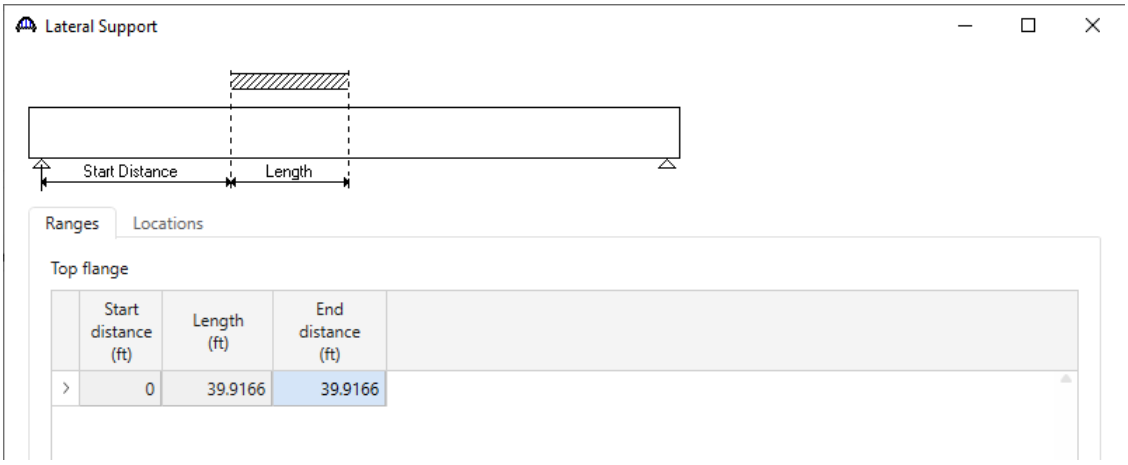
Double click on the **Haunch Profile** node in the **Bridge Workspace** tree and enter data in the **Haunch Profile** window as shown below.



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

Lateral Support

Open the **Lateral Support** window by double clicking on the **Lateral Support** node in the **Bridge Workspace** tree. Regions where the slab is considered to provide lateral support for the top flange are defined as shown below.

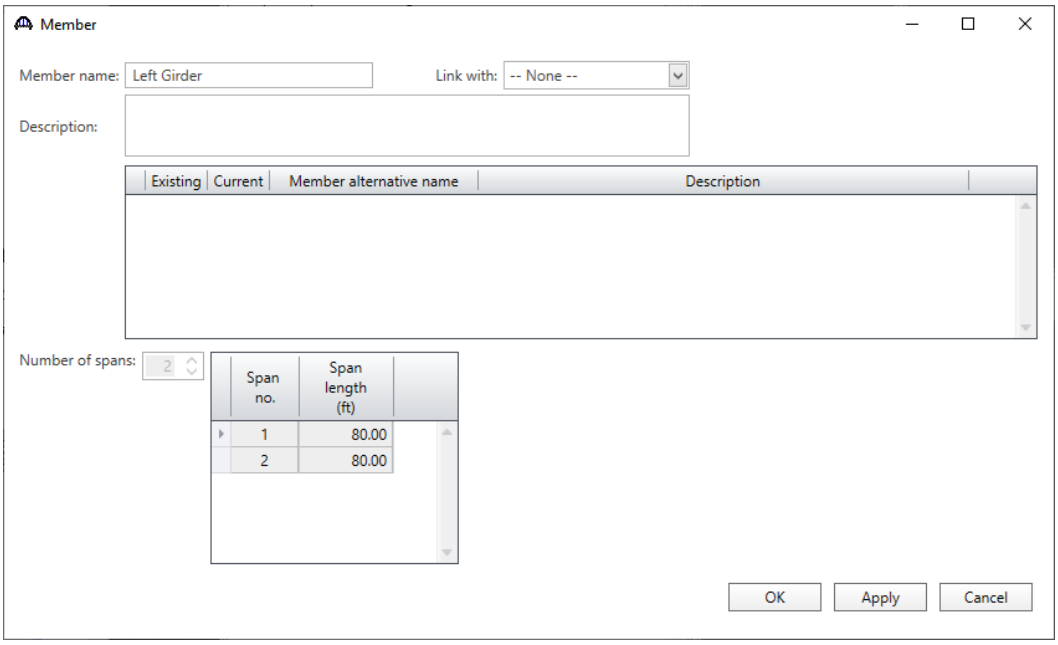


Click **OK** to apply the data and close the window

The description of the stringer is complete.

Describing a girder member (Plate girder Girders)

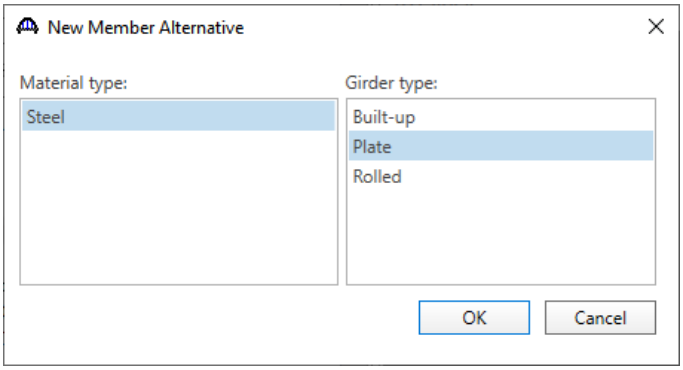
Expand the **GIRDER MEMBERS** node in the **Bridge Workspace** tree and double click on **Girder 1** (or select **Girder 1** and click on **Open** from the **Manage** group of the **WORKSPACE** ribbon) The **Member** window shows the data that was generated when the superstructure definition was created. Change the name to **Left Girder**. The first Member Alternative created will automatically be assigned as the **Existing** and **Current member alternative** for this Member.



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

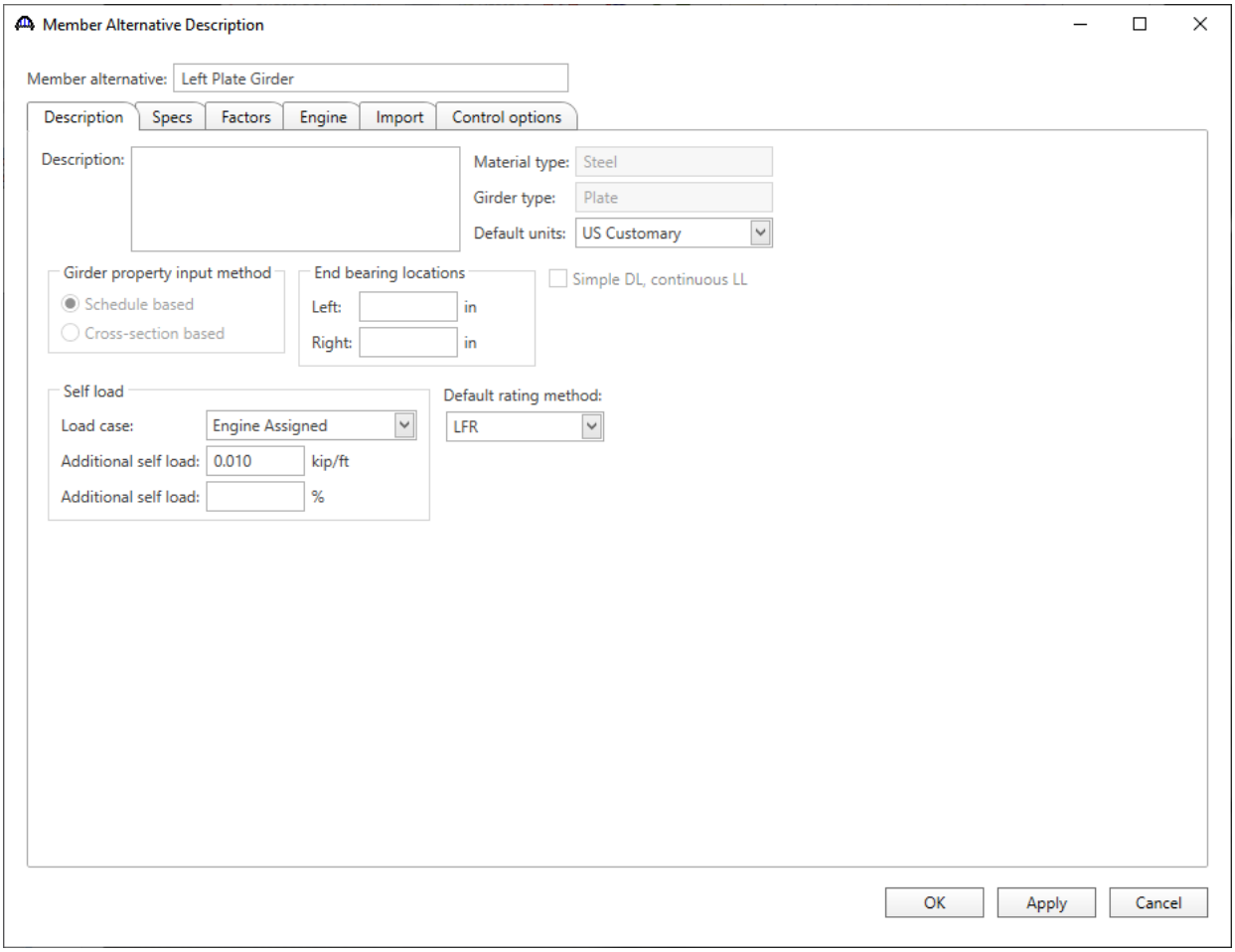
Defining a Girder Member Alternative

Double-click on **GIRDER MEMBER ALTERNATIVES** in the **Bridge Workspace** tree for member **Left Girder** to create a new member alternative. The **New Member Alternative** window shown below will open. Select **Steel** for the **Material type** and **Plate** for the **Girder Type**.



Click **OK** to close the window and create a new member alternative.

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

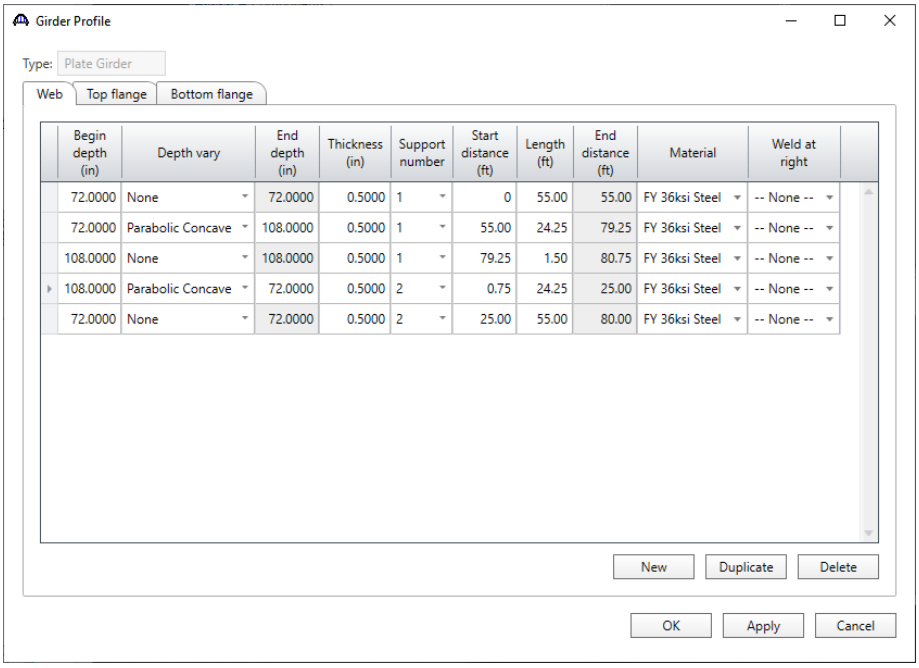


Click **OK** to close the window and create a new member alternative.

