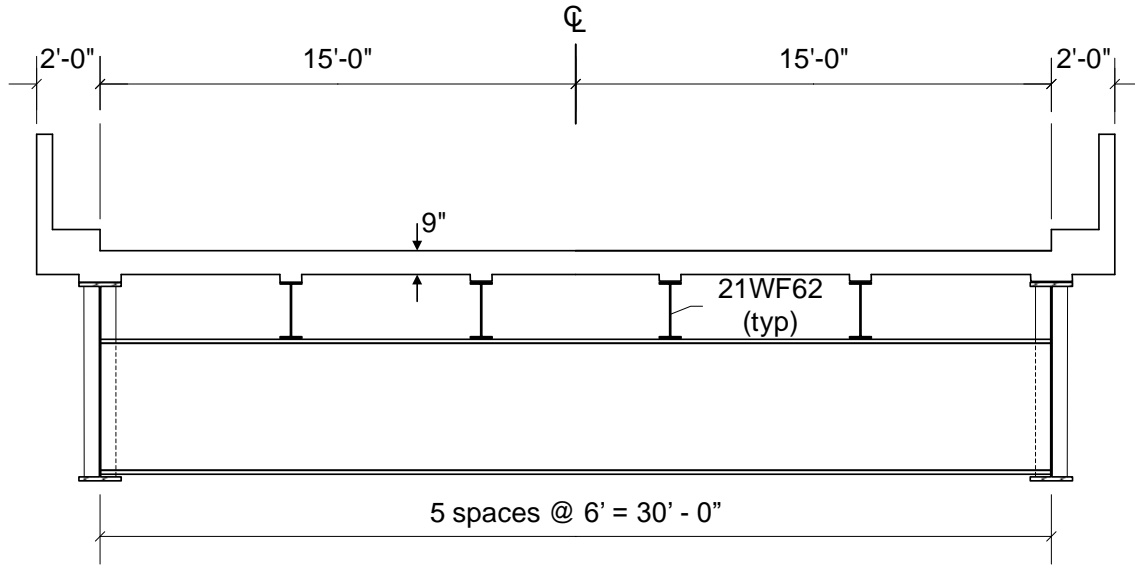

AASHTOWare BrDR 7.5.0
Floor System Tutorial
FS1 – Girder Floorbeam Stringer Example

FS1 – Girder Floorbeam Stringer Example

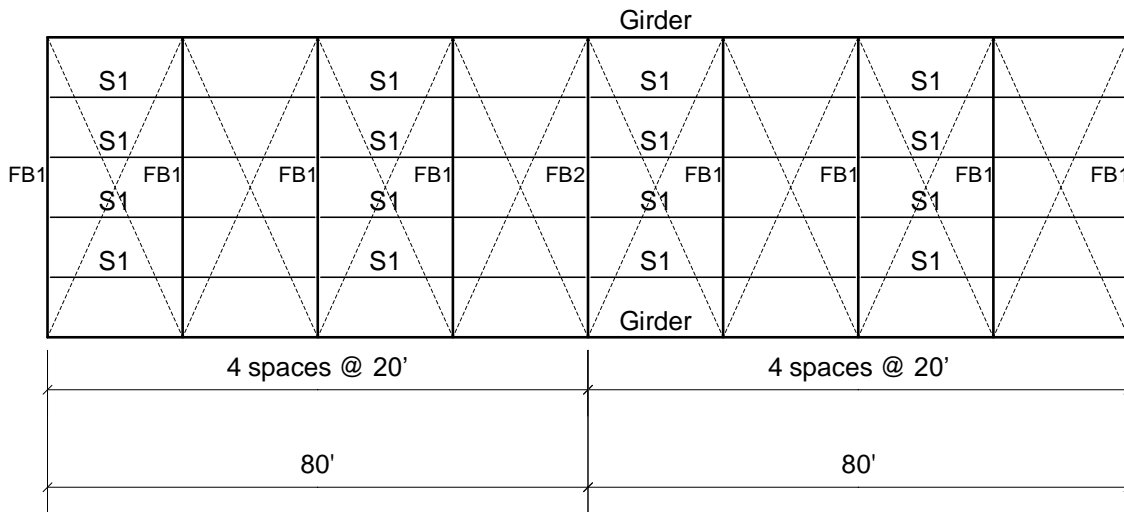


Concrete curb & railing = 0.3k/ft each side

$F_y = 36\text{ksi}$

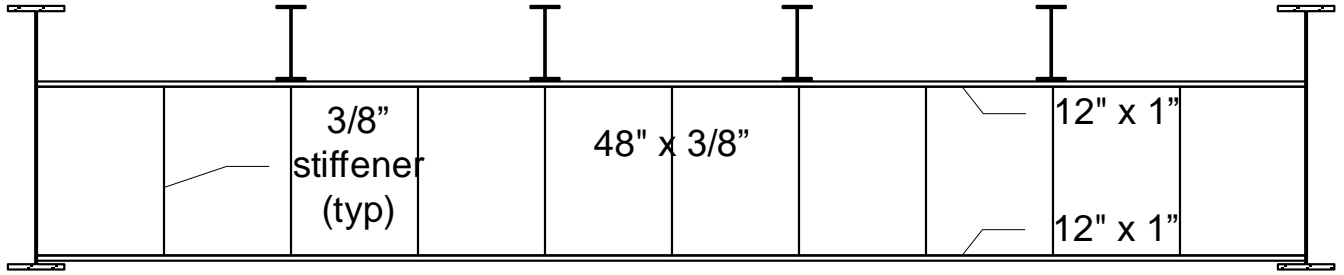
$f'_c = 3\text{ksi}$

Composite stringers & girders, 8.5" effective slab thickness



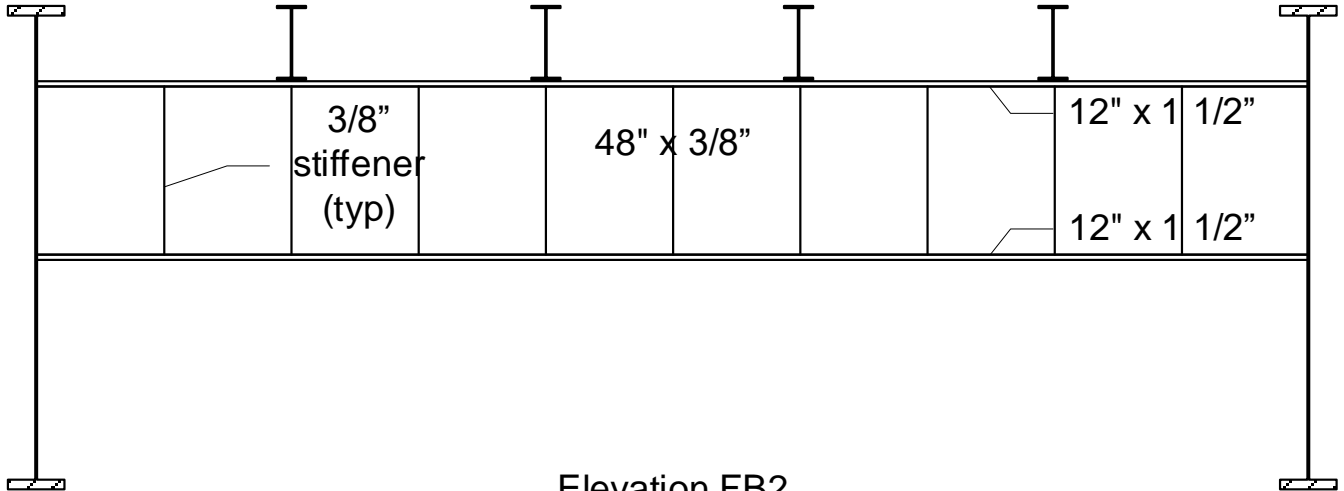
Lateral Bracing = ST 6WF20 (typ)

FS1 – Girder Floorbeam Stringer Example



Elevation FB1

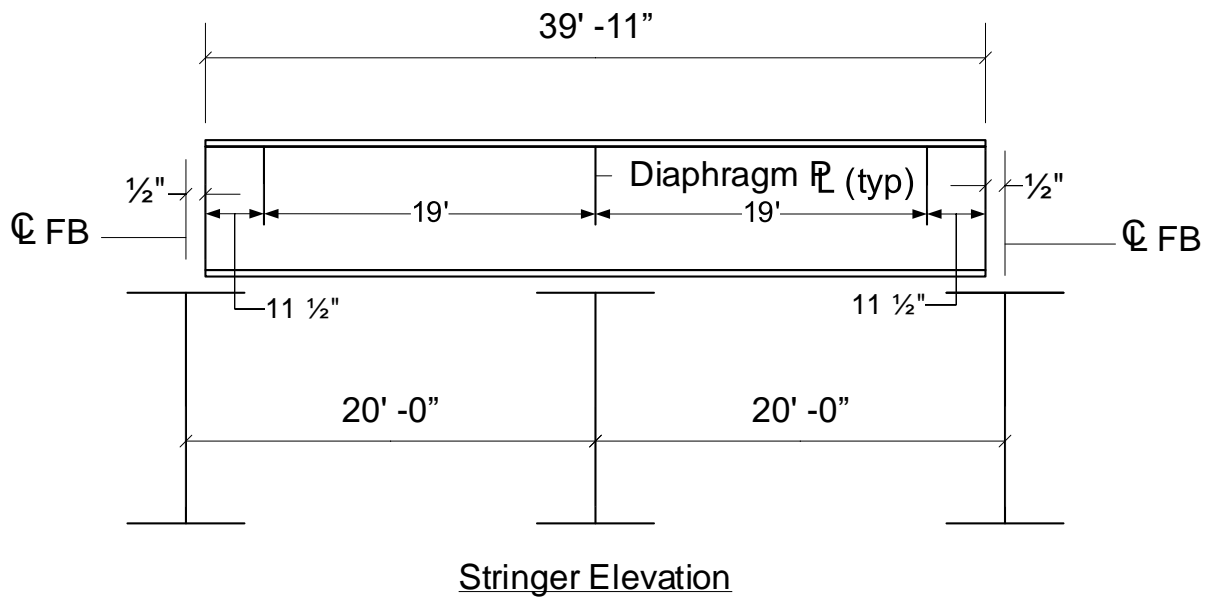
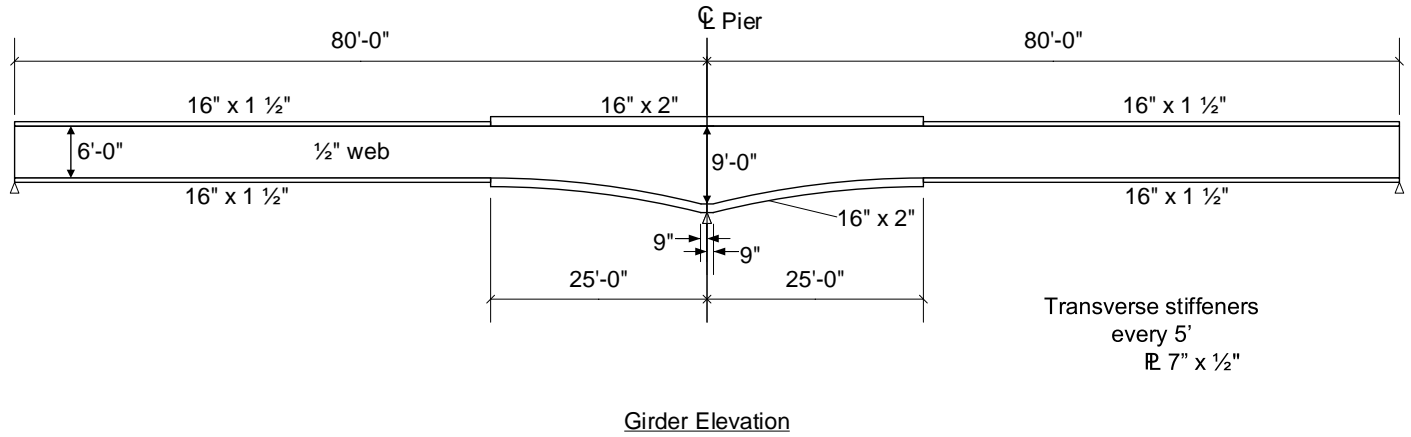
Stiffeners = 6" x 3/8"



Elevation FB2

Stiffeners = 6" x 3/8"

FS1 – Girder Floorbeam Stringer Example



Diaphragms 10 [20

FS1 – Girder Floorbeam Stringer Example

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.

New Bridge

Bridge ID: NBI structure ID (8):

Template Superstructures
 Bridge completely defined Culverts
 Substructures

Description | Description (cont'd) | Alternatives | Global reference point | Traffic | Custom agency fields

Name: Year built:

Description:

Location: Length: ft

Facility carried (7): Route number:

Feat. intersected (6): Mi. post:

Default units:

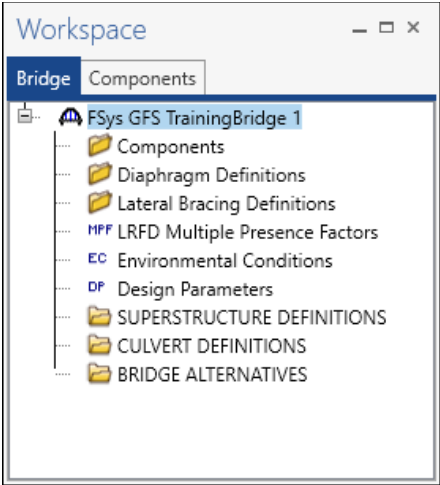
Bridge association... BrR BrD BrM

OK Apply Cancel

Close the window by clicking **OK**.


FS1 – Girder Floorbeam Stringer Example

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

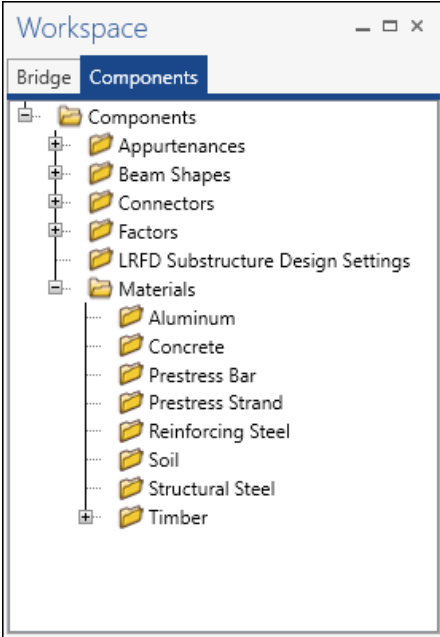


The **Bridge Workspace** tree is organized according to the definition of a bridge with data shared by many of the bridge components shown in the upper part of the tree. A bridge can be described by working from top to bottom within the **Bridge Workspace** tree.

Bridge Materials

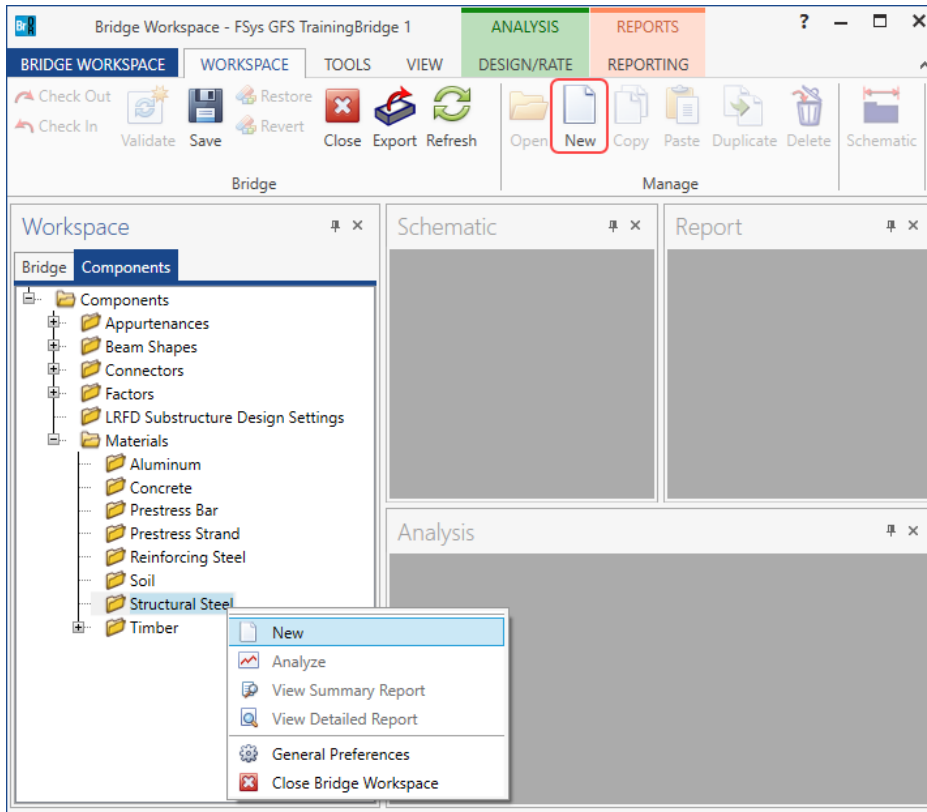
To enter the materials to be used by members of the bridge, in the **Components** tab of the **Bridge Workspace**, click on the  button to expand the tree for **Materials**.