Girder Profile

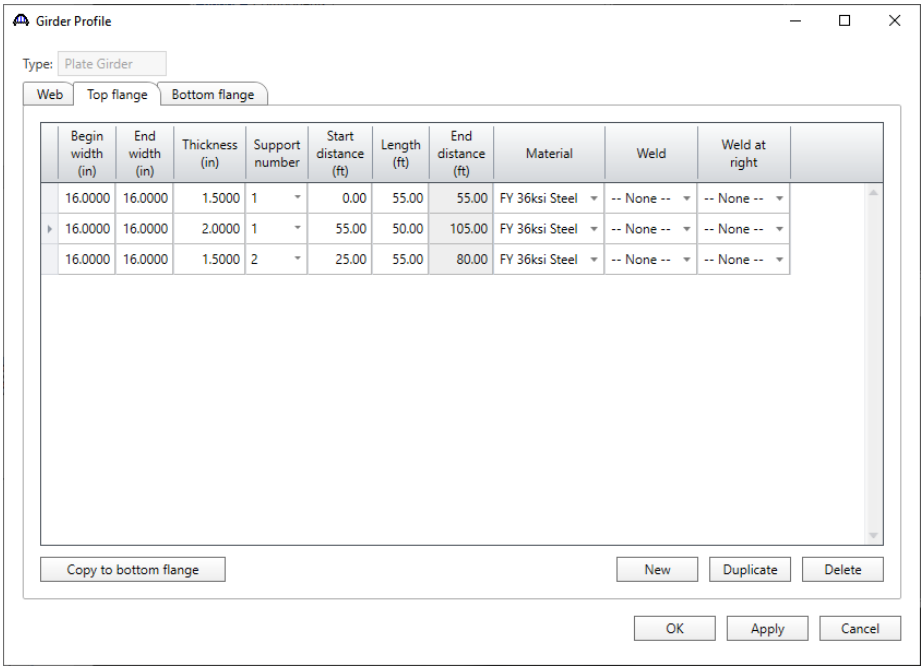
Next describe the girder profile by double clicking on the **Girder Profile** node in the **Bridge Workspace** tree. Enter the data in each tab of the **Girder Profile** window as shown below.

Web

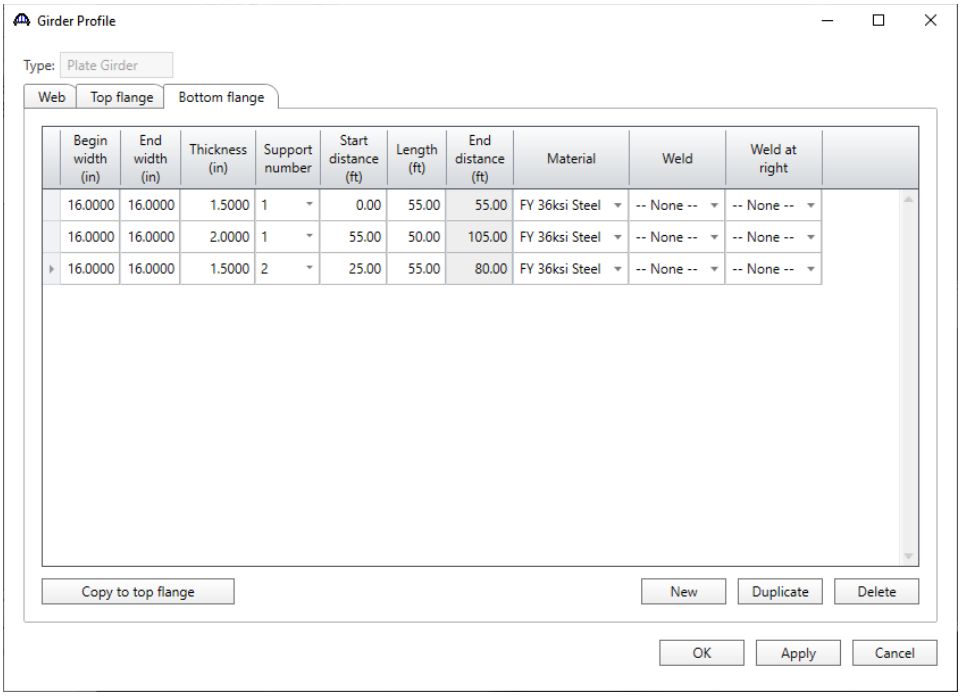


Describe the flanges as shown below.

Top flange



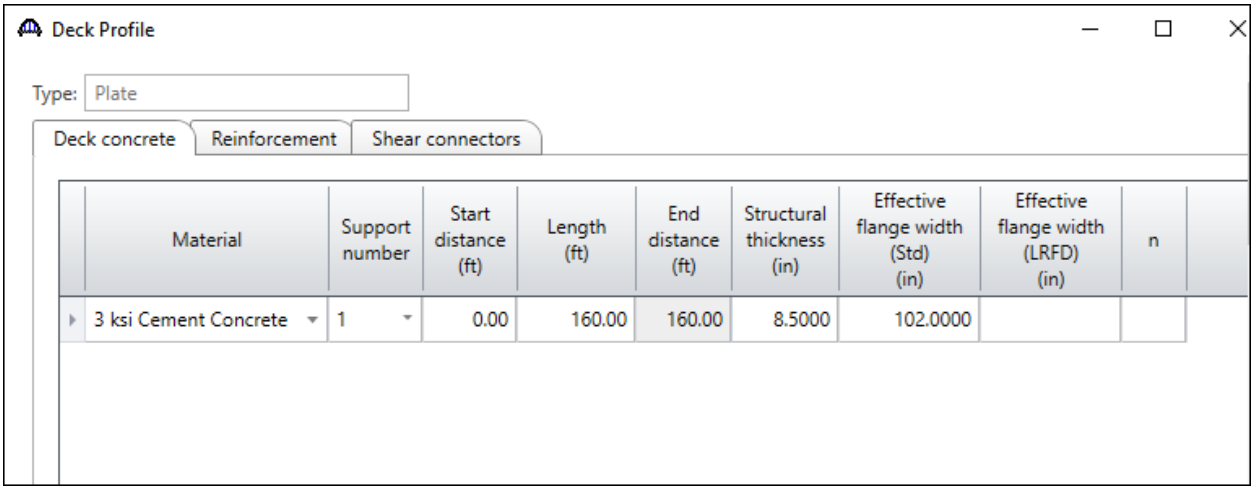
Botton flange



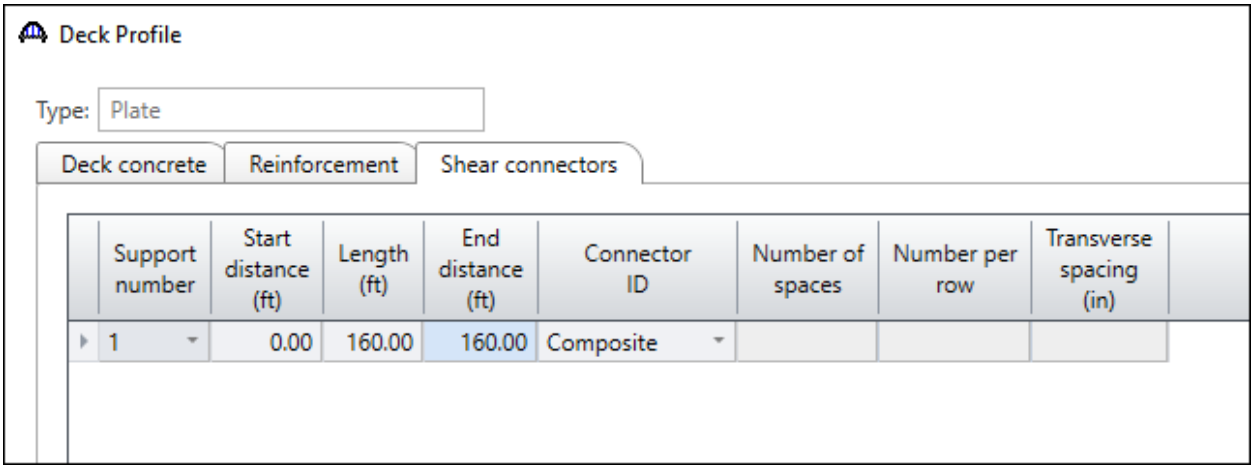
Click **OK** to apply the data and close the window

Deck Profile

Next open the **Deck Profile** window by double-clicking the **Deck Profile** node in the **Bridge Workspace** tree and enter the data describing the structural properties of the deck. Deck effective flange width is calculated according to AASHTO Article 10.38.3, the effective flange width shall not exceed one-fourth of the span length of the girder, 80’/4 = 20’ = 240”, the distance center to center of girders, 30’/2+2’ = 17’ = 204”, and twelve times the least thickness of the slab, 12x8.5” = 102”. Twelve times the least thickness of the slab, 102” controls. The window is shown below.



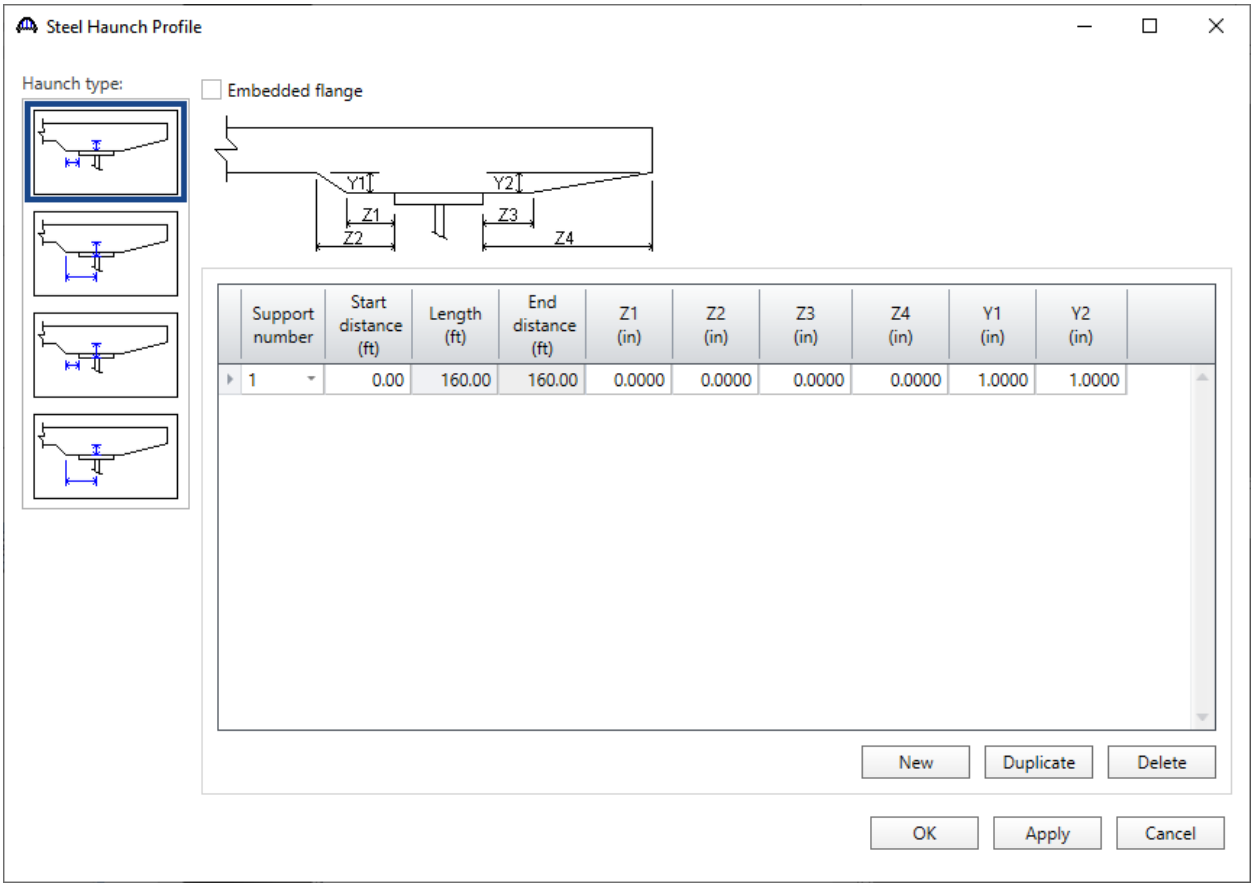
No reinforcement is described. Composite regions are described in the **Shear connectors** tab as shown below.