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



FS1 – Girder Floorbeam Stringer Example

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.



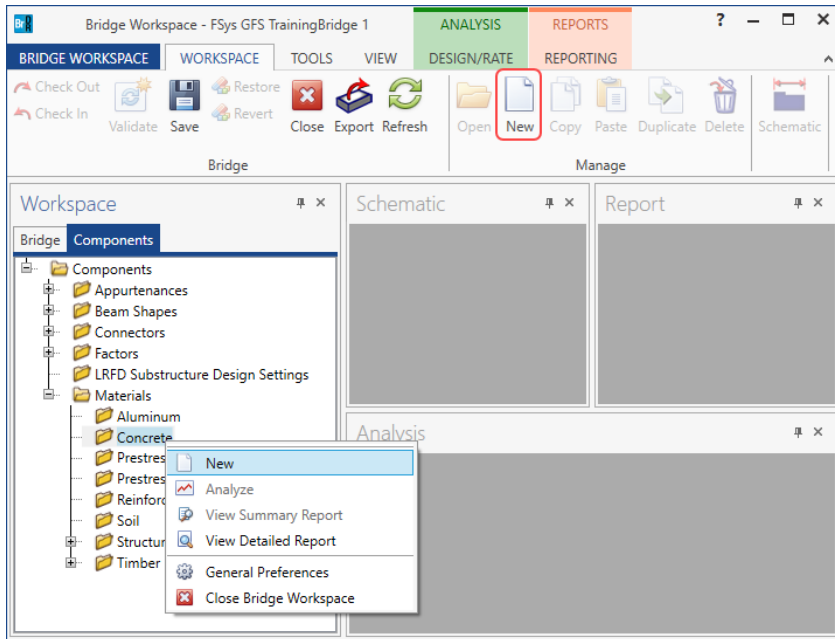
Enter the structural steel material as shown below.

The screenshot shows the "Bridge Materials - Structural Steel" dialog box. The "Name" field contains "FY 36ksi Steel" and the "Description" field contains "Built after 1963 - 36 ksi steel". Under "Material properties", the following values are entered: Specified minimum yield strength (fy): 36.000 ksi; Specified minimum tensile strength (Fu): [empty] ksi; Coefficient of thermal expansion: 0.0000065000 1/F; Density: 0.4900 kcf; Modulus of elasticity (E): 29000.00 ksi. At the bottom, there are buttons for "Copy to library...", "Copy from library...", "OK", "Apply", and "Cancel".

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

FS1 – Girder Floorbeam Stringer Example

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.

Name:	3 ksi Cement Concrete
Description:	Class A cement concrete 3 ksi
Compressive strength at 28 days (F _c):	3 ksi
Initial compressive strength (F _{ci}):	
Composition of concrete:	Normal
Density (for dead loads):	0.15 kcf
Density (for modulus of elasticity):	0.145 kcf
Poisson's ratio:	0.2
Coefficient of thermal expansion (α):	0.000006 1/F
Splitting tensile strength (f _{ct}):	
LRFD Maximum aggregate size:	
Compute	
Std modulus of elasticity (E _c):	3155.924251 ksi
LRFD modulus of elasticity (E _c):	3625.494616 ksi
Std initial modulus of elasticity:	
LRFD initial modulus of elasticity:	
Std modulus of rupture:	0.410792 ksi
LRFD modulus of rupture:	0.415692 ksi
Shear factor:	1

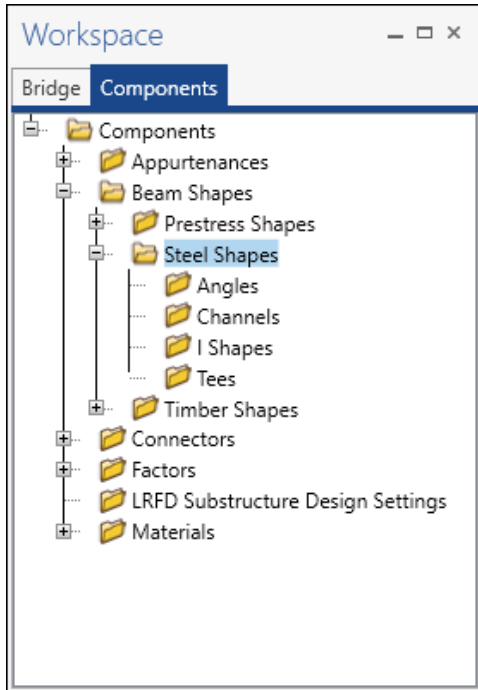
Buttons: Copy to library..., Copy from library..., OK, Apply, Cancel

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

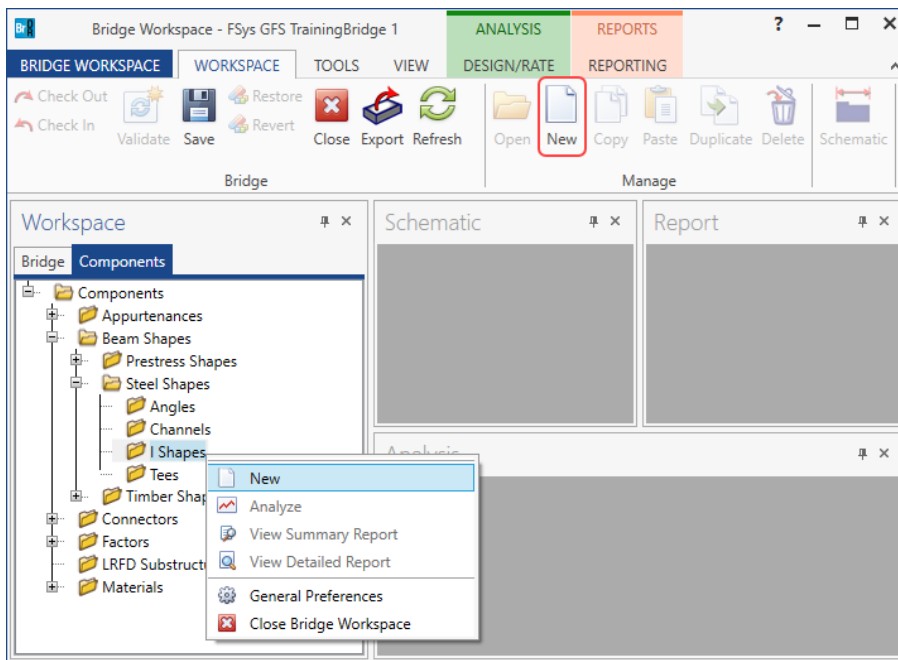
FS1 – Girder Floorbeam Stringer Example

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.

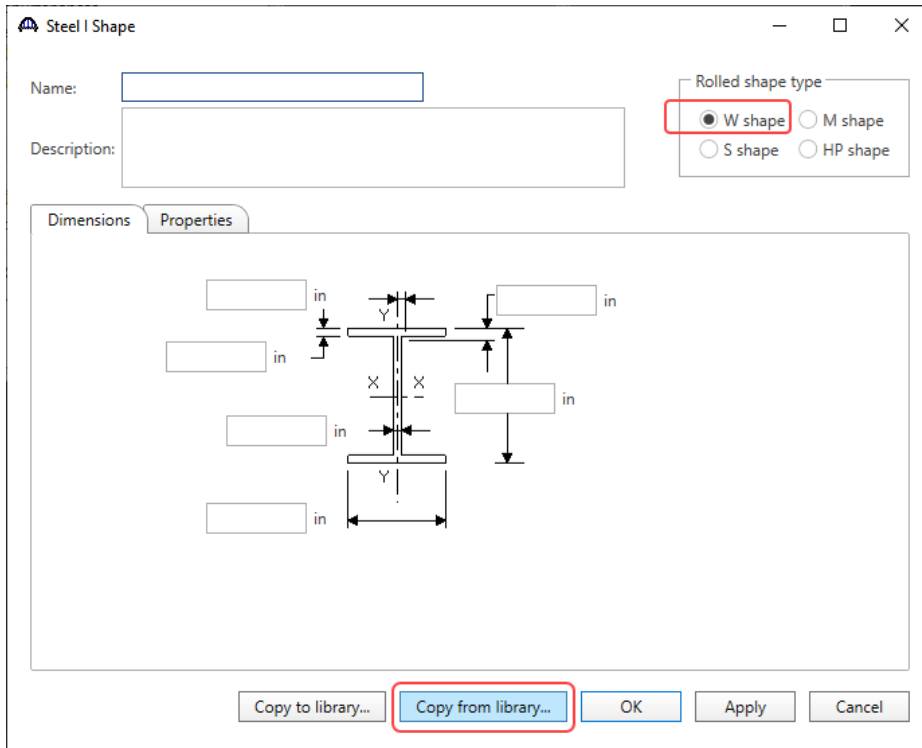


To add a new steel I shape, click on the **I Shapes** node in the **Components** tree and select **New** from the **Manage** group of the **WORKSPACE** ribbon (or right mouse click on **I Shapes** and select **New** or double click on **I Shapes** in the **Components** tree). The window shown below will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

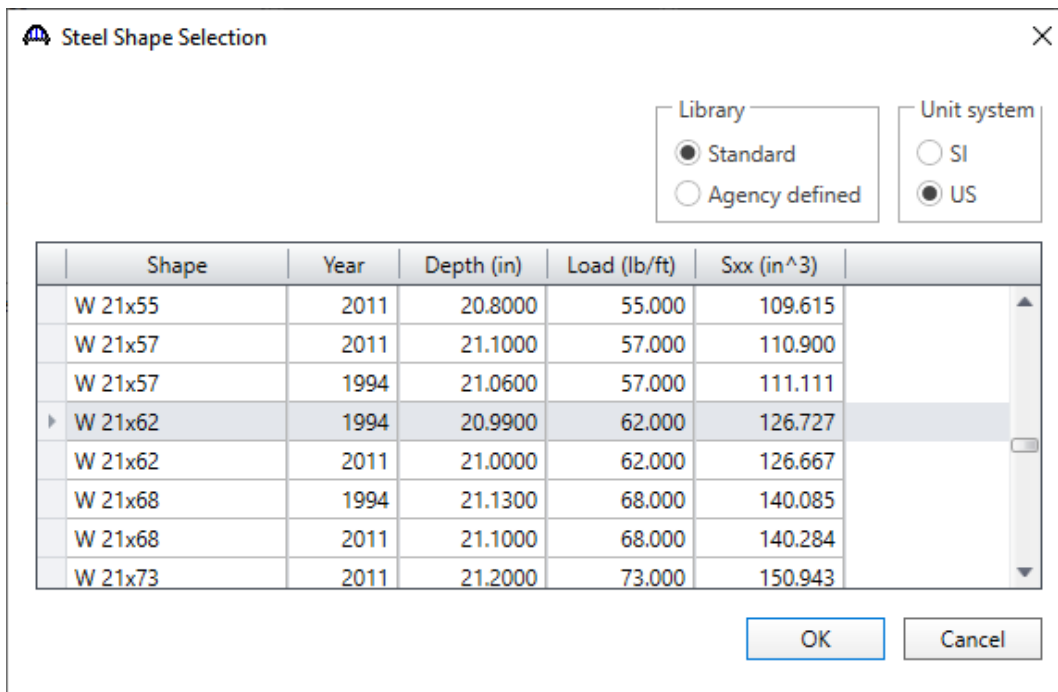


FS1 – Girder Floorbeam Stringer Example

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**.



FS1 – Girder Floorbeam Stringer Example

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

The screenshot shows the "Steel I Shape" dialog box. The "Name" field contains "W 21x62" and the "Description" field contains "W 21x62 Imported from AISC Tables (1994)". The "Rolled shape type" section has four radio buttons: "W shape" (selected), "M shape", "S shape", and "HP shape". The "Dimensions" tab is active, displaying a cross-section diagram of a wide-flange beam with the following dimensions: top flange thickness (0.6150 in), top flange width (8.2400 in), web thickness (0.4000 in), web height (20.9900 in), and bottom flange thickness (1.3750 in). The diagram also shows the X and Y axes. At the bottom, there are buttons for "Copy to library...", "Copy from library...", "OK", "Apply", and "Cancel".

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.

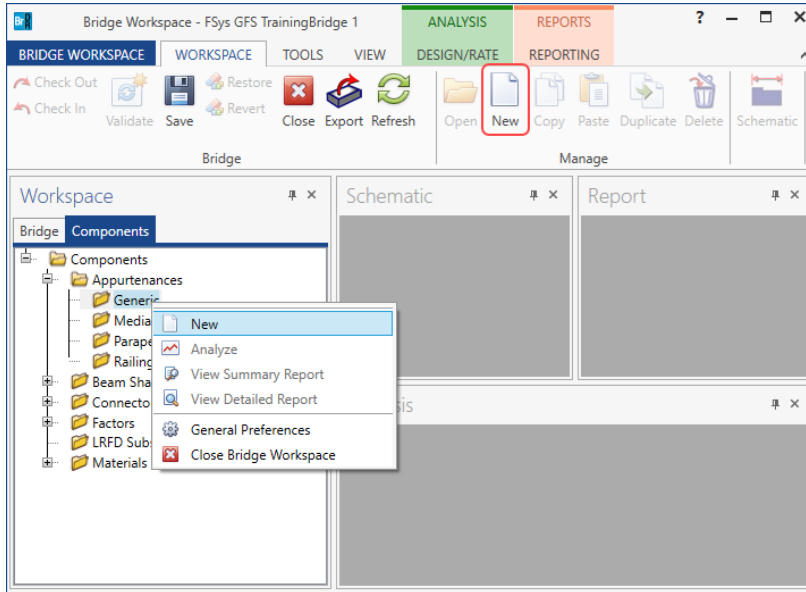
The screenshot shows the "Steel I Shape" dialog box updated for a "W 6x20" beam. The "Name" field contains "W 6x20" and the "Description" field contains "W 6x20 Imported from AISC Tables (1994)". The "Rolled shape type" section has four radio buttons: "W shape" (selected), "M shape", "S shape", and "HP shape". The "Dimensions" tab is active, displaying a cross-section diagram of a wide-flange beam with the following dimensions: top flange thickness (0.3650 in), top flange width (6.0200 in), web thickness (0.2600 in), web height (6.2000 in), and bottom flange thickness (0.7500 in). The diagram also shows the X and Y axes. At the bottom, there are buttons for "Copy to library...", "Copy from library...", "OK", "Apply", and "Cancel".

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

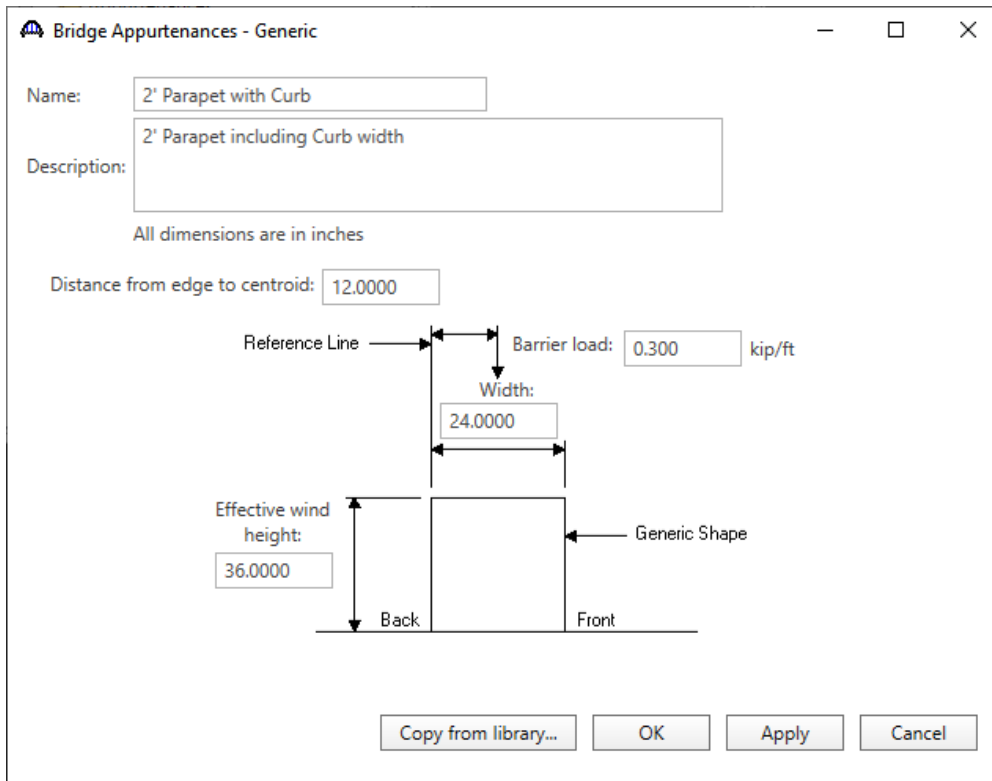
FS1 – Girder Floorbeam Stringer Example

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.

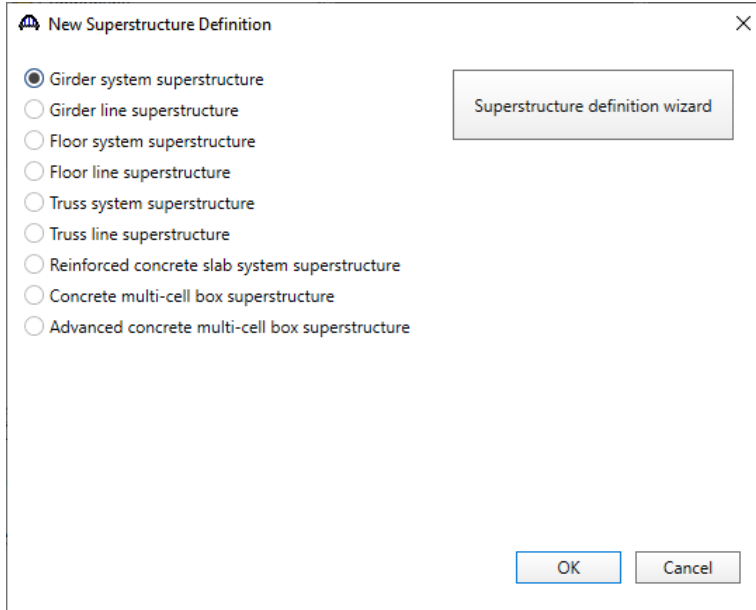


Click **OK** to apply the data and close the window

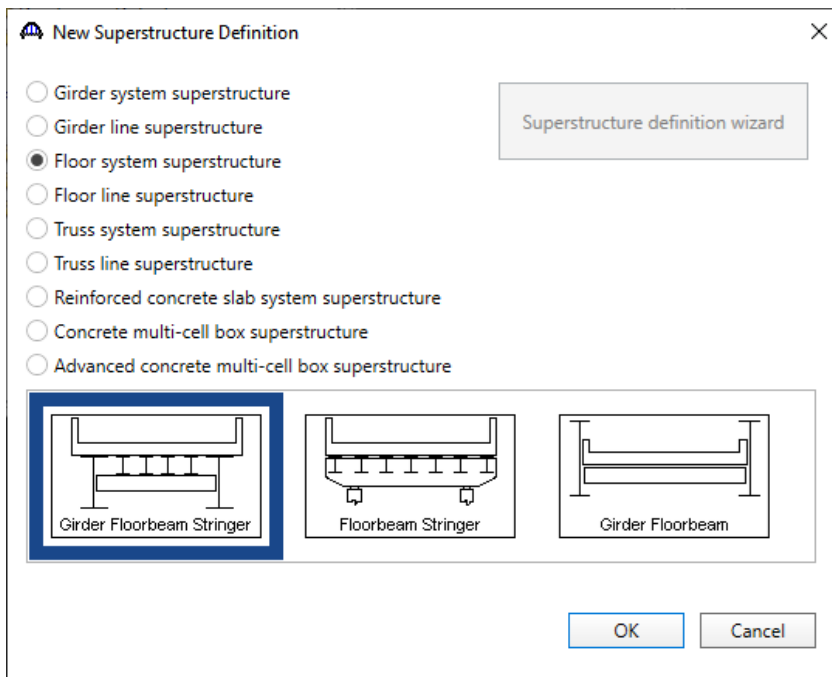
FS1 – Girder Floorbeam Stringer Example

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**.



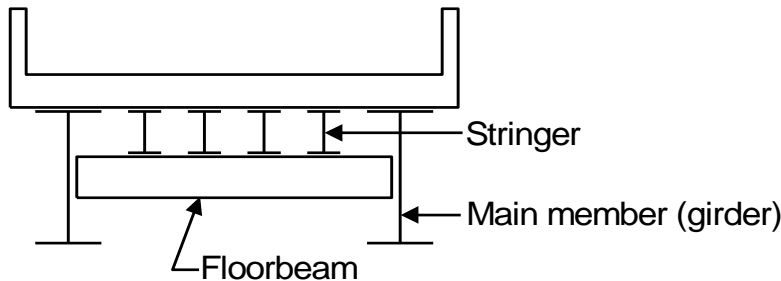
FS1 – Girder Floorbeam Stringer Example

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

Span	Length (ft)
1	80.00
2	80.00

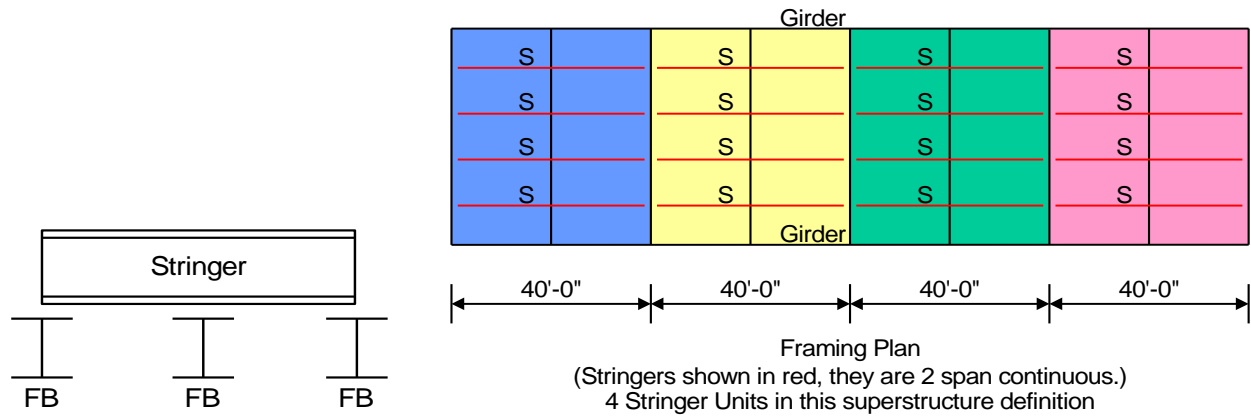
Click **OK** to apply the data and close the window.

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.

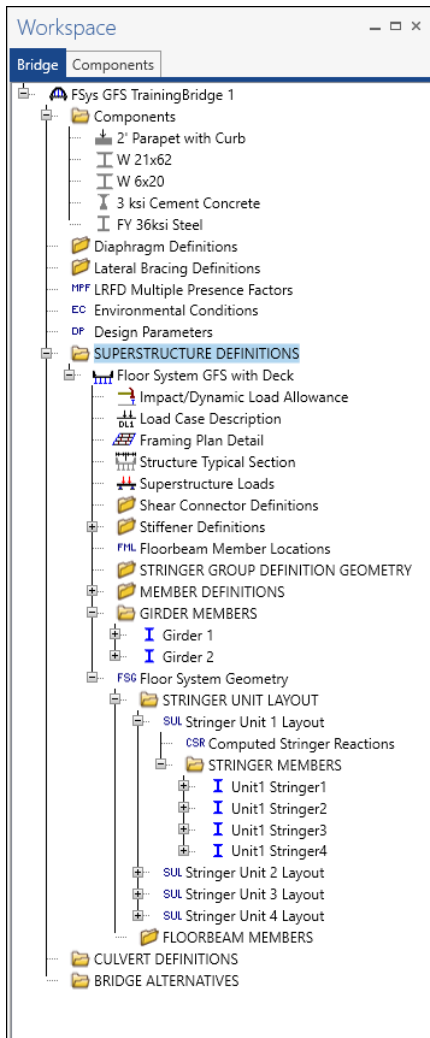


FS1 – Girder Floorbeam Stringer Example

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.



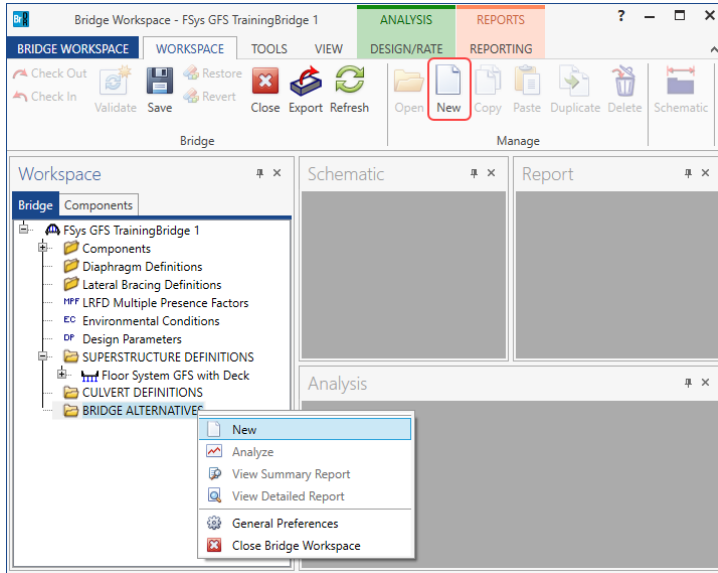
The partially expanded **Bridge Workspace** tree is shown below.



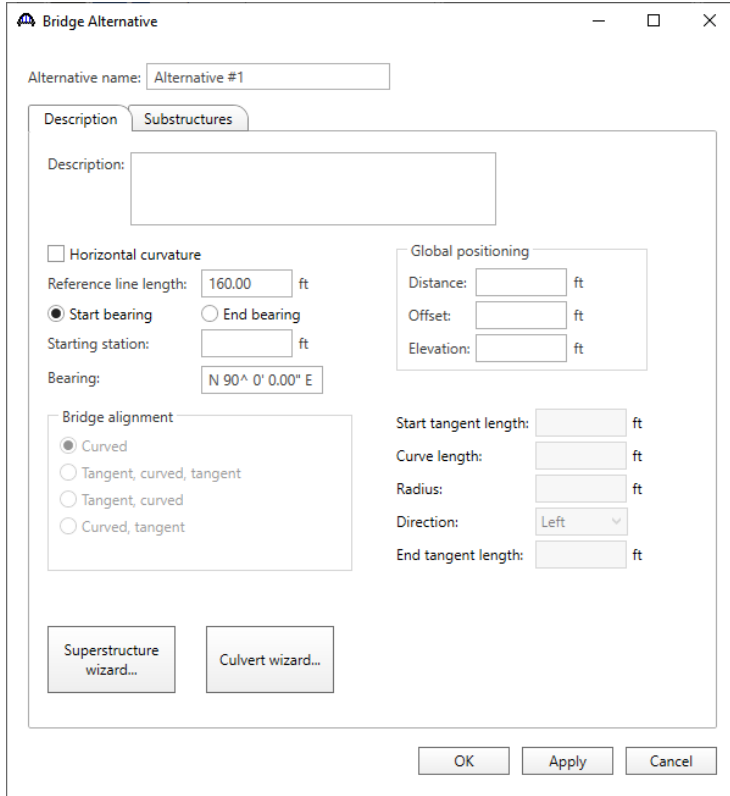
FS1 – Girder Floorbeam Stringer Example

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).



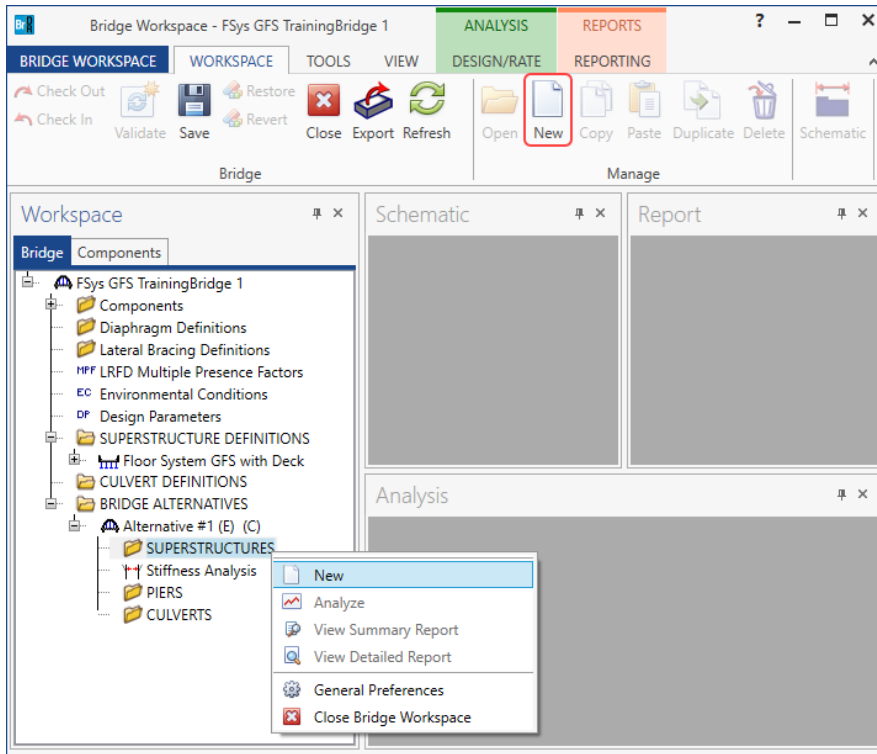
Enter the following data.



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

FS1 – Girder Floorbeam Stringer Example

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.