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

Haunch Profile

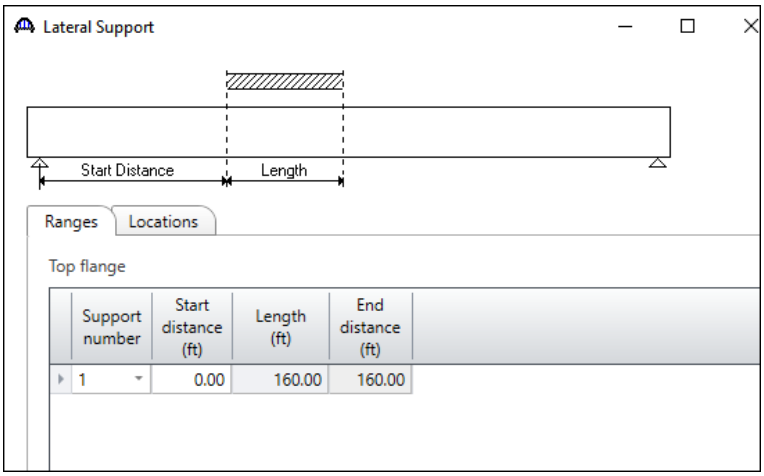
The haunch profile is defined by double-clicking on the **Haunch Profile** node in the **Bridge Workspace** tree. Enter data as shown below.



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

Lateral Support

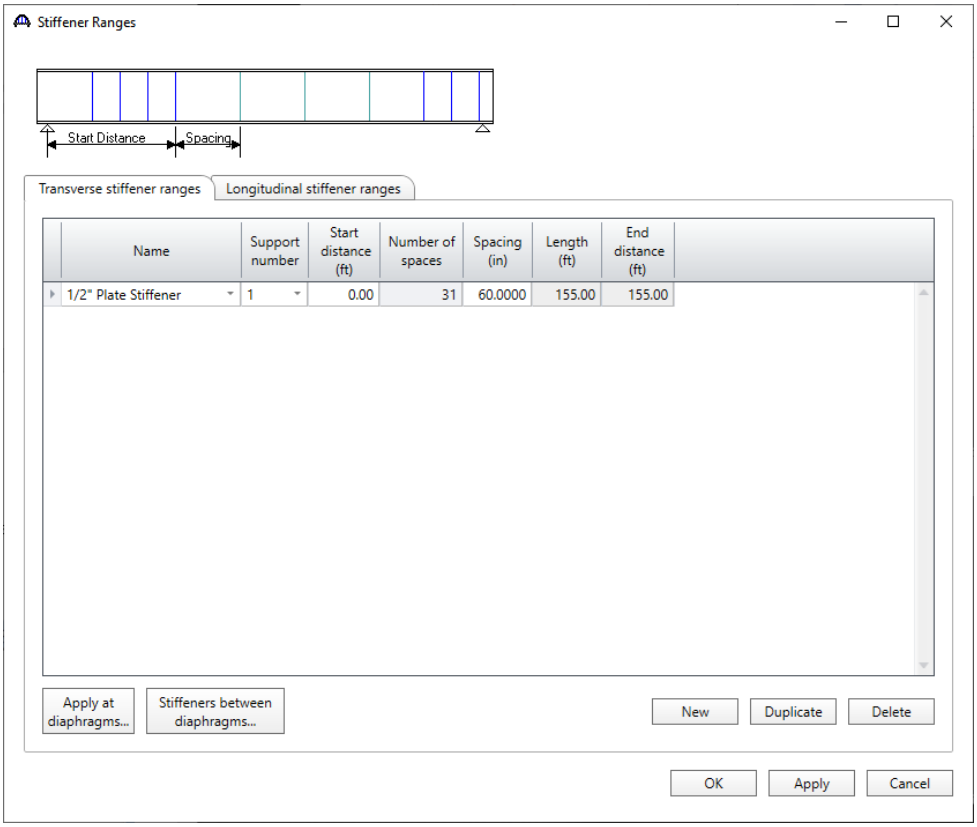
Open the **Lateral Support** window by double clicking on the **Lateral Support** node in the **Bridge Workspace** tree. Regions where the slab is considered to provide lateral support for the top flange are defined as shown below.



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

Stiffener Ranges

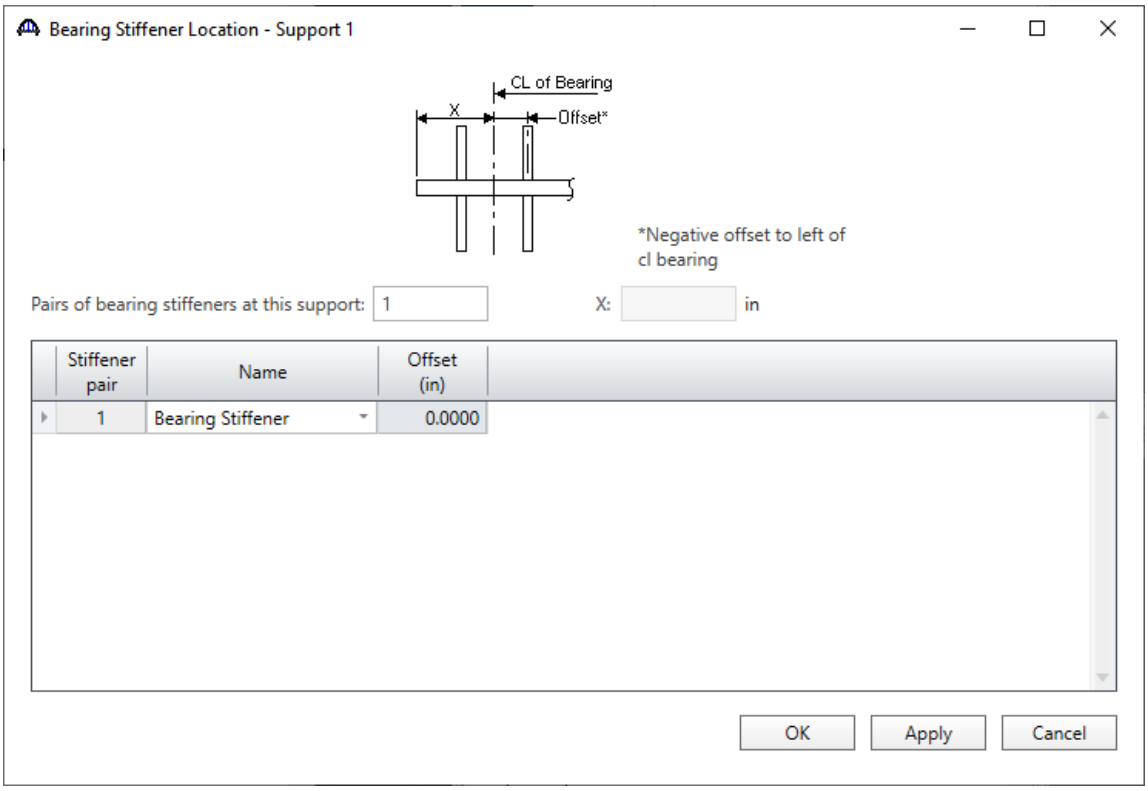
Double click on the **Stiffener Ranges** node in the **Bridge Workspace** to open the **Stiffener Ranges** window. Enter the transverse stiffener ranges as shown below.



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

Bearing Stiffener Locations

The **Bearing Stiffener Location – Support 1** window is opened by expanding the **Bearing Stiffener Locations** node in the **Bridge Workspace** tree and double clicking on the **Support1** node. The assignment for support 1 is shown below.

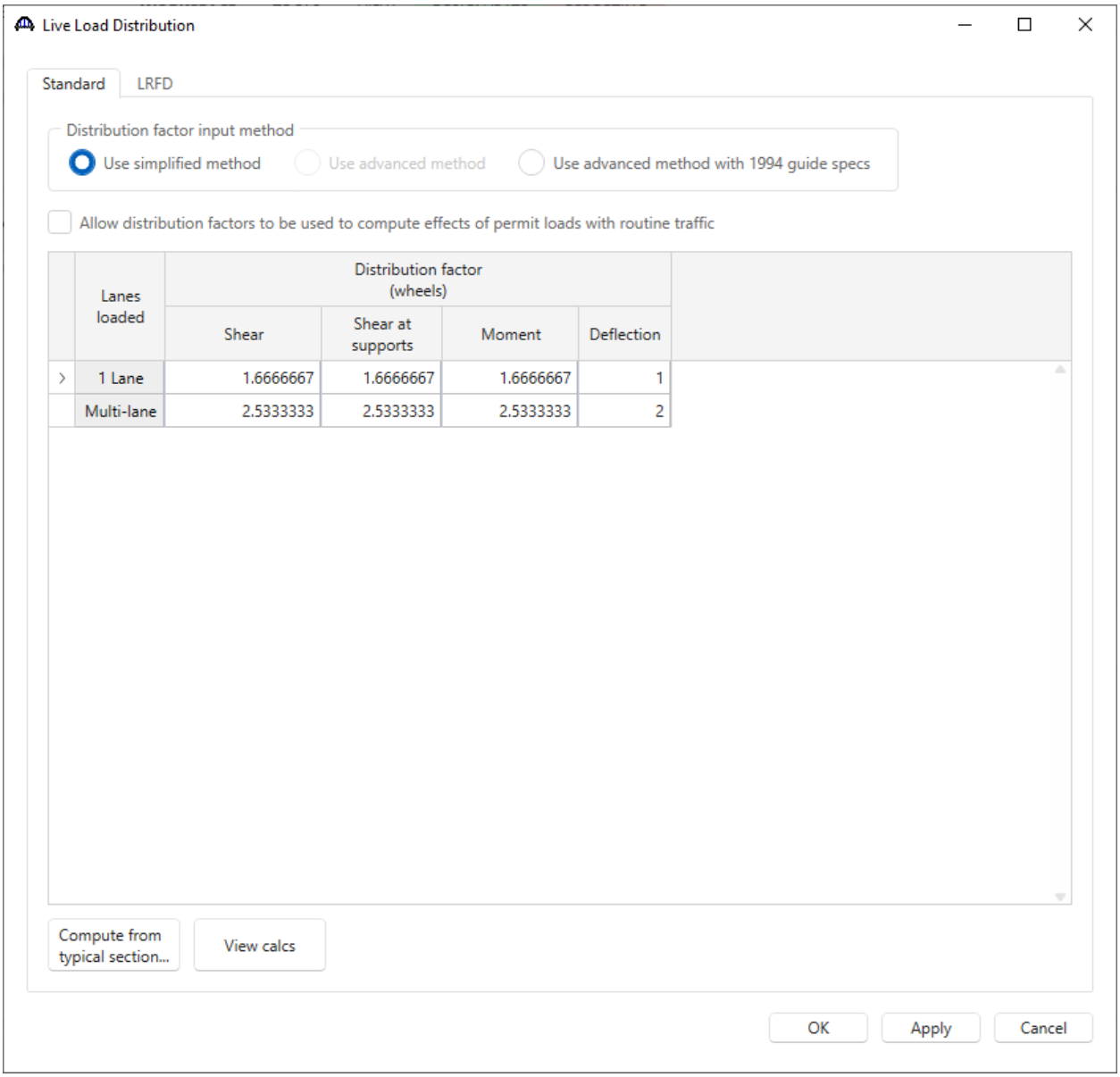


Click **OK** to apply the data and close the window

Repeat this process for **Support2** and **Support3**.