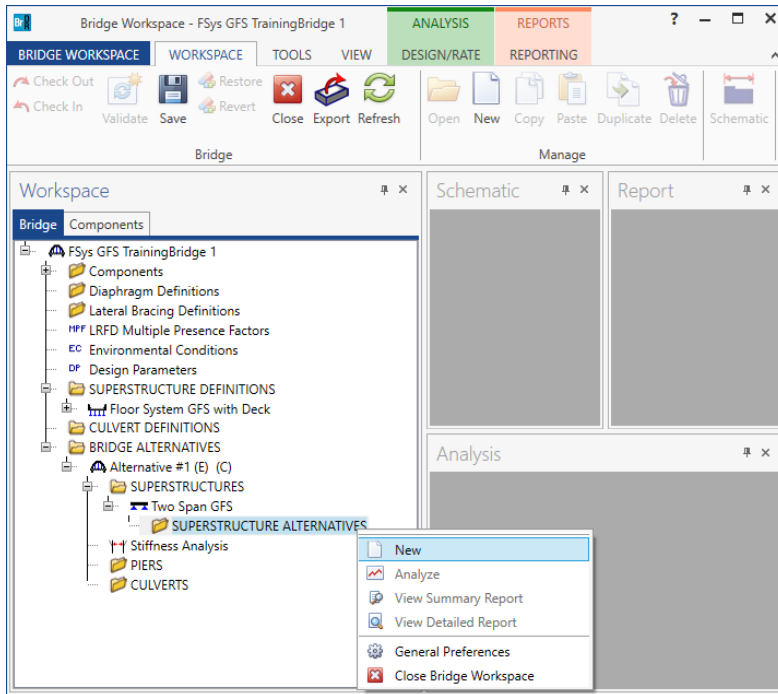


The screenshot shows the "Superstructure" dialog box. The "Superstructure name" field contains "Two Span GFS". The "Description" field is empty. The "Reference line" section has the following values: Distance: 0.00 ft, Offset: 0.00 ft, Angle: 0.00 Degrees, and Starting station: ft. The "OK", "Apply", and "Cancel" buttons are at the bottom right.

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

FS1 – Girder Floorbeam Stringer Example

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.

The screenshot shows the **Superstructure Alternative** dialog box. The **Alternative name** is **Alternative #1**. The **Description** field is empty. The **Superstructure definition** is set to **Floor System GFS with Deck**. The **Superstructure type** is **GirderFloorBeamStringer**. The **Number of main members** is **2**. The table below shows the span lengths:

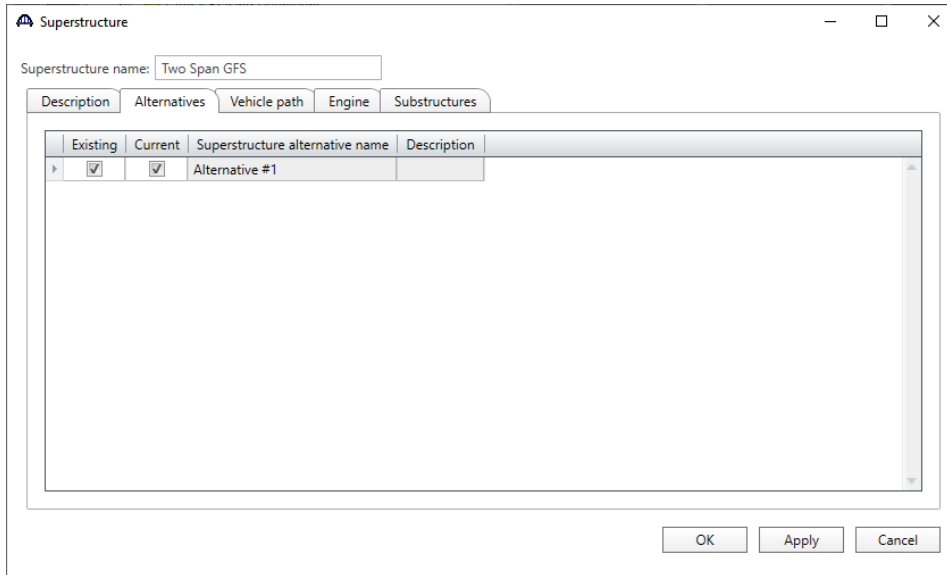
Span	Length (ft)
1	80.00
2	80.00

Buttons: **OK**, **Apply**, **Cancel**

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

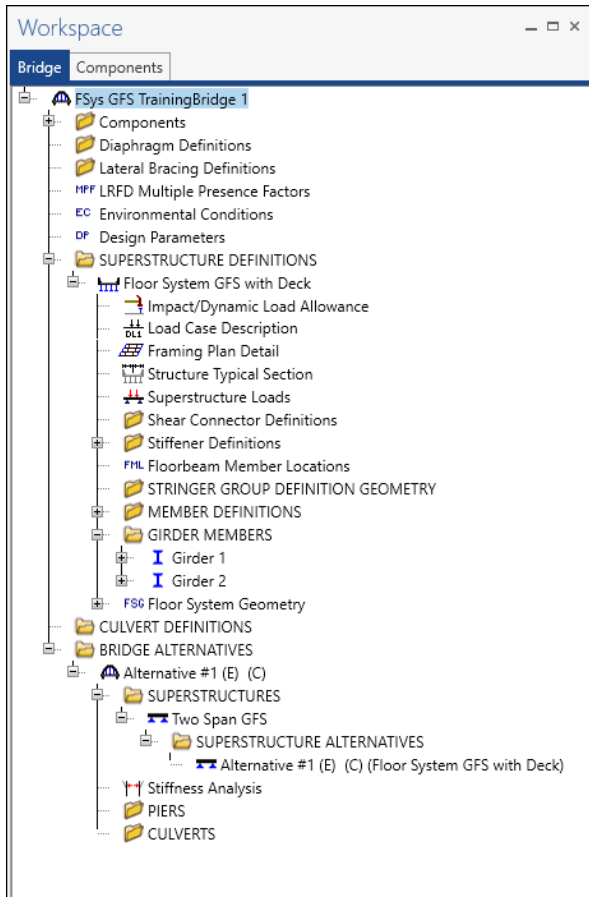
FS1 – Girder Floorbeam Stringer Example

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.

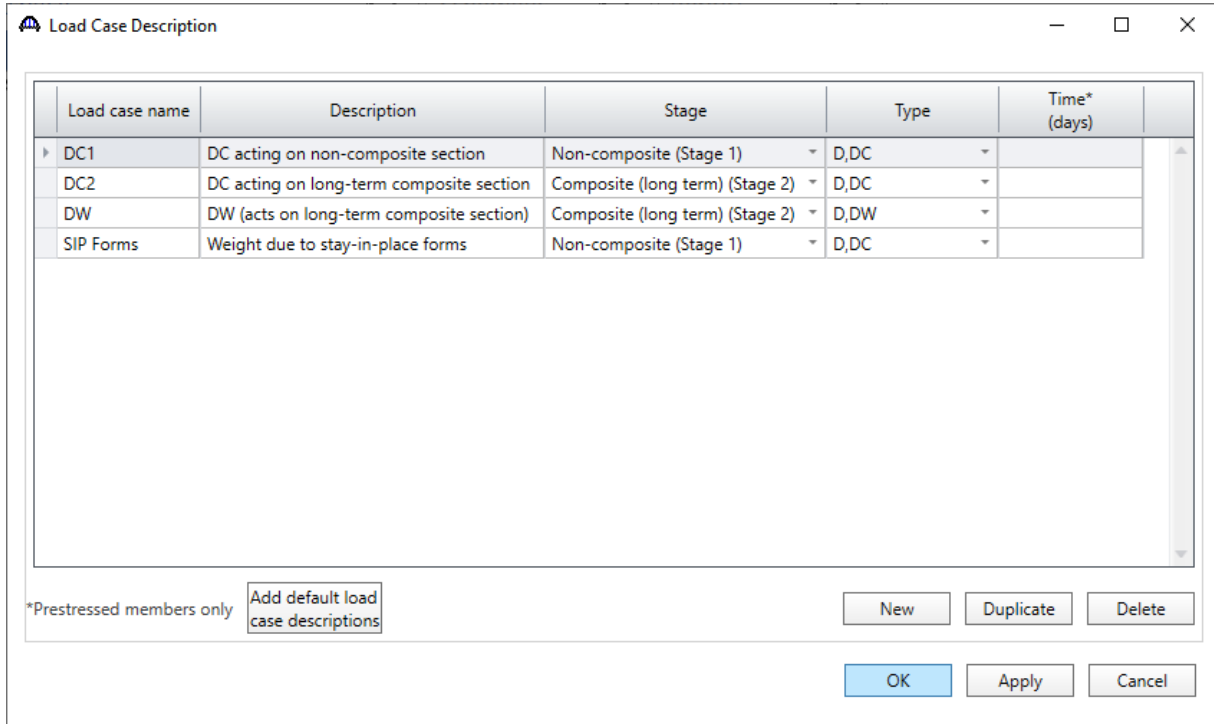
The partially expanded **Bridge Workspace** tree is shown below.



FS1 – Girder Floorbeam Stringer Example

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.



The screenshot shows a window titled "Load Case Description" with a table containing the following data:

Load case name	Description	Stage	Type	Time* (days)
DC1	DC acting on non-composite section	Non-composite (Stage 1)	D,DC	
DC2	DC acting on long-term composite section	Composite (long term) (Stage 2)	D,DC	
DW	DW (acts on long-term composite section)	Composite (long term) (Stage 2)	D,DW	
SIP Forms	Weight due to stay-in-place forms	Non-composite (Stage 1)	D,DC	

Below the table, there is a text label "*Prestressed members only" and a button "Add default load case descriptions". At the bottom right, there are buttons for "New", "Duplicate", "Delete", "OK", "Apply", and "Cancel".

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

FS1 – Girder Floorbeam Stringer Example

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.

Structure Framing Plan Details

Number of main member spans: Number of main members: Number of stringers:

Layout **Diaphragms**

Main member support skew:

Support	Skew (degrees)
1	0.000
2	0.000
3	0.000

Member spacing orientation

Perpendicular to member

Along support

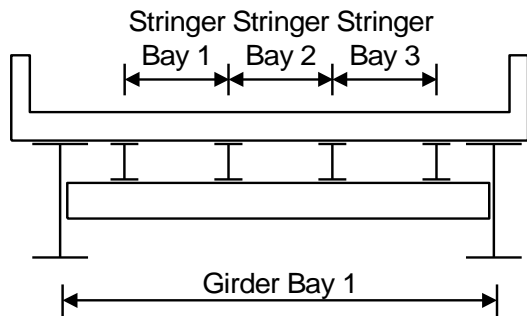
Main member spacing:

Girder bay	Member spacing (ft)	
	Start of member	End of member
1	30.00	30.00

Stringer spacing:

Stringer bay	Stringer spacing (ft)	
	Start of stringer	End of stringer
1	6.00	6.00
2	6.00	6.00
3	6.00	6.00

The Main Member and Stringer Bays are labeled as follows.



FS1 – Girder Floorbeam Stringer Example

Structure Framing Plan Detail – Diaphragms

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

Structure Framing Plan Details

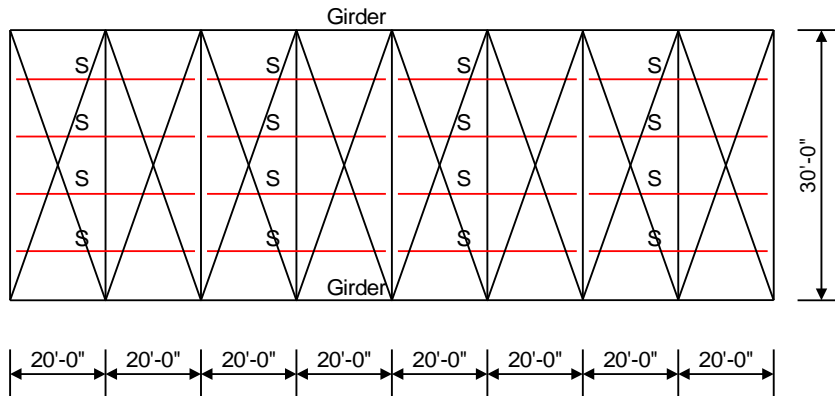
Number of main member spans: Number of main members: Number of stringers:

Layout Diaphragms

Girder bay:

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	20.00	0.00	1	0.00	0.00	20.00	0.7200	--Not Assigned--
1	0.00	20.00	20.00	7	140.00	140.00	160.00	0.7200	--Not Assigned--
1	20.00	0.00	0.00	1	0.00	20.00	0.00	0.7200	--Not Assigned--
1	20.00	0.00	20.00	7	140.00	160.00	140.00	0.7200	--Not Assigned--

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



The load of each brace is computed as follows.

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

$$\text{Load of each brace} = 36' * 20 \text{ lb/ft} = 720 \text{ lb}$$

FS1 – Girder Floorbeam Stringer Example

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

Distance from left edge of deck to superstructure definition ref. line | Distance from right edge of deck to superstructure definition ref. line

Left edge of deck to first stringer | Superstructure Definition Reference Line | Left edge of deck to first main member

Deck | Deck (cont'd) | Parapet | Median | Railing | Generic | Sidewalk | Lane position | Striped lanes | Wearing surface

Superstructure definition reference line is within the bridge deck.

	Start	End
Distance from left edge of deck to superstructure definition reference line:	17.00 ft	17.00 ft
Distance from right edge of deck to superstructure definition reference line:	17.00 ft	17.00 ft
Left edge of deck to first main member:	2.00 ft	2.00 ft
Left edge of deck to first stringer:	8.00 ft	8.00 ft

OK Apply Cancel

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

Distance from left edge of deck to superstructure definition ref. line | Distance from right edge of deck to superstructure definition ref. line

Left edge of deck to first stringer | Superstructure Definition Reference Line | Left edge of deck to first main member

Deck | Deck (cont'd) | Parapet | Median | Railing | Generic | Sidewalk | Lane position | Striped lanes | Wearing surface

Deck concrete: 3 ksi Cement Concrete

Total deck thickness: 9.0000 in

Load case: Engine Assigned

Deck crack control parameter: 130.000 kip/in

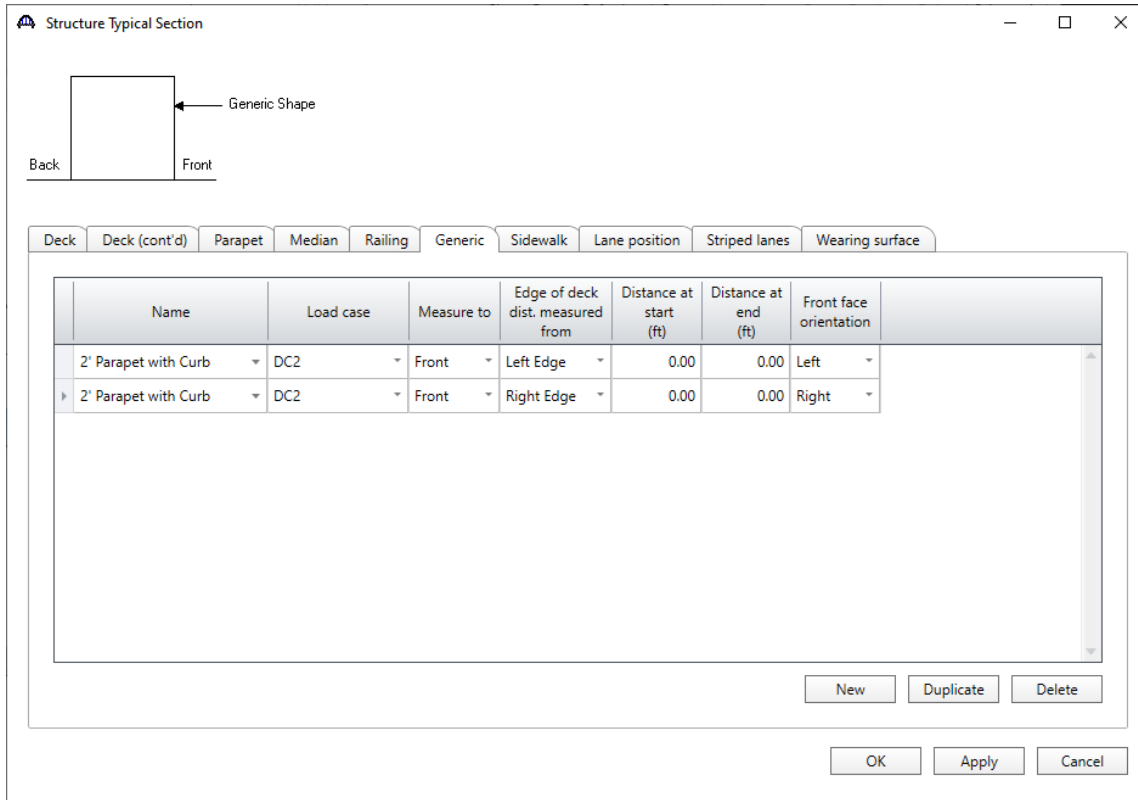
Sustained modular ratio factor: 3.000

OK Apply Cancel

FS1 – Girder Floorbeam Stringer Example

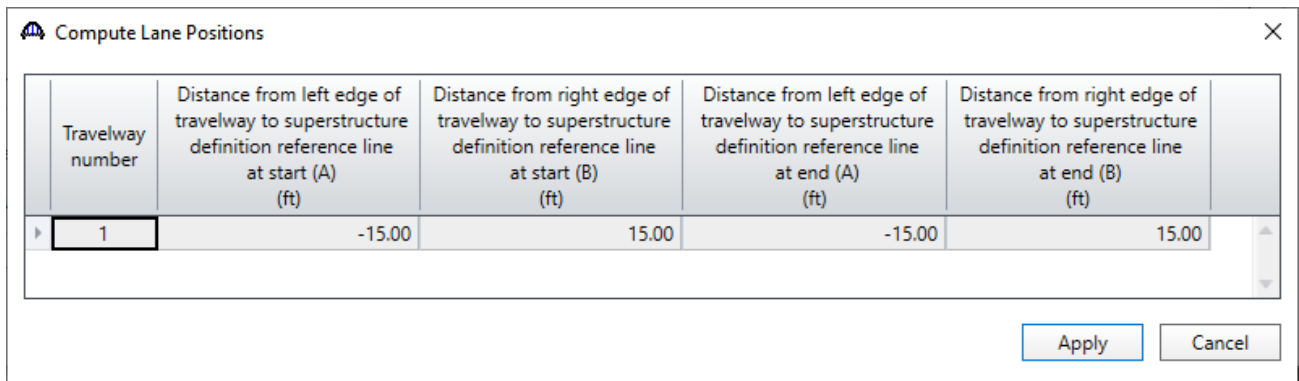
Structure Typical Section – Generic

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 completed tab is shown below.



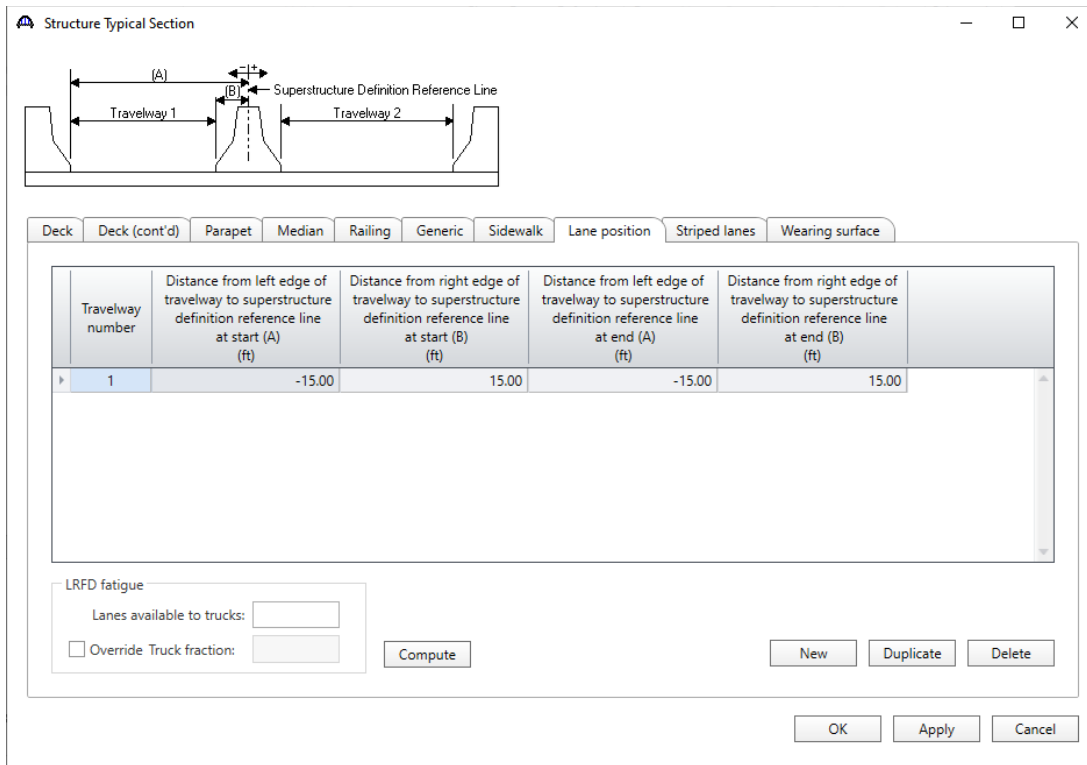
Structure Typical Section – Lane Positions

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.



FS1 – Girder Floorbeam Stringer Example

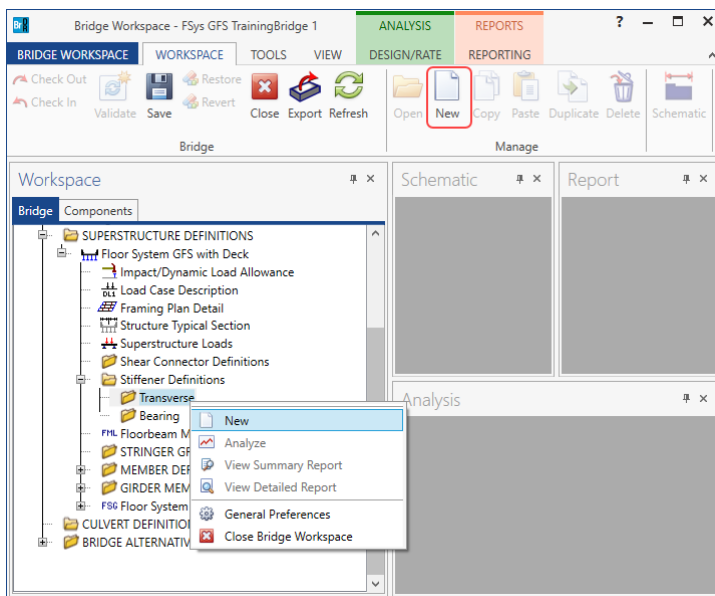
The **Lane Position** tab is populated as shown below.



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

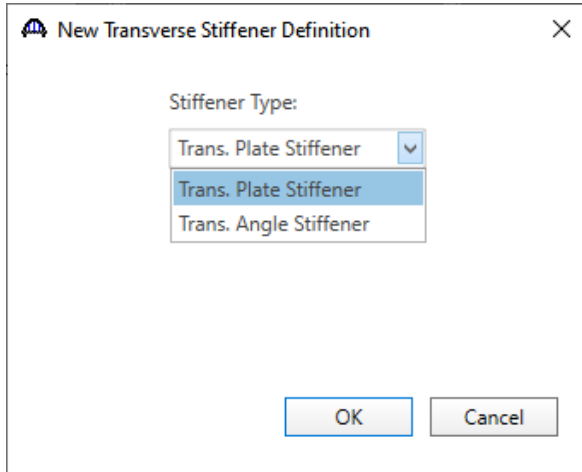
Stiffener Definitions – Transverse

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.

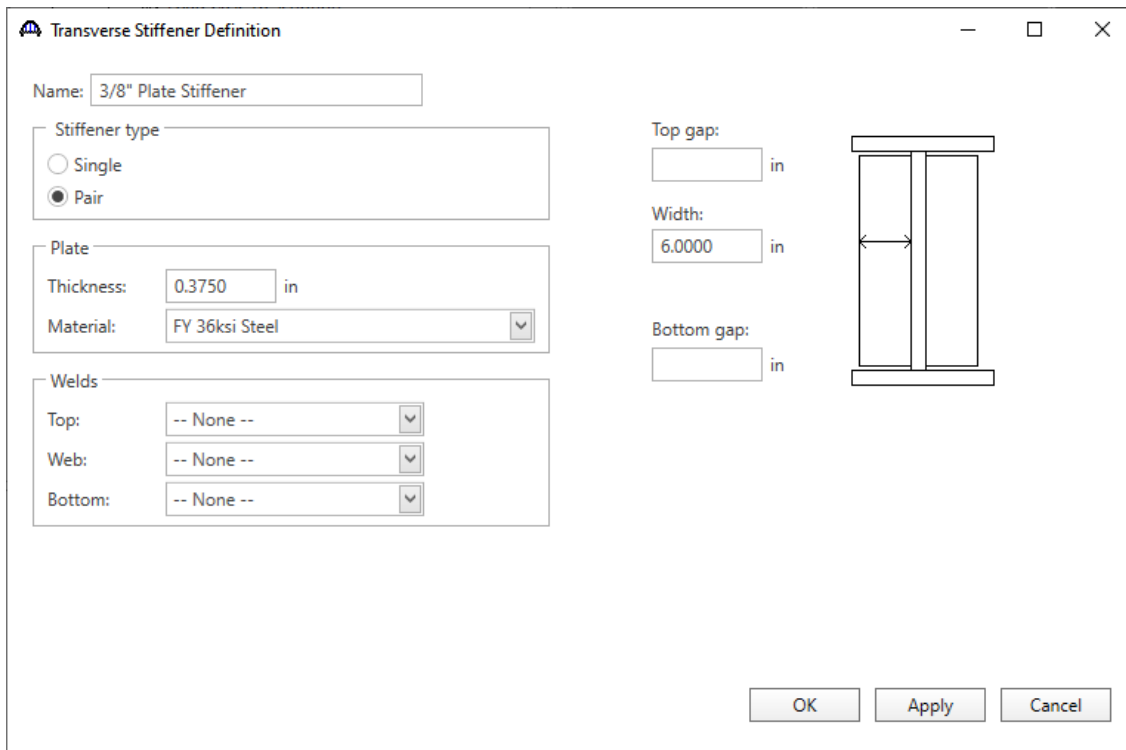


FS1 – Girder Floorbeam Stringer Example

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.



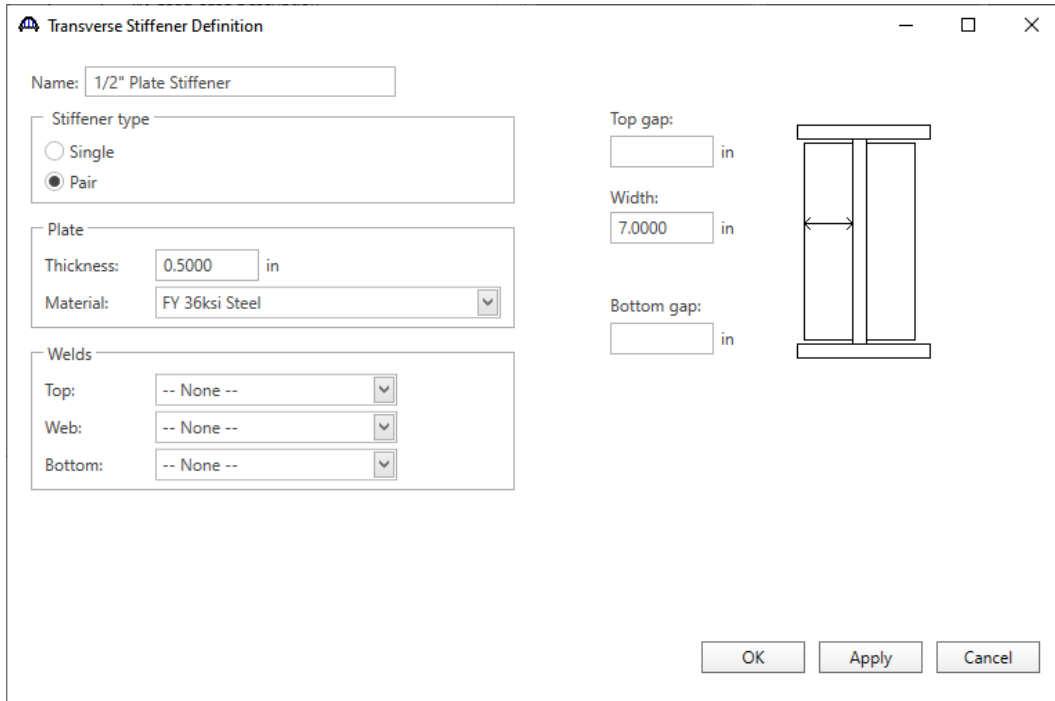
Define the stiffener as shown below.



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

Repeat this process to define another stiffener as shown below.

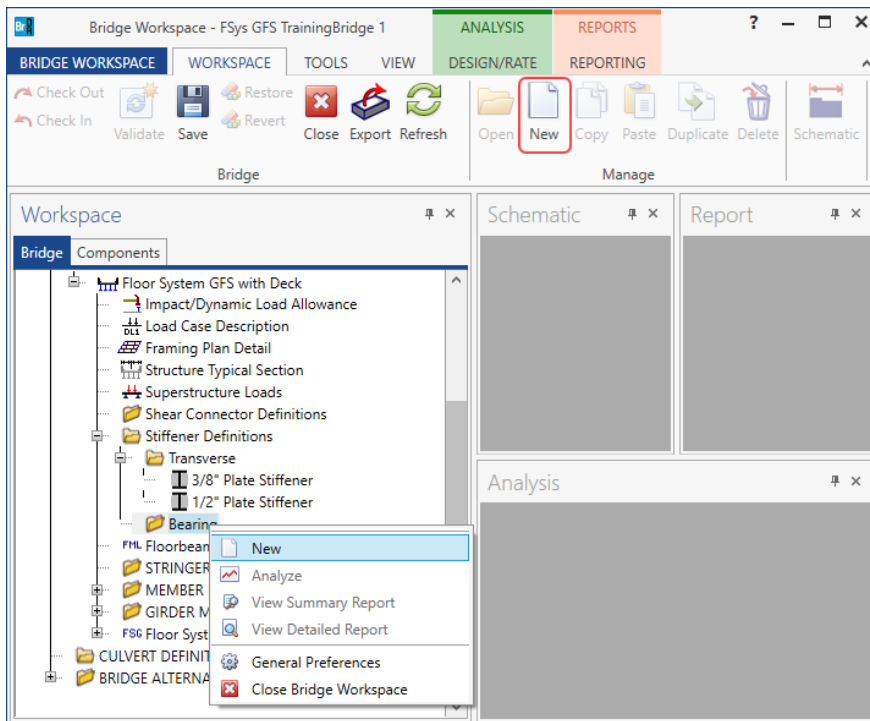
FS1 – Girder Floorbeam Stringer Example



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

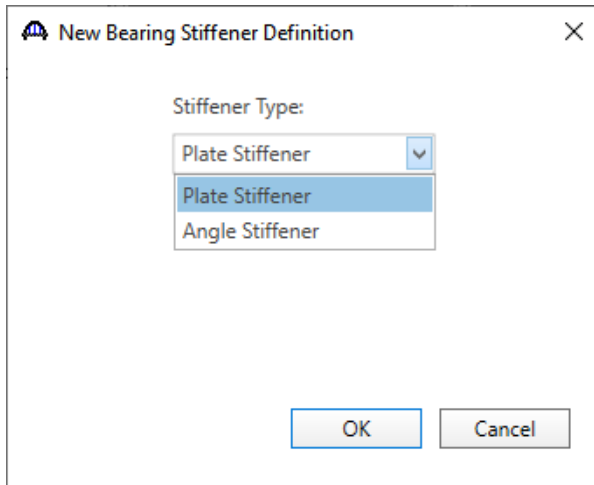
Stiffener Definitions – Bearing

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.