Live Load Distribution

Open the **Live Load Distribution** window from the **Bridge Workspace** tree. Click the **Compute from typical section…** button to compute the standard live load distribution factors.

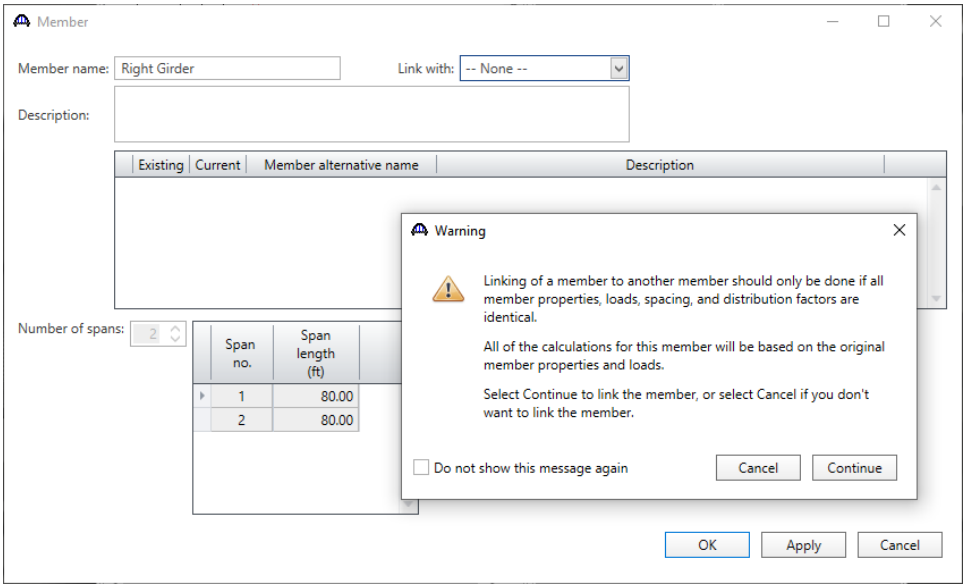


Click **OK** to apply the data and close the window

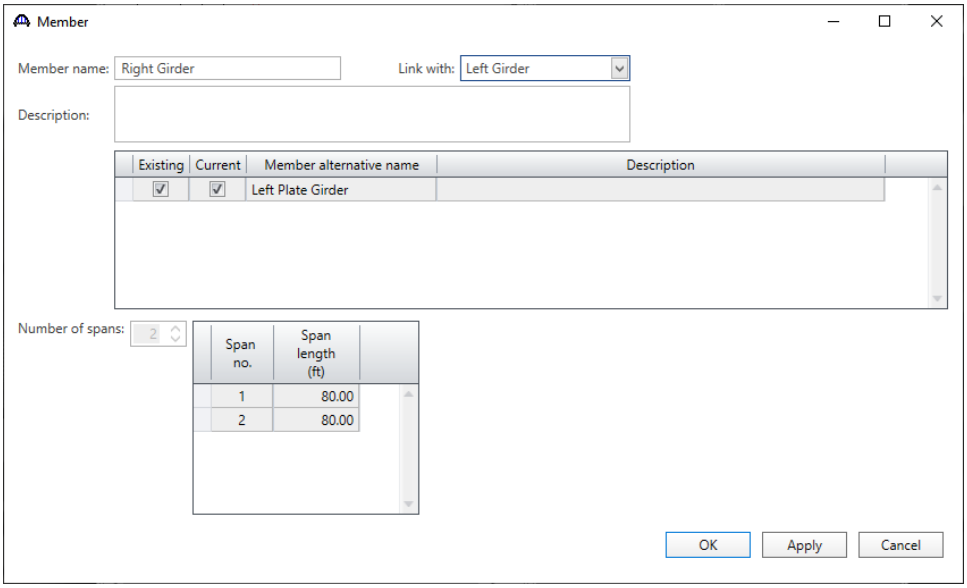
The description of the girder member is complete.

Member – Girder 2

Expand the **GIRDER MEMBERS** node in the **Bridge Workspace** tree and double click on **Girder 2**. The **Member** window shows the data that was generated when the superstructure definition was created. Change the name to **Right Girder** and select **Left Girder** from the options under the **Link with** menu**.** A warning message will appear to remind that both members must share the exact same definition if they are to be linked. Click **Continue** to link the two members.



The **Member** window will be updated as shown below.

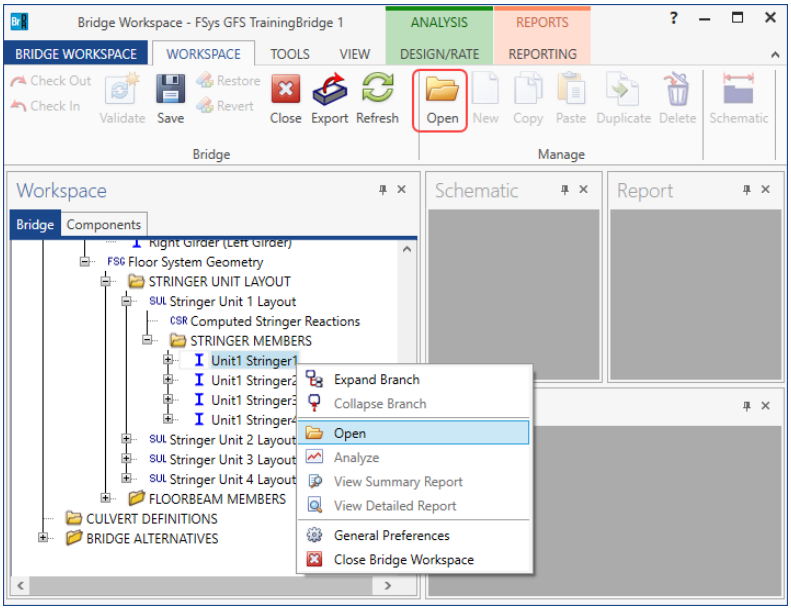


Click **OK** to apply the data and close the window

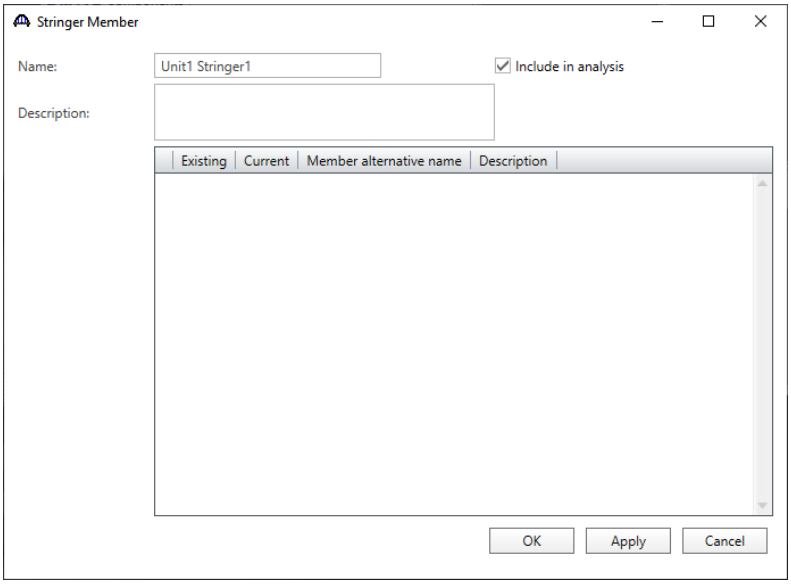
The description of the second girder member is complete.

Describing a Stringer Member – STRINGER UNIT LAYOUT

Expand the **Floor System Geometry**, **STRINGER UNIT LAYOUT, Stringer Unit 1 Layout** and **STRINGER MEMBERS** in the **Bridge Workspace** tree**.** Double click on the **Unit1 Stringer1** node to open the **Stringer Member** window (or select **Unit Stringer1** and click the **Open** button from the **Manage** group of the **WORKSPACE** ribbon, or right click and select **Open**) as shown below.



Include the stringer in analysis by making sure that the Include in analysis option is checked. The first Stringer Member Alternative created will automatically be assigned as the **Existing** and **Current** Member Alternative for this member.

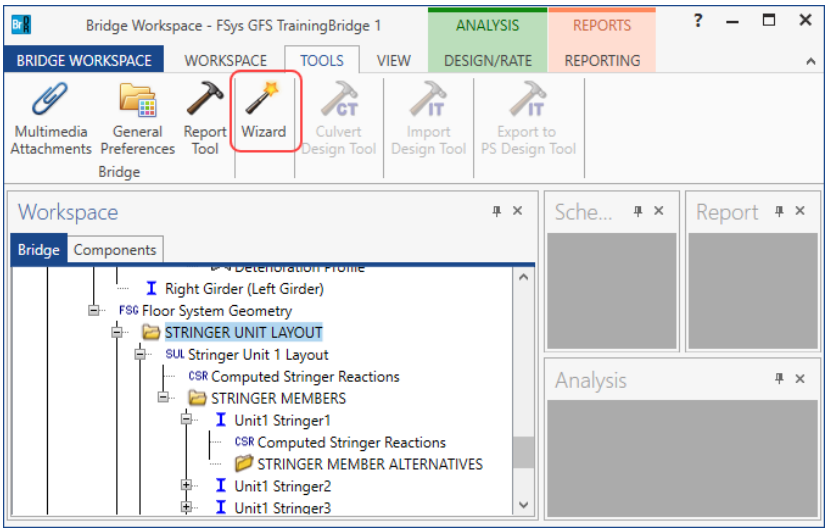


Click **OK** to apply the data and close the window

Defining a Stringer Member Alternative

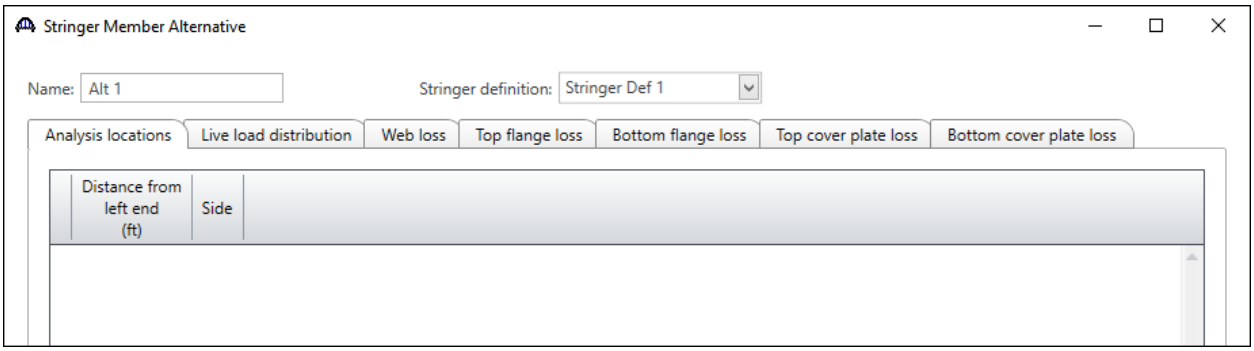
There are two methods to create stringer member alternatives for the stringer members in the structure:

1. Manually create a stringer member alternative in the **Bridge Workspace** tree and assign a stringer definition to this alternative.
2. Use the **Stringer Unit Layout Wizard** to quickly create stringer member alternatives for all the stringer members in the structure. This wizard can be accessed by selecting the **Wizard** button from the **TOOLS** ribbon while the **STRINGER UNIT LAYOUT** is selected in the **Bridge Workspace** tree.