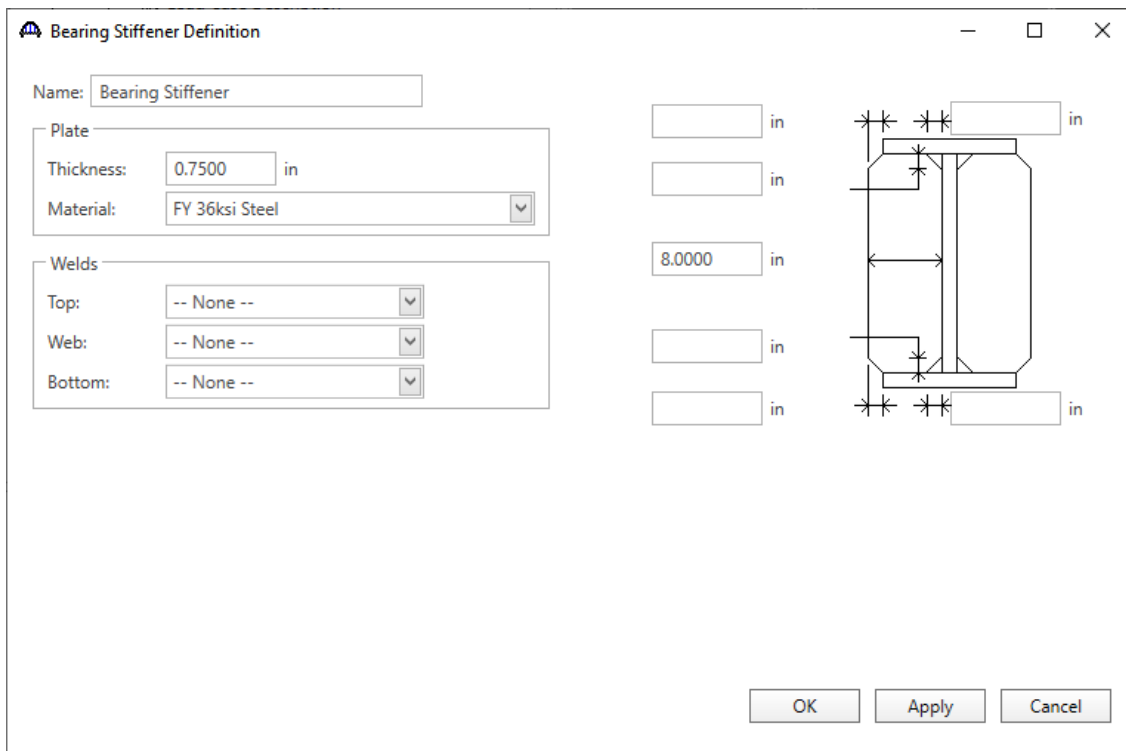


FS1 – Girder Floorbeam Stringer Example

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.

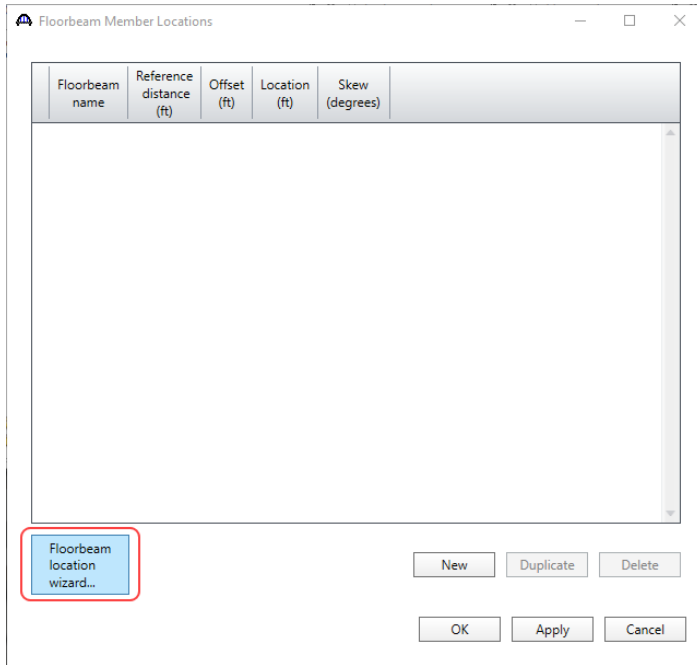


Click **OK** to apply the data and close the window.

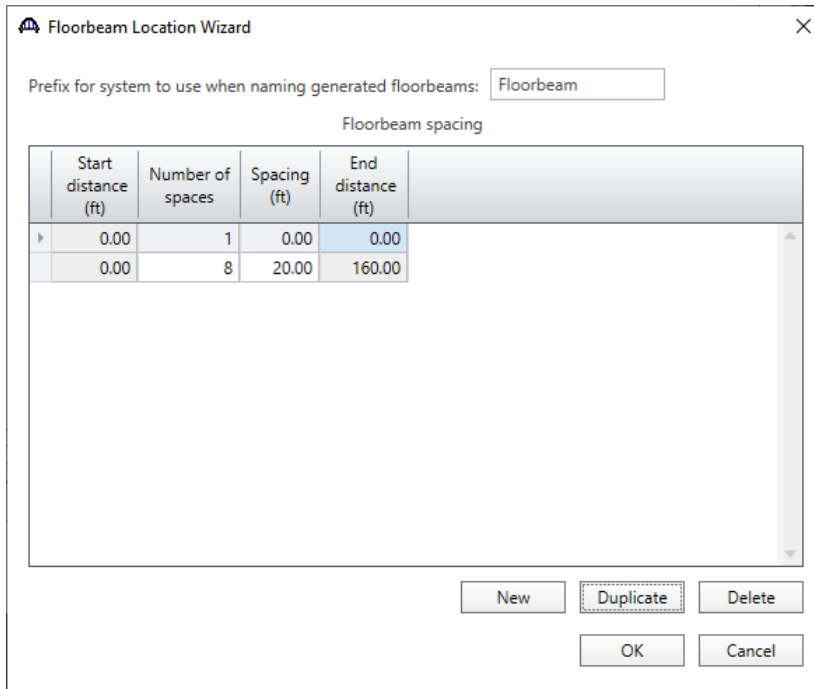
FS1 – Girder Floorbeam Stringer Example

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.



FS1 – Girder Floorbeam Stringer Example

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

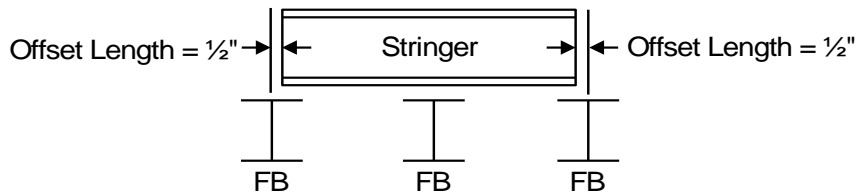
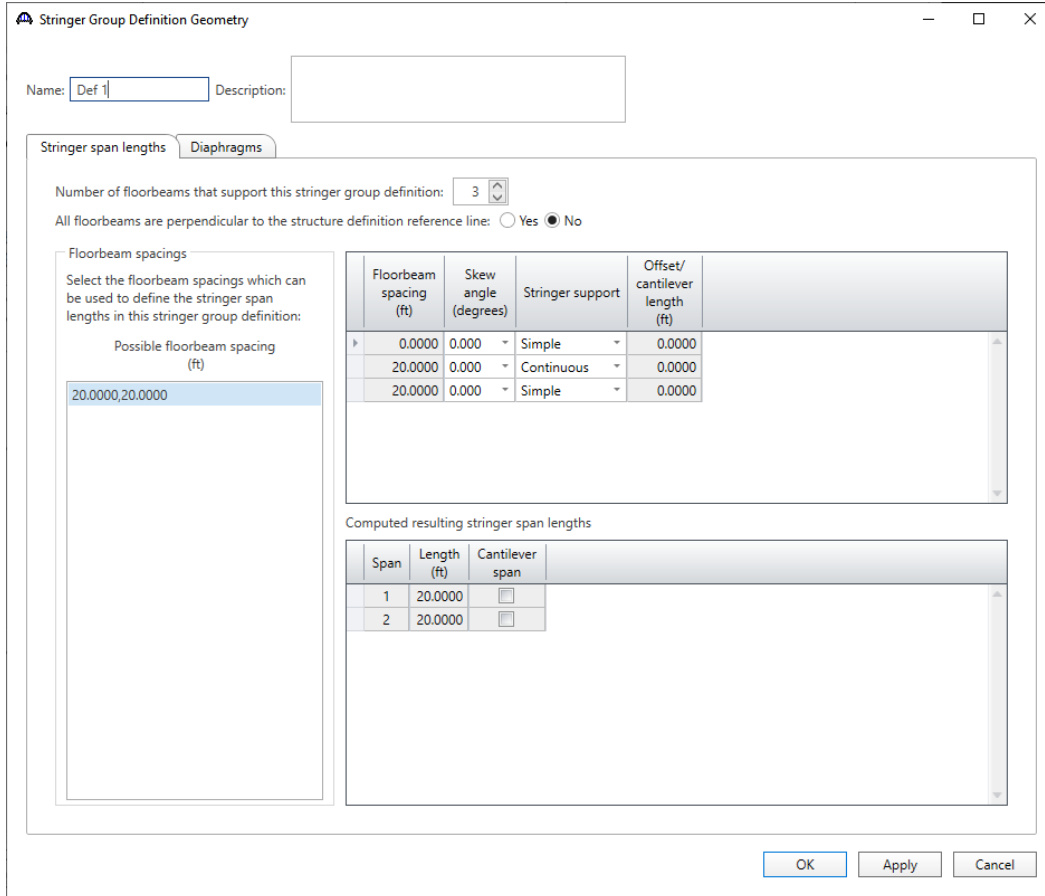
Floorbeam name	Reference distance (ft)	Offset (ft)	Location (ft)	Skew (degrees)
Floorbeam1	0.00	0.00	0.00	0.0000
Floorbeam2	0.00	20.00	20.00	0.0000
Floorbeam3	20.00	20.00	40.00	0.0000
Floorbeam4	40.00	20.00	60.00	0.0000
Floorbeam5	60.00	20.00	80.00	0.0000
Floorbeam6	80.00	20.00	100.00	0.0000
Floorbeam7	100.00	20.00	120.00	0.0000
Floorbeam8	120.00	20.00	140.00	0.0000
Floorbeam9	140.00	20.00	160.00	0.0000

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

FS1 – Girder Floorbeam Stringer Example

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.



Stringer Support Type: Simple, Offset Continuous Simple, Offset

FS1 – Girder Floorbeam Stringer Example

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.

Stringer Group Definition Geometry

Name: Description:

Stringer span lengths | Diaphragms

Number of floorbeams that support this stringer group definition:

All floorbeams are perpendicular to the structure definition reference line: Yes No

Floorbeam spacings

Select the floorbeam spacings which can be used to define the stringer span lengths in this stringer group definition:

Possible floorbeam spacing (ft)

Floorbeam spacing (ft)	Skew angle (degrees)	Stringer support	Offset/cantilever length (ft)
0.0000	0.000	Simple, Offset	0.0417
20.0000	0.000	Continuous	0.0000
20.0000	0.000	Simple, Offset	0.0417

Computed resulting stringer span lengths

Span	Length (ft)	Cantilever span
1	19.9583	<input type="checkbox"/>
2	19.9583	<input type="checkbox"/>

OK Apply Cancel

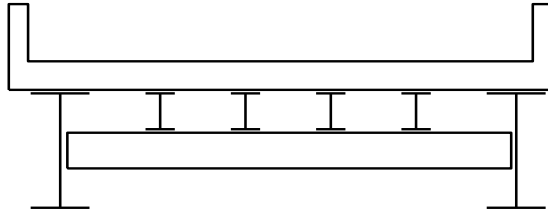
Click **Apply** to compute and save the stringer span length data before navigating to the **Diaphragms** tab.

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.

FS1 – Girder Floorbeam Stringer Example

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.



Diaphragm Bay: Bay 1 Bay 2 Bay 3 Bay 4 Bay 5

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

Stringer Group Definition Geometry

Name: Description:

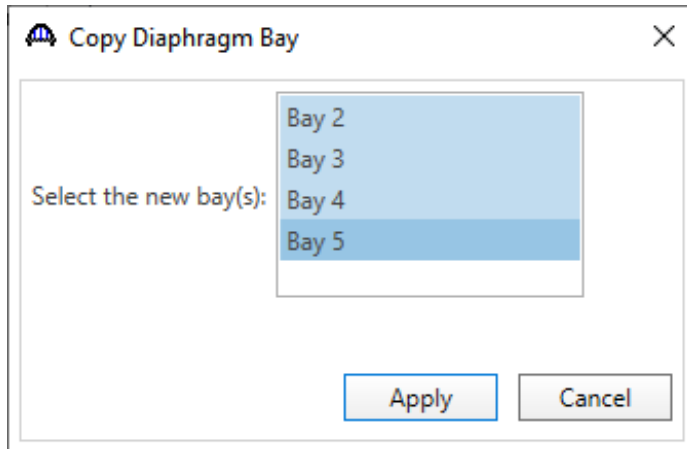
Stringer span lengths | **Diaphragms**

Diaphragm Bay:

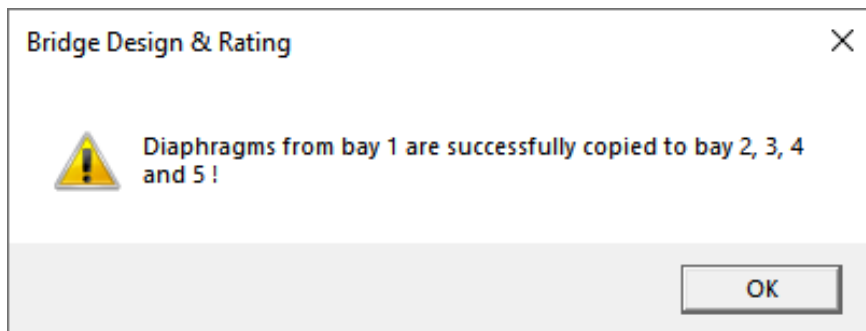
	Start distance (ft)		Diaphragm spacing (ft)	Number of spaces	Length (ft)	End distance (ft)		Load (kip)
	Left	Right				Left	Right	
>	0.96	0.96	0	1	0	0.96	0.96	0.12
	0.96	0.96	19.4783	2	38.9566	39.9166	39.9166	0.12

FS1 – Girder Floorbeam Stringer Example

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.

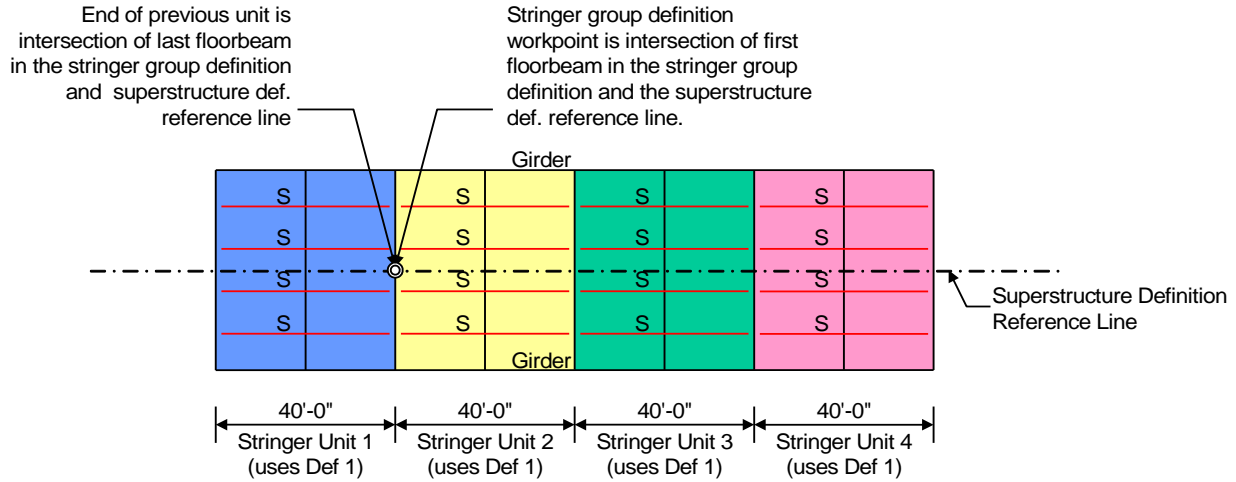


[Assigning Stringer Group Definitions to Stringer Units – Floorbeam Member Locations](#)

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.

FS1 – Girder Floorbeam Stringer Example



Enter the data as shown below.

Floor System Geometry

Include floorbeams in unit references

Stringer unit number	Stringer group definition	Unit referenced from left end of superstructure or end of previous unit	Distance to stringer group definition workpoint (ft)	Mirror group definition	Include in analysis
Unit 1	Def 1	Left end of structure	0.00	None	<input checked="" type="checkbox"/>
Unit 2	Def 1	Left end of structure	40.00	None	<input checked="" type="checkbox"/>
Unit 3	Def 1	Left end of structure	80.00	None	<input checked="" type="checkbox"/>
Unit 4	Def 1	Left end of structure	120.00	None	<input checked="" type="checkbox"/>

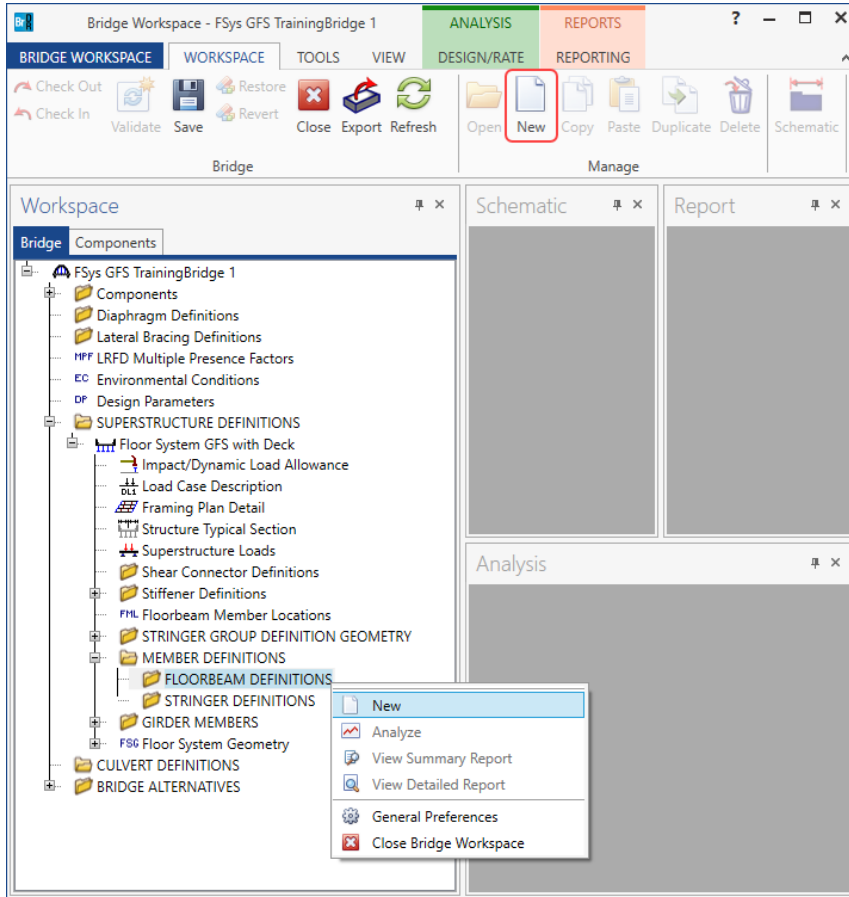
OK Apply Cancel

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

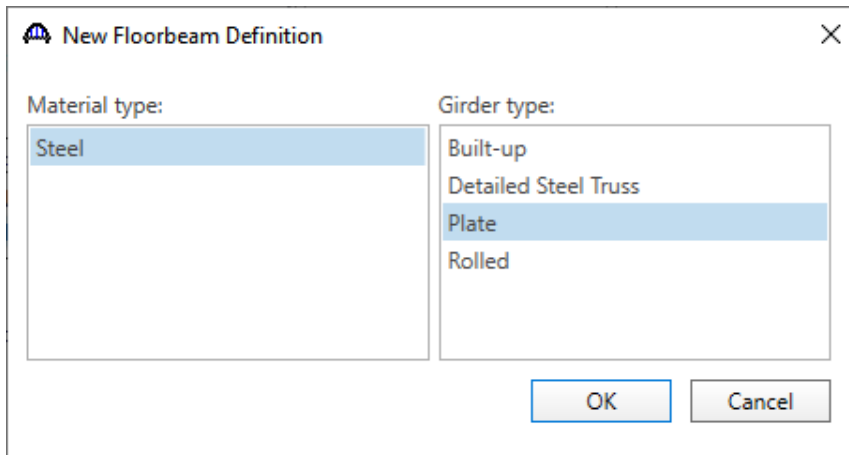
FS1 – Girder Floorbeam Stringer Example

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.

FS1 – Girder Floorbeam Stringer Example

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 **FBI** in the structure.

Name: Floorbeam Def 1

Description:

Material type: Steel

Floorbeam type: Plate

Default units: US Customary

Floorbeam property input method

Schedule-based

Cross-section based

Self load

Load case: Engine Assigned

Additional self load: 0.005 kip/ft

Additional self load: %

Default rating method: LFR

Cantilever

Cantilever lengths

Left: ft

Right: ft

Floorbeam length between main members

Span	Length (ft)
1	30.00

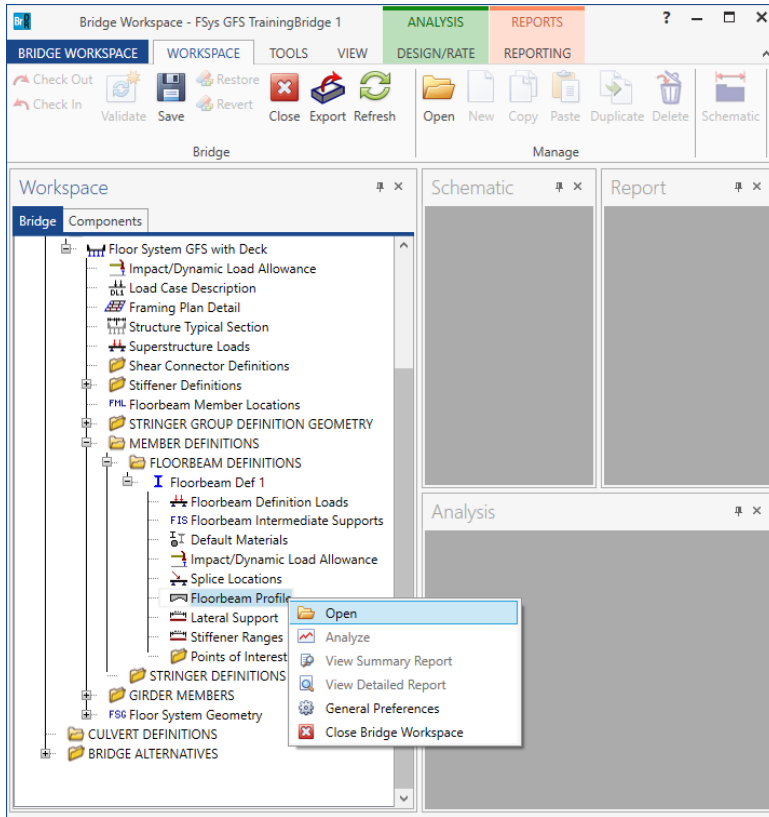
OK Apply Cancel

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

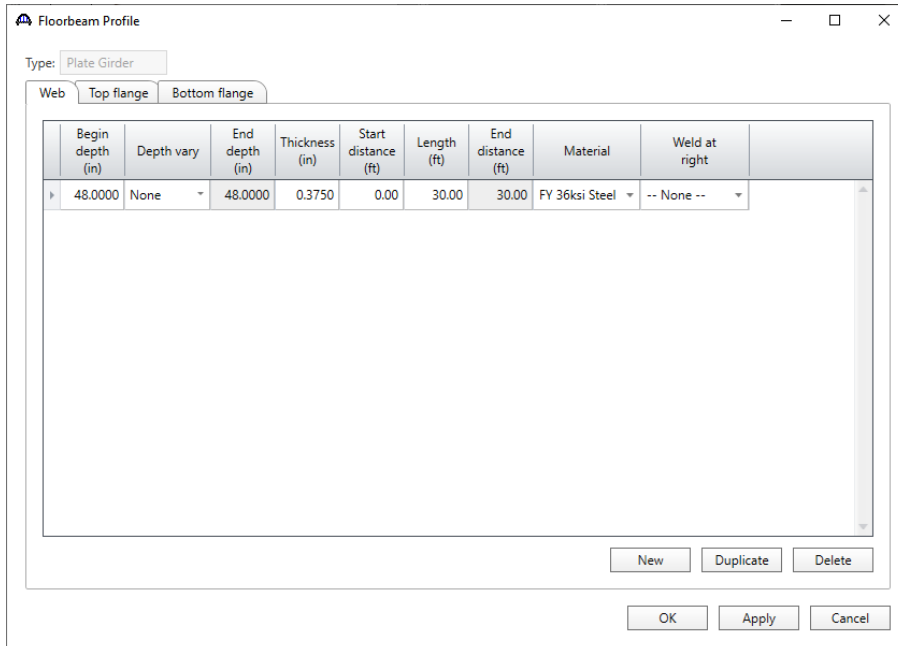
FS1 – Girder Floorbeam Stringer Example

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.



FS1 – Girder Floorbeam Stringer Example

Describe the flanges as shown below.

The screenshot shows the 'Floorbeam Profile' dialog box with the 'Top flange' tab selected. The 'Type' is set to 'Plate Girder'. The table below contains one row of data:

Begin width (in)	End width (in)	Thickness (in)	Start distance (ft)	Length (ft)	End distance (ft)	Material	Weld	Weld at right
12.0000	12.0000	1.0000	0.00	30.00	30.00	FY 36ksi Steel	-- None --	-- None --

Buttons at the bottom include 'Copy to bottom flange', 'New', 'Duplicate', 'Delete', 'OK', 'Apply', and 'Cancel'.

The screenshot shows the 'Floorbeam Profile' dialog box with the 'Bottom flange' tab selected. The 'Type' is set to 'Plate Girder'. The table below contains one row of data:

Begin width (in)	End width (in)	Thickness (in)	Start distance (ft)	Length (ft)	End distance (ft)	Material	Weld	Weld at right
12.0000	12.0000	1.0000	0.00	30.00	30.00	FY 36ksi Steel	-- None --	-- None --

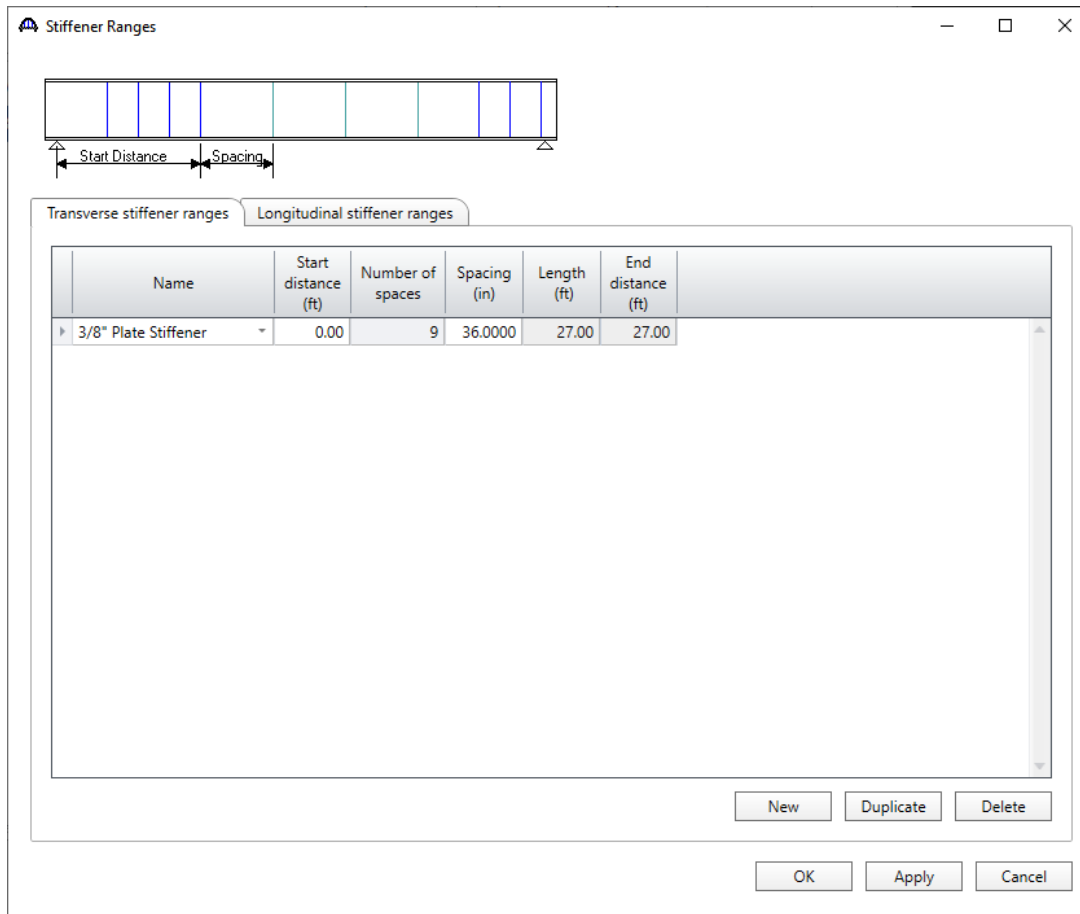
Buttons at the bottom include 'Copy to top flange', 'New', 'Duplicate', 'Delete', 'OK', 'Apply', and 'Cancel'.

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

FS1 – Girder Floorbeam Stringer Example

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.

FS1 – Girder Floorbeam Stringer Example

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.