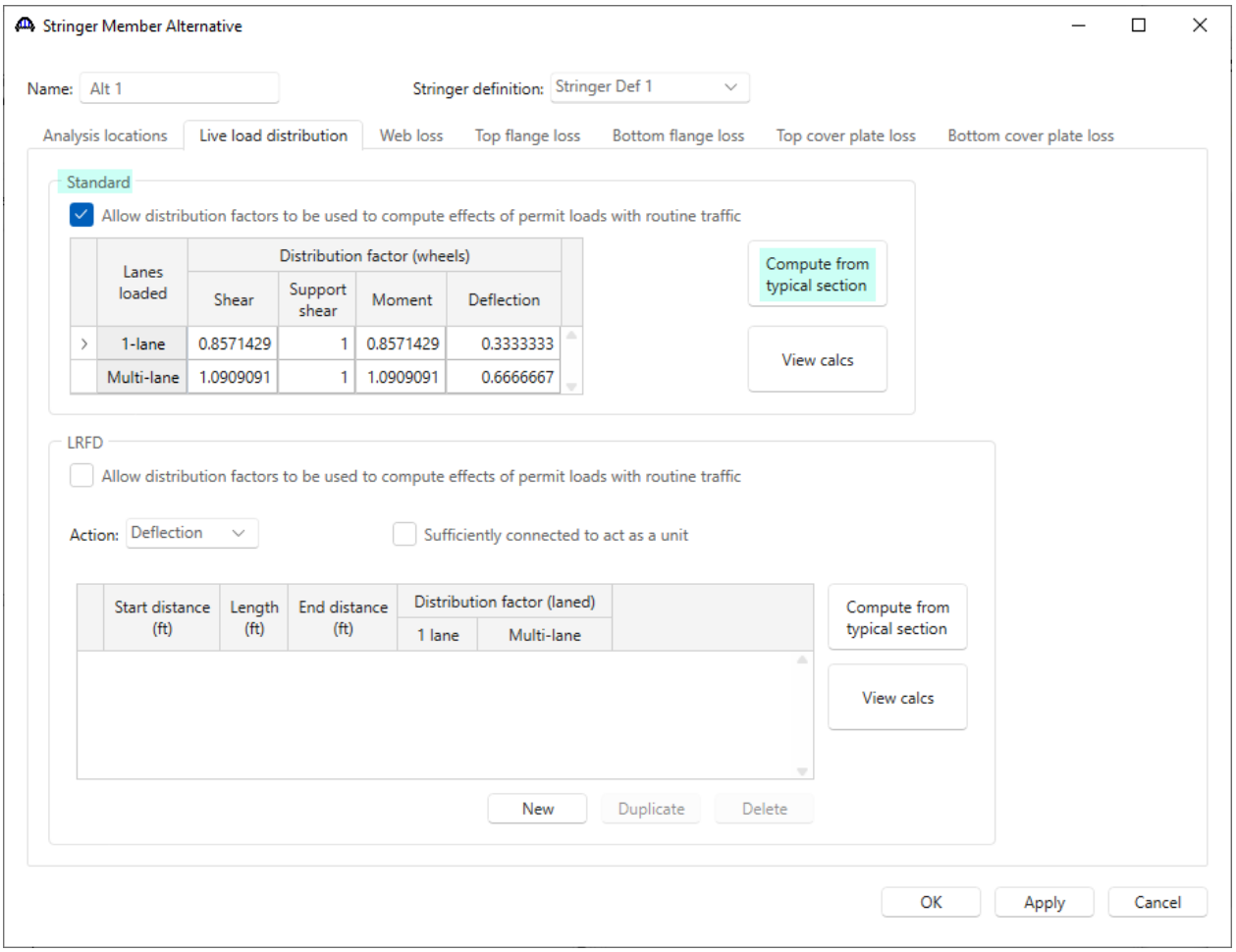
This example uses the manual approach in Option 1 to create stringer member alternatives for the stringer members in this structure.

Double click on the **STRINGER MEMBER ALTERNATIVES** node in the **Bridge Workspace** tree to create a new member alternative for **Unit1 Stringer1**. The **Stringer Member Alternative** window shown below will open. Enter **Alt1** for the **Name** of the alternative. Note that **Stringer Def 1** is assigned as the **Stringer definition** for this alternative. Click **Apply** to create the member alternative.



Stringer Member Alternative – Live load distribution

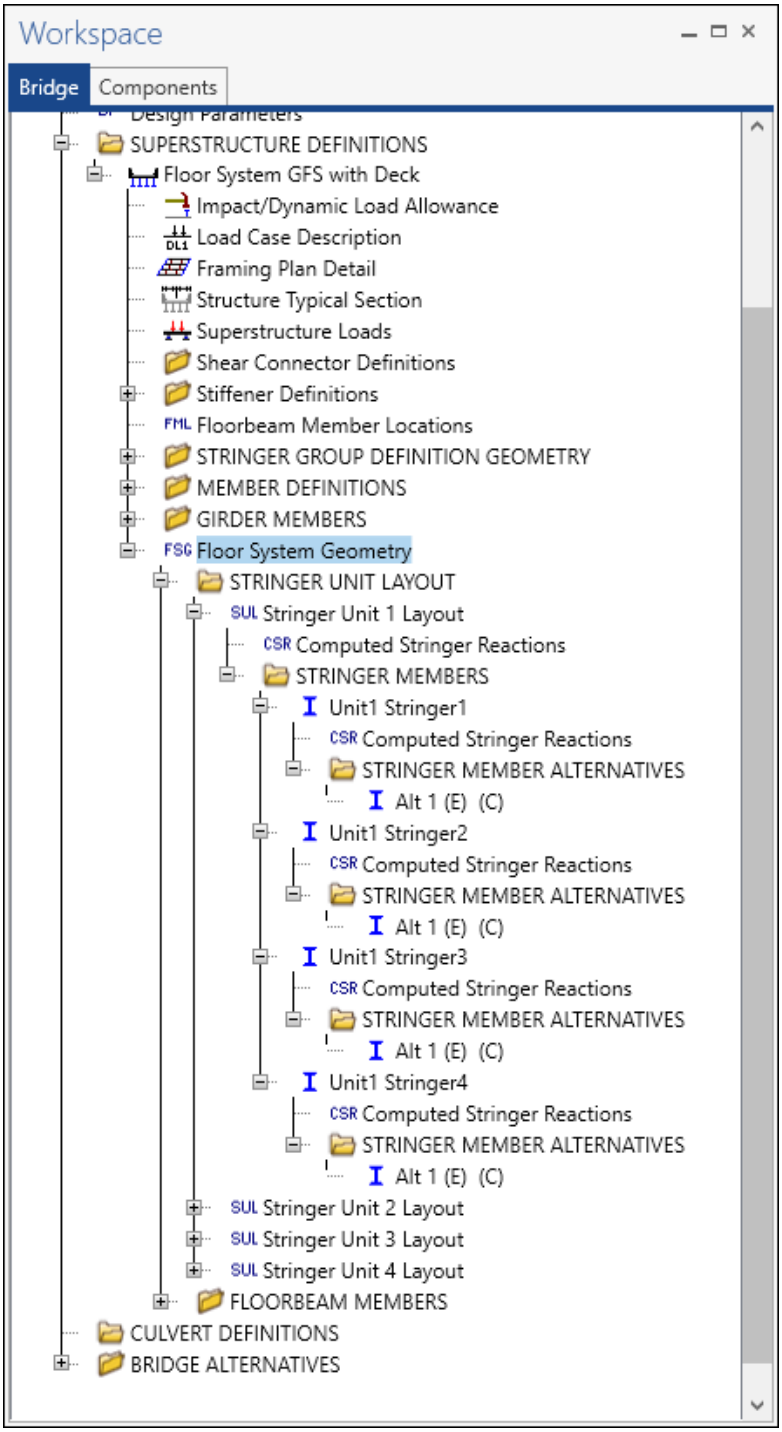
Navigate to the **Live load distribution** tab of this window. Use the **Compute from typical section** button to compute the **Standard** (LFR) distribution factors.



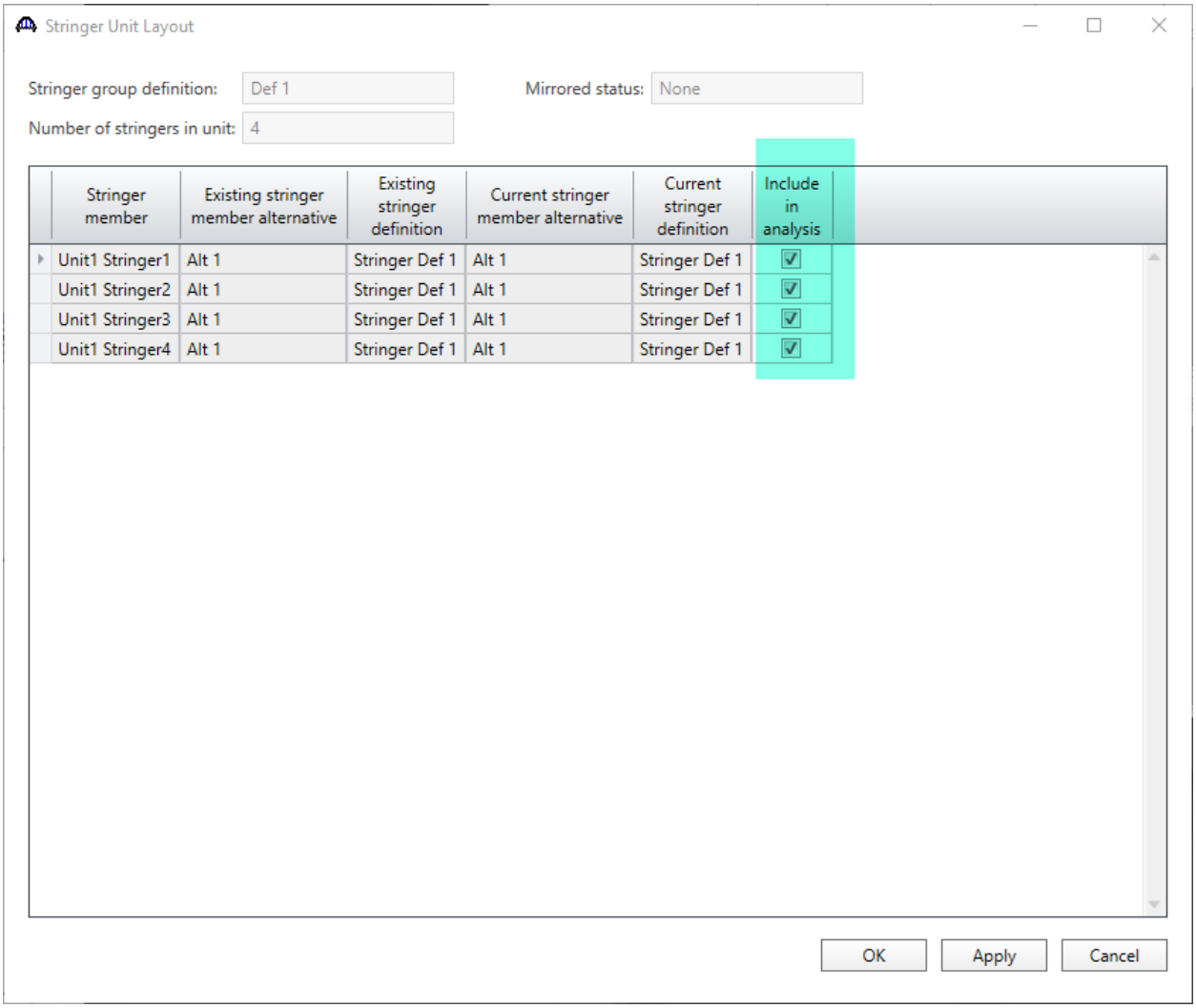
Click **OK** to apply the data and close the window

The description of the stringer member is complete. Repeat this process for **Unit1 Stringer2**, **Unit1 Stringer3**, and **Unit1 Stringer4** of **Stringer Unit 1 Layout**.

The partially expanded **Bridge Workspace** tree for **Stringer Unit 1 Layout** is shown below.



Double click on the **Stringer Unit 1 Layout** node in the **Bridge Workspace tree** to include all stringers in analysis as shown below.



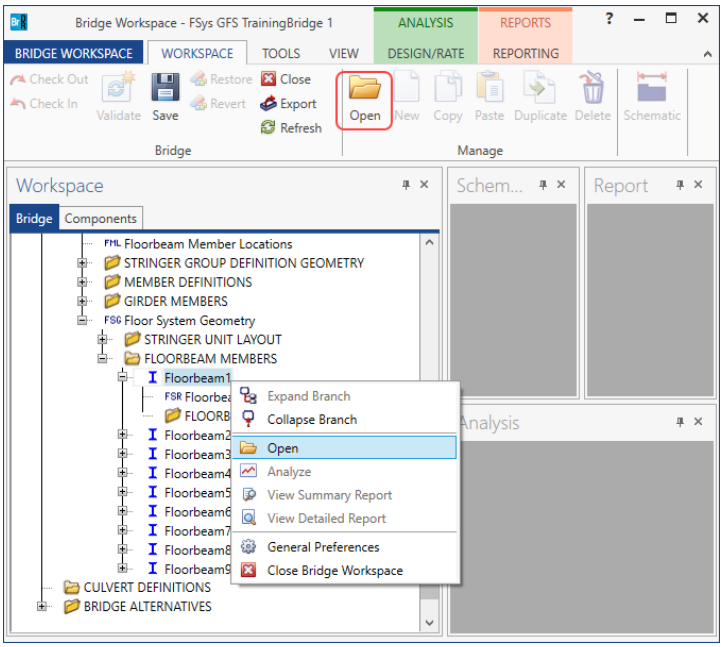
Click **OK** to apply the data and close the window

The description of the **Stringer Unit 1 Layout** is complete.

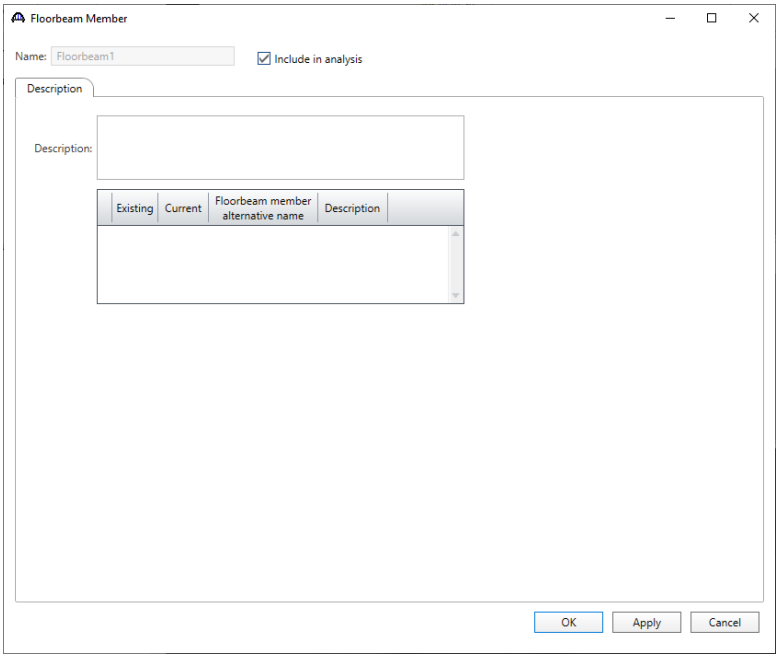
Repeat the process for describing a stringer member to all stringers in **Stringer Unit 2 Layout**, **Stringer Unit 3 Layout**, and **Stringer Unit 4 Layout**. Include all stringers in analysis.

Describing a Floorbeam Member – FLOORBEAM MEMBERS

Expand the **Floor System Geometry**, and double click on **Floorbeam1** (or select **Floorbeam1** and click **Open** from the **Manage** group of the **WORKSPACE** ribbon or right click and select **Open**) to open the **Floorbeam Member** window.



Include the floorbeam in analysis by making sure that the **Include in analysis** option is checked. The first floorbeam member alternative created will automatically be assigned as the **Existing** and **Current** Member Alternative for this member.

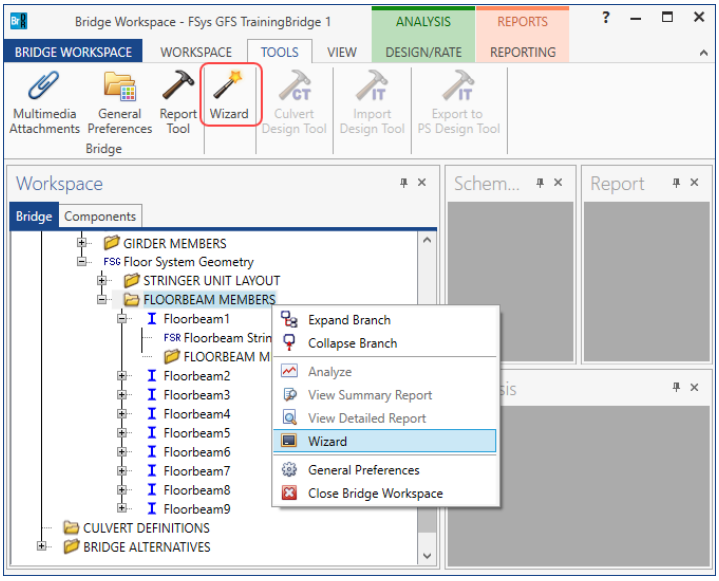


Click **OK** to apply the data and close the window

Defining a Floorbeam Member Alternative

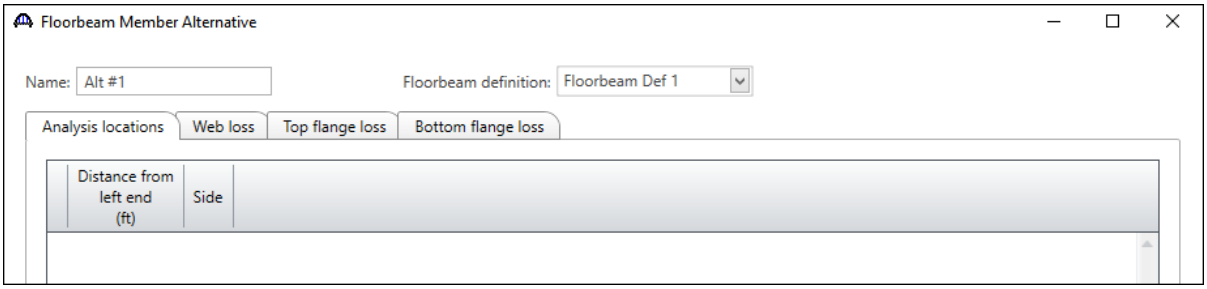
There are two methods to create floorbeam member alternatives for the floorbeam members in the structure:

1. Manually create a floorbeam member alternative in the **Bridge Workspace** tree and assign a floorbeam definition to this alternative.
2. Use the **Floorbeam Unit Layout Wizard** to quickly create stringer member alternatives for all the floorbeam members in the structure. This wizard can be accessed by selecting the **Wizard** button from the **TOOLS** ribbon while the **FLOORBEAM MEMBERS** is selected in the **Bridge Workspace** tree (or right click **FLOORBEAM MEMBERS** and select **Wizard** from the menu).



This example uses the manual approach in Option 1 to create floorbeam member alternatives for the floorbeam members in this structure.

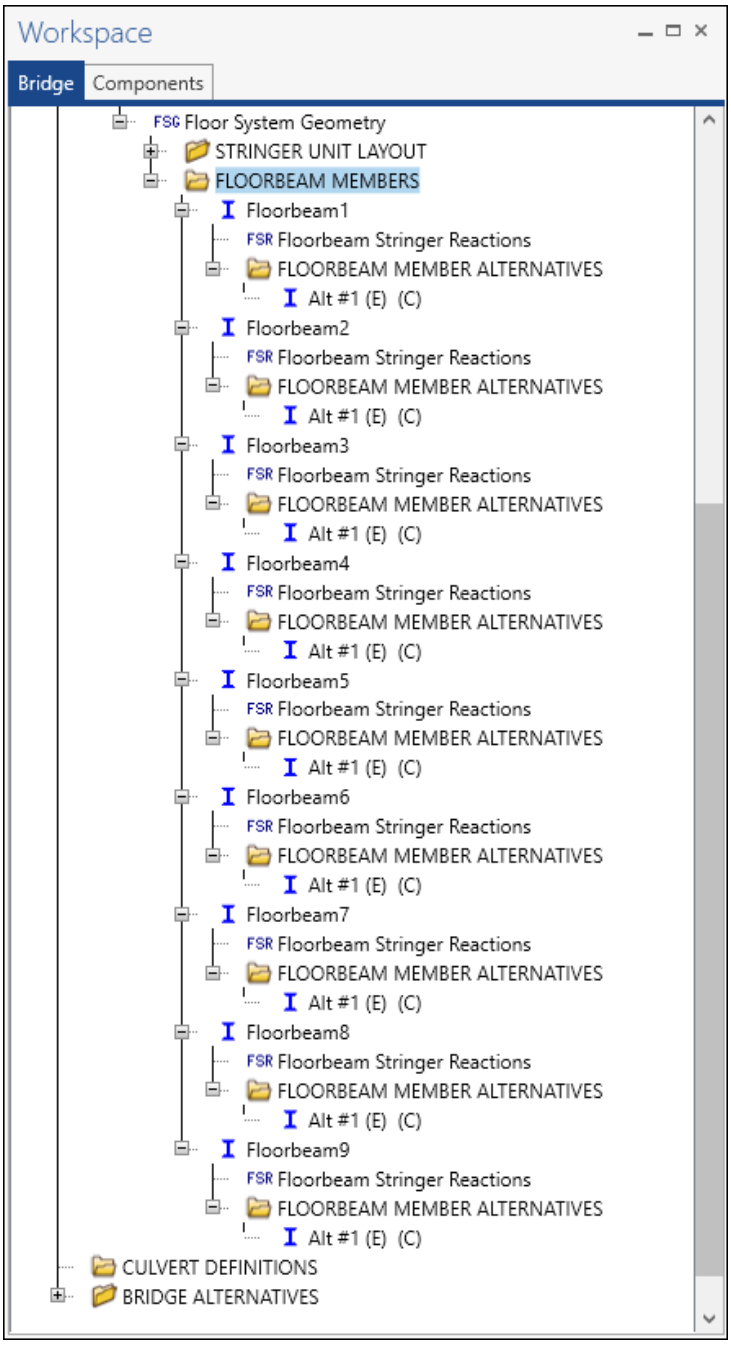
Double click on the **FLOORBEAM MEMBER ALTERNATIVES** node in the **Bridge Workspace** tree to create a new member alternative for **Floorbeam1**. The **Floorbeam Member Alternative** window shown below will open. Enter **Alt1** for the **Name** of the alternative. Select **Floorbeam Def 1** as the **Floorbeam definition** for this alternative.



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

The description of the floorbeam member is complete. Repeat the process for describing a floorbeam member to **Floorbeam2**, **Floorbeam3**, **Floorbeam4**, **Floorbeam5**, **Floorbeam6**, **Floorbeam7**, **Floorbeam8**, and **Floorbeam9**. Since **Floorbeam5** is located at the interior pier, the floorbeam definition assigned for the alternative is **Floorbeam Def 2**.

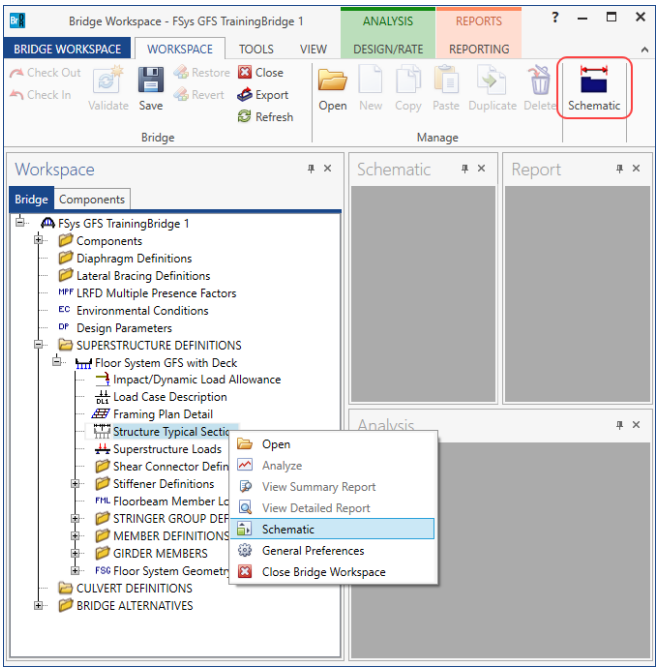
The partially expanded **Bridge Workspace** tree for **FLOORBEAM MEMBERS** is shown below.



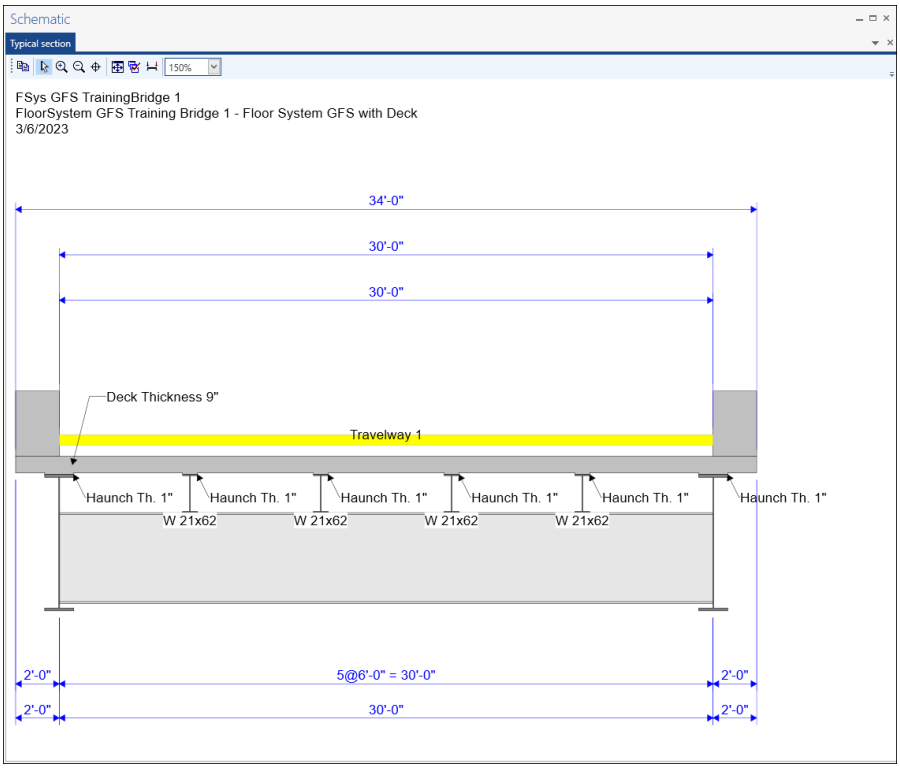
The description of the bridge is complete.

Schematic – Structure Typical Section

While **Structure Typical Section** is selected in the **Bridge Workspace** tree, open the schematic for the structure typical section by selecting the **Schematic** button on the **WORKSPACE** ribbon (or right click on **Structure Typical Section** in the **Bridge Workspace** and select **Schematic** from the menu).

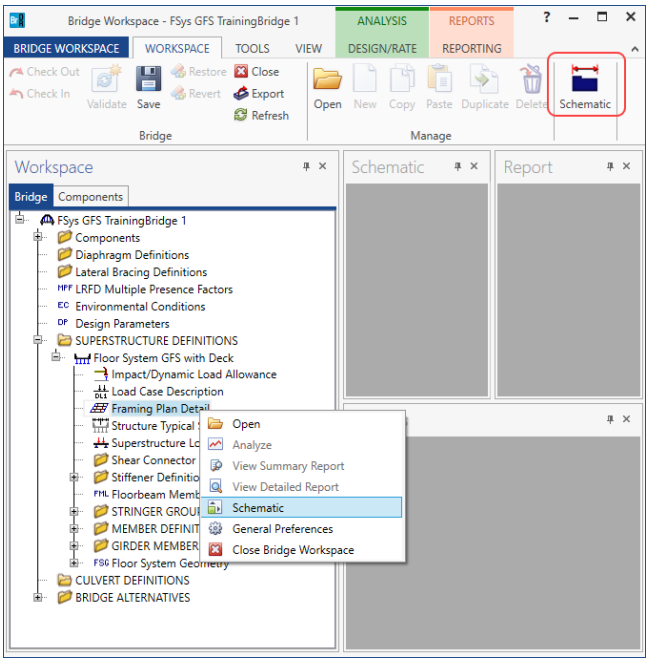


The following schematic will be displayed.

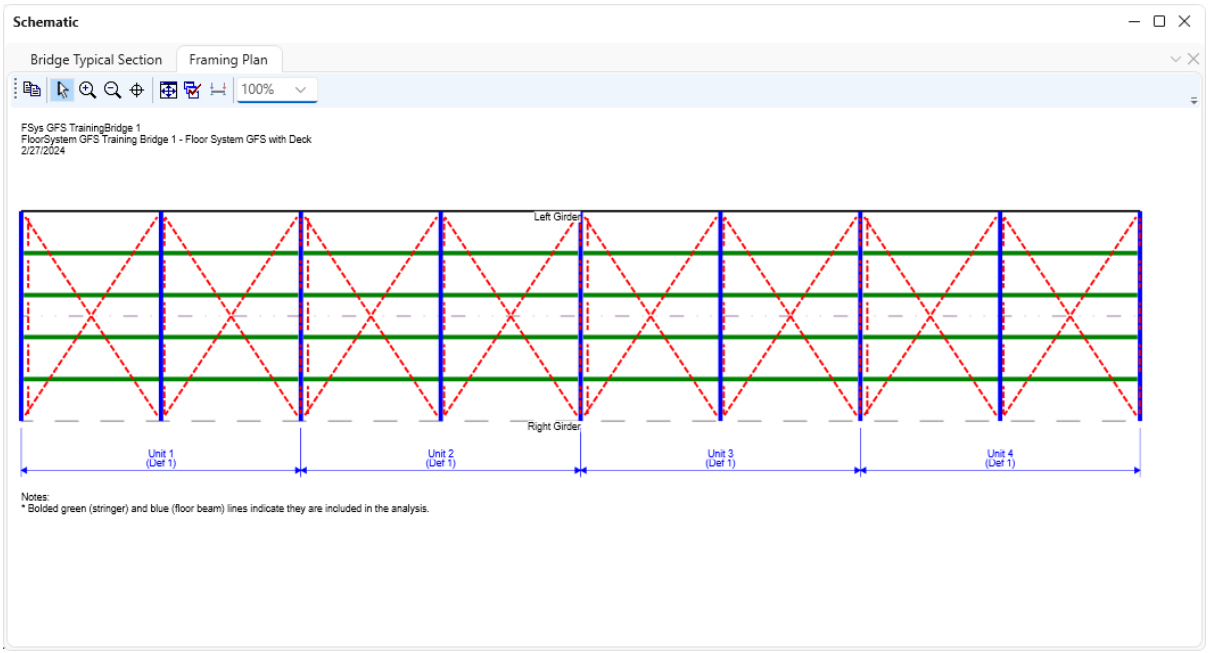


Schematic - Framing Plan Detail

While the **Framing Plan Detail** is selected in the **Bridge Workspace** tree, open the schematic for the framing plan by selecting the **Schematic** button on the **WORKSPACE** ribbon (or right click on **Framing Plan Detail** in the Bridge Workspace and select **Schematic** from the menu).

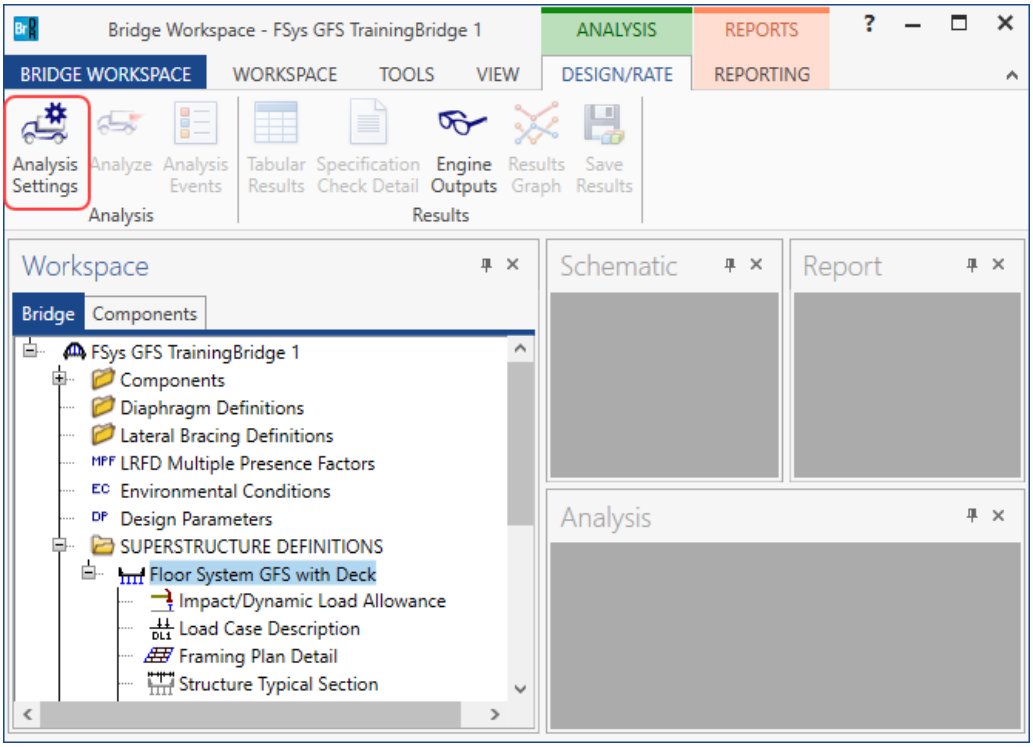


The following schematic will be displayed.

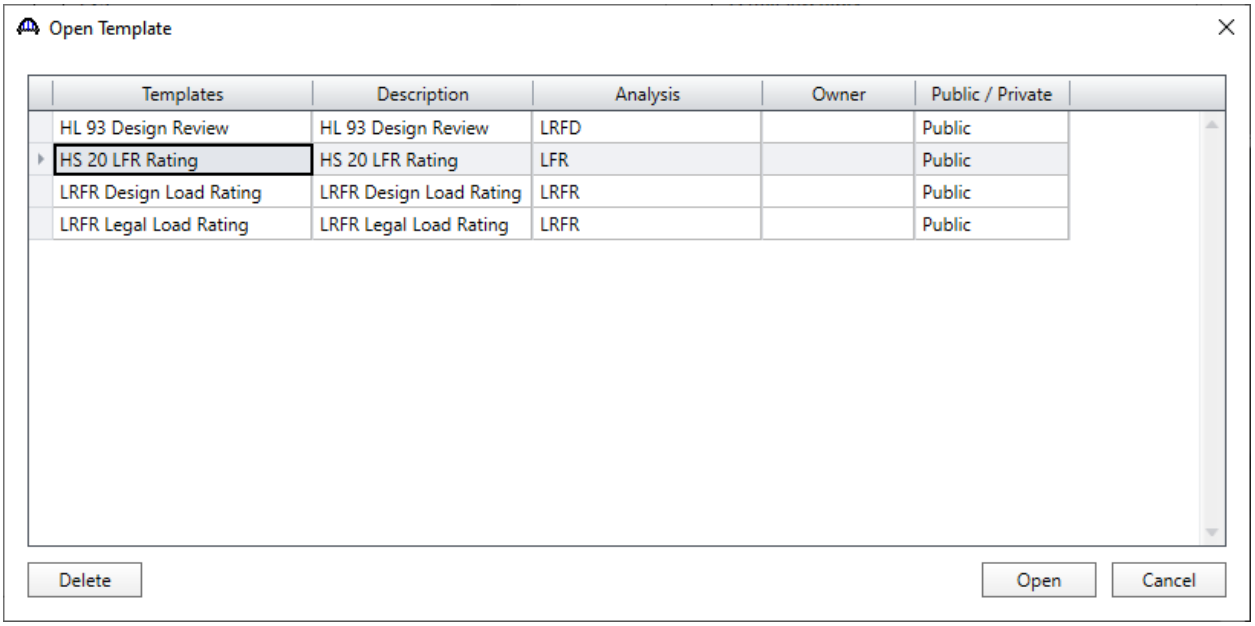


LFR Analysis

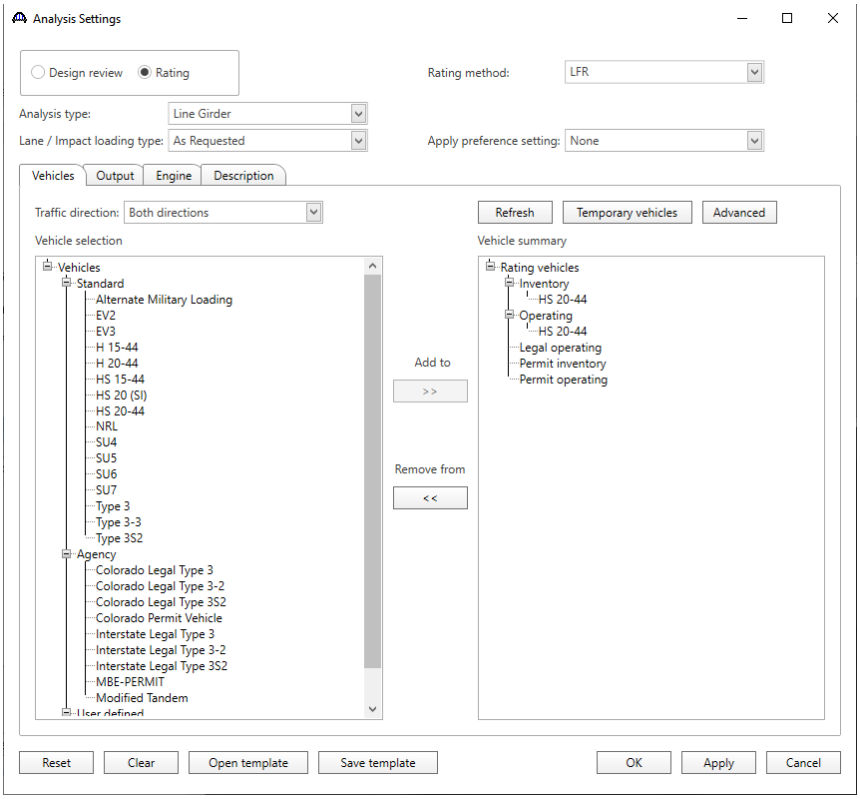
The perform a rating for all the girder, floorbeam and stringer member alternatives, select the superstructure definition **Floor System GFS with Deck** in the **Bridge Workspace** tree and click the **Analysis Settings** button on the **Analysis** group of the **DESIGN/RATE** ribbon. The window shown below opens.



Click the **Open Template** button and select the **HS 20 LFR Rating** to be used in the rating and click **Open**.



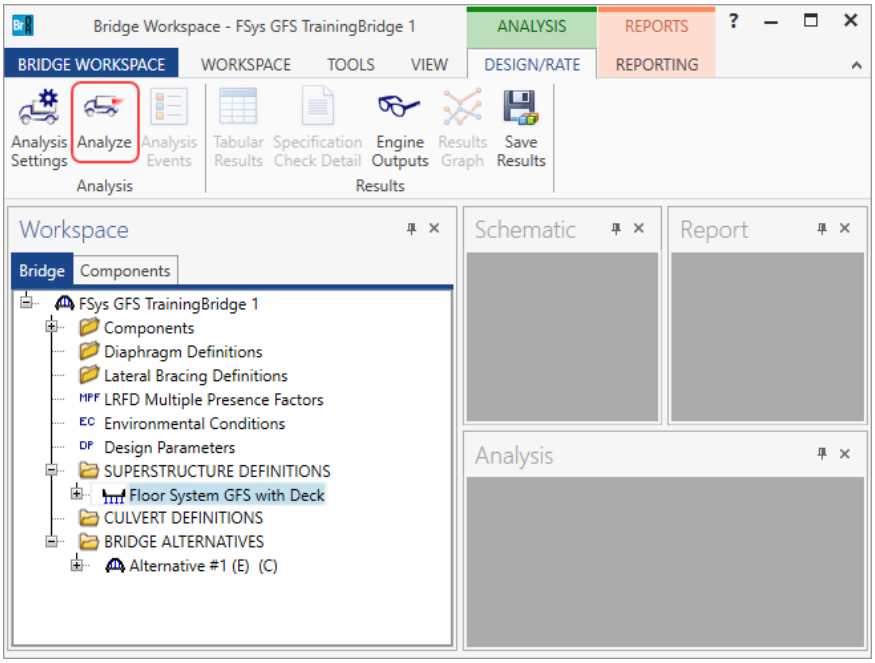
The **Analysis Settings** window will be populated as shown below.



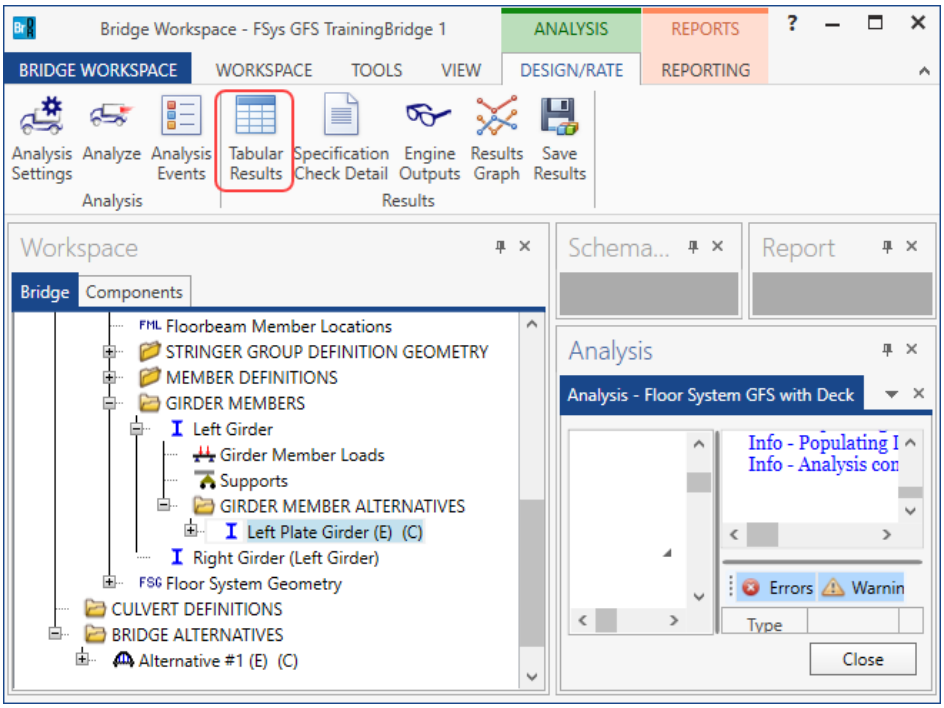
Click **OK** to save the analysis settings to memory and close the window.

Tabular Results

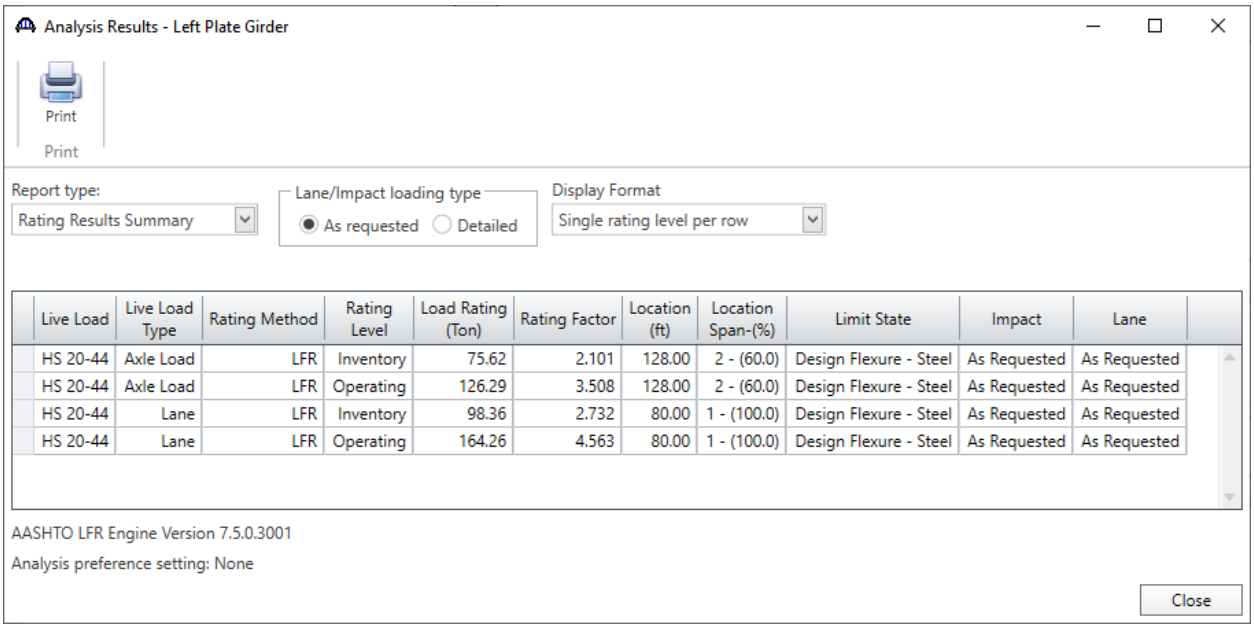
Next click the **Analyze** button on the **Analysis** group of the **DESIGN/RATE** ribbon to perform the rating.



When the rating is finished results can be reviewed by selecting the **Left Plate Girder** member alternative in the **Bridge Workspace** tree and clicking the **Tabular Results** button on the **Results** group of the ribbon.



The window shown below will open.



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	75.62	2.101	128.00	2 - (60.0)	Design Flexure - Steel	As Requested	As Requested
HS 20-44	Axle Load	LFR	Operating	126.29	3.508	128.00	2 - (60.0)	Design Flexure - Steel	As Requested	As Requested
HS 20-44	Lane	LFR	Inventory	98.36	2.732	80.00	1 - (100.0)	Design Flexure - Steel	As Requested	As Requested
HS 20-44	Lane	LFR	Operating	164.26	4.563	80.00	1 - (100.0)	Design Flexure - Steel	As Requested	As Requested