Name: Floorbeam Def 2

Description: [Empty]

Material type: Steel

Floorbeam type: Plate

Default units: US Customary

Floorbeam property input method:
 Schedule-based
 Cross-section based

Self load:
Load case: Engine Assigned
Additional self load: 0.005 kip/ft
Additional self load: [Empty] %

Default rating method: LFR

Cantilever

Cantilever lengths:
Left: [Empty] ft
Right: [Empty] ft

Floorbeam length between main members

Span	Length (ft)
1	30.00

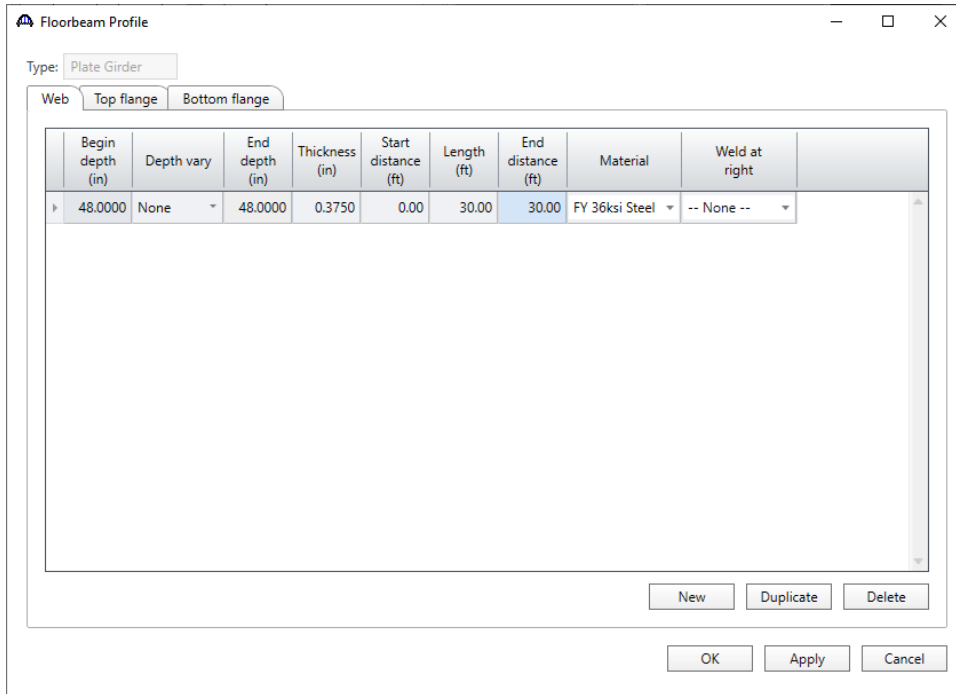
OK Apply Cancel

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

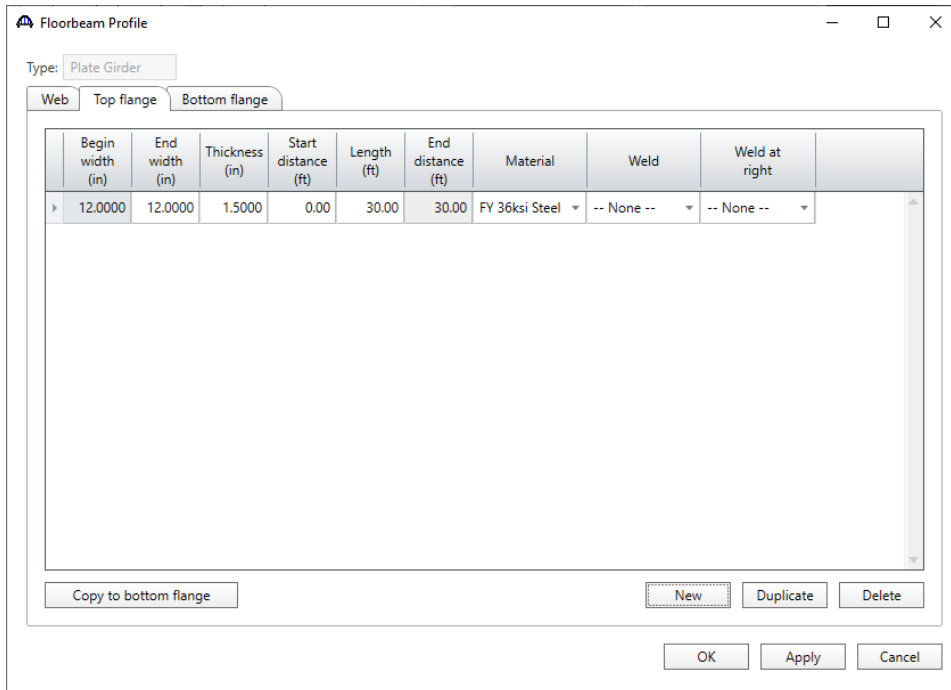
FS1 – Girder Floorbeam Stringer Example

Floorbeam Profile

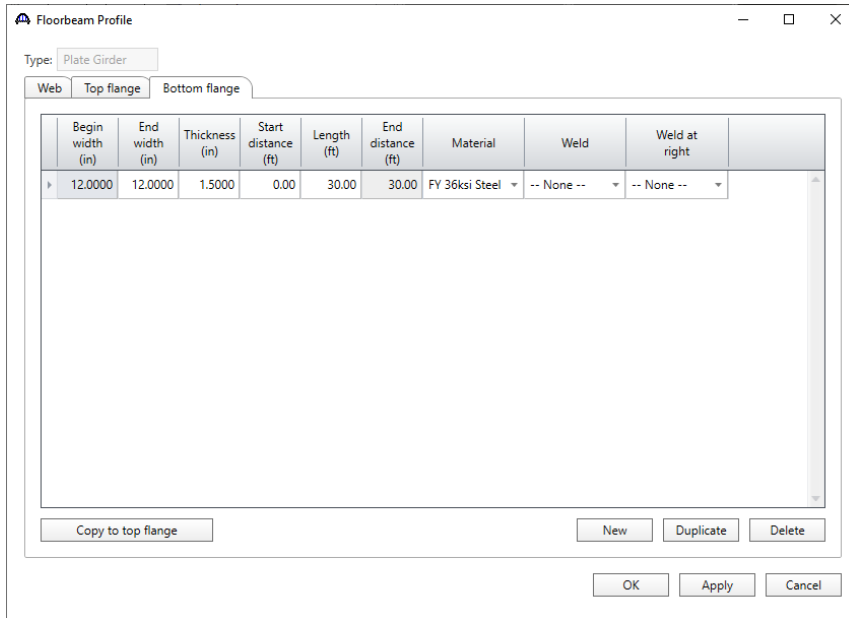
Expand the **Floorbeam Def 2** node in the **Bridge Workspace** tree and double click on the **Floorbeam Profile** node in the **Bridge Workspace** tree to open the **Floorbeam Profile** window. Describe the web as shown below.



Describe the flanges as shown below.



FS1 – Girder Floorbeam Stringer Example



The 'Floorbeam Profile' dialog box is shown with the 'Type' set to 'Plate Girder'. The 'Top flange' tab is active. The table below shows the configuration for the top flange.

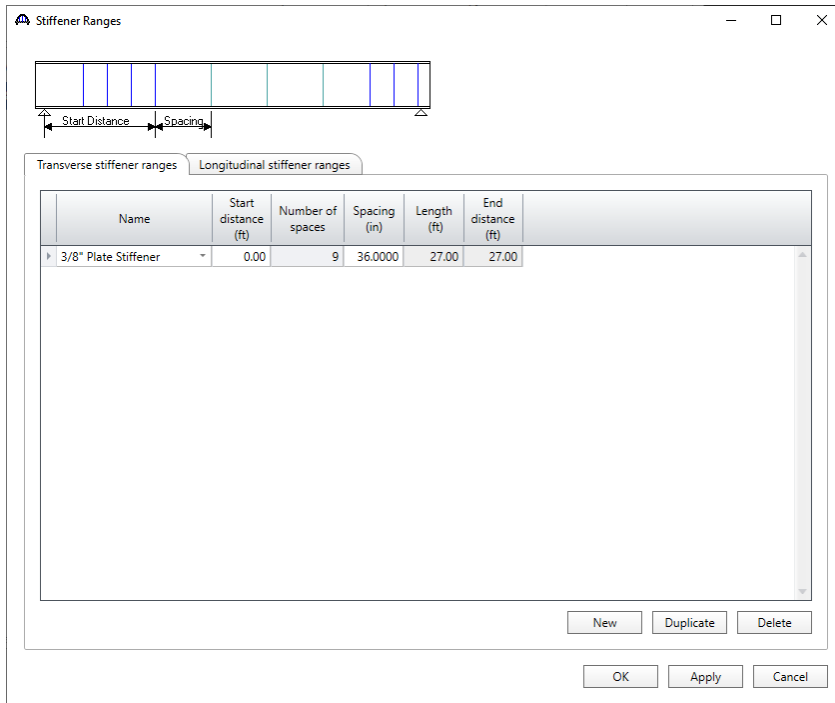
Begin width (in)	End width (in)	Thickness (in)	Start distance (ft)	Length (ft)	End distance (ft)	Material	Weld	Weld at right
12.0000	12.0000	1.5000	0.00	30.00	30.00	FY 36ksi Steel	-- None --	-- None --

Buttons at the bottom include 'Copy to top flange', 'New', 'Duplicate', 'Delete', 'OK', 'Apply', and 'Cancel'.

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.



The 'Stiffener Ranges' dialog box is shown with the 'Transverse stiffener ranges' tab active. A diagram at the top shows a horizontal beam with vertical stiffeners. Below the diagram, a table shows the configuration for the transverse stiffeners.

Name	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)
3/8" Plate Stiffener	0.00	9	36.0000	27.00	27.00

Buttons at the bottom include 'New', 'Duplicate', 'Delete', 'OK', 'Apply', and 'Cancel'.

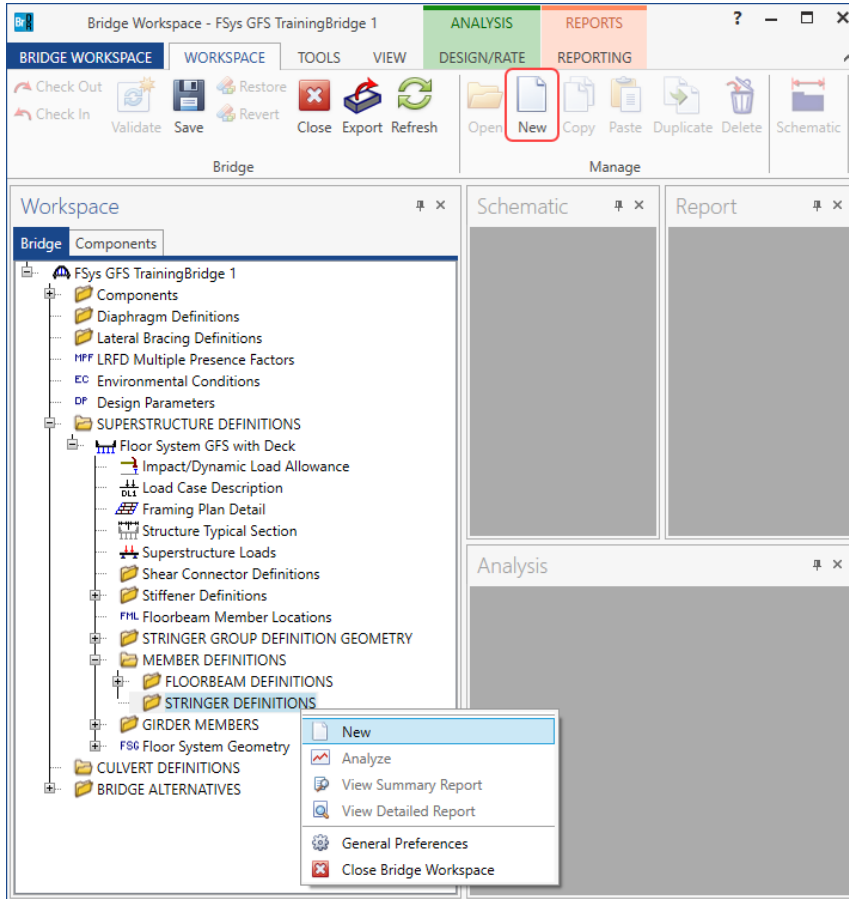
Click **OK** to apply the data and close the window

The description of the second floorbeam definition is complete.

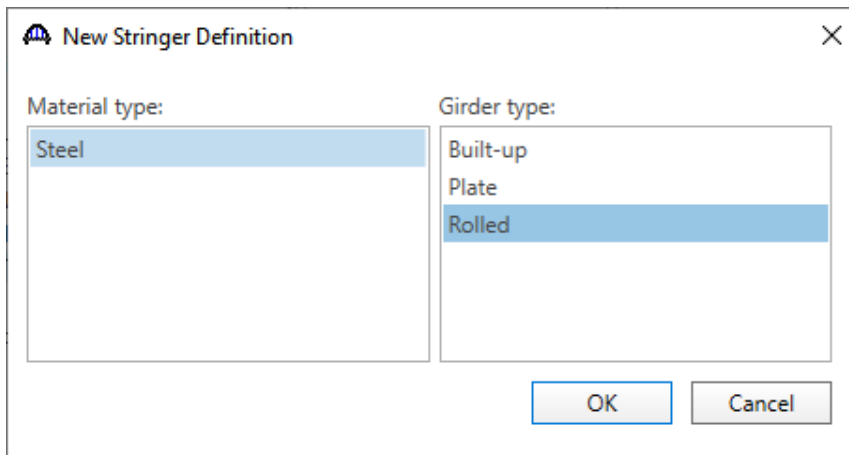
FS1 – Girder Floorbeam Stringer Example

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.

FS1 – Girder Floorbeam Stringer Example

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.

Name: Stringer Def 1

Description: [Empty]

Material type: Steel
Stringer type: Rolled
Default units: US Customary

Stringer property input method:
 Schedule-based
 Cross-section based

Self load:
Load case: Engine Assigned
Additional self load: [Empty] kip/ft
Additional self load: [Empty] %

Stringer span lengths:
 Associate with stringer group definition: Def 1
 Enter stringer span lengths
Number of spans: 2

Span	Length (ft)	Cantilever span
1	19.9583	<input type="checkbox"/>
2	19.9583	<input type="checkbox"/>

Default rating method: LFR

End bearing locations:
Left: [Empty] in
Right: [Empty] in

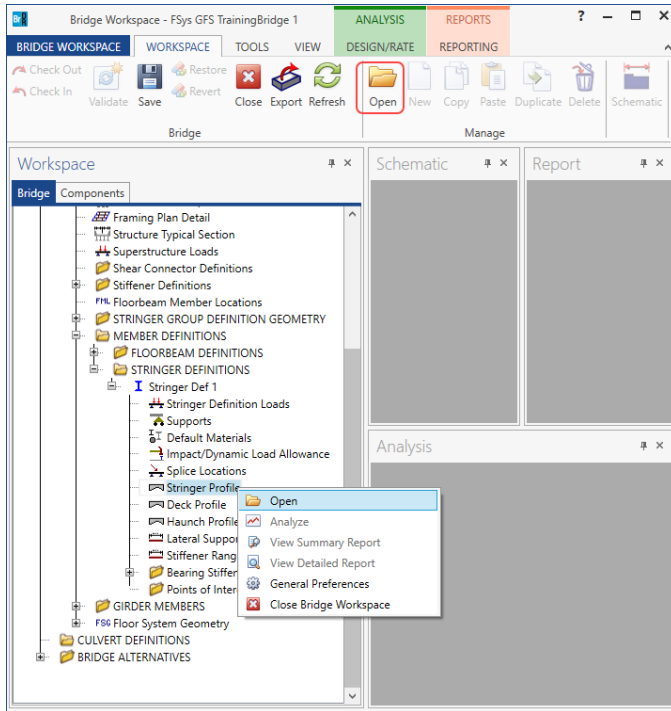
OK Apply Cancel

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

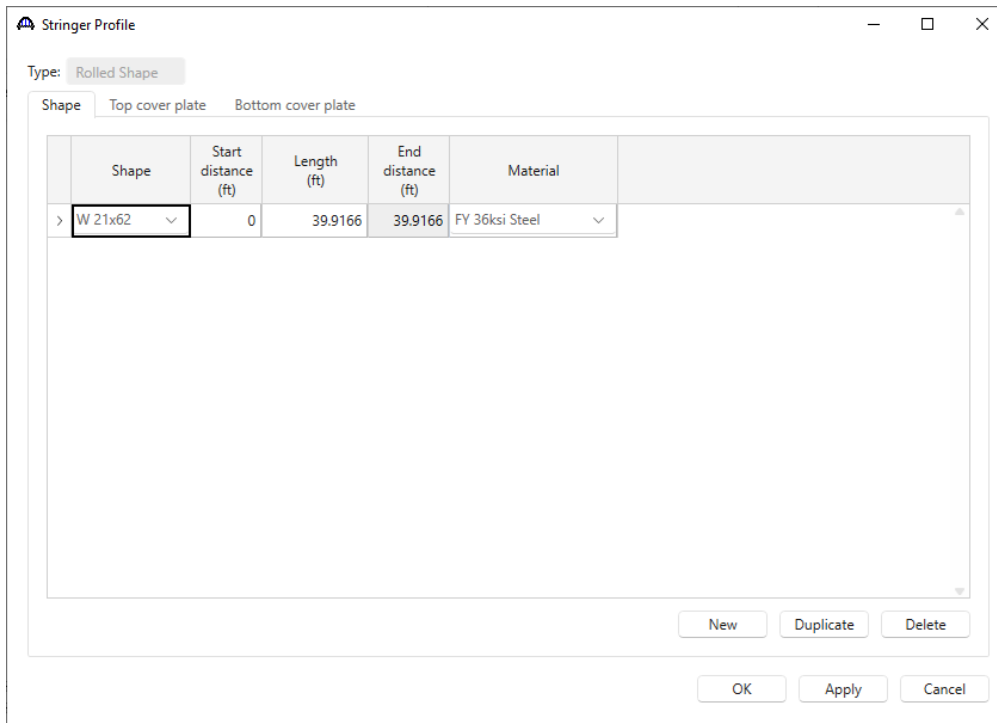
FS1 – Girder Floorbeam Stringer Example

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.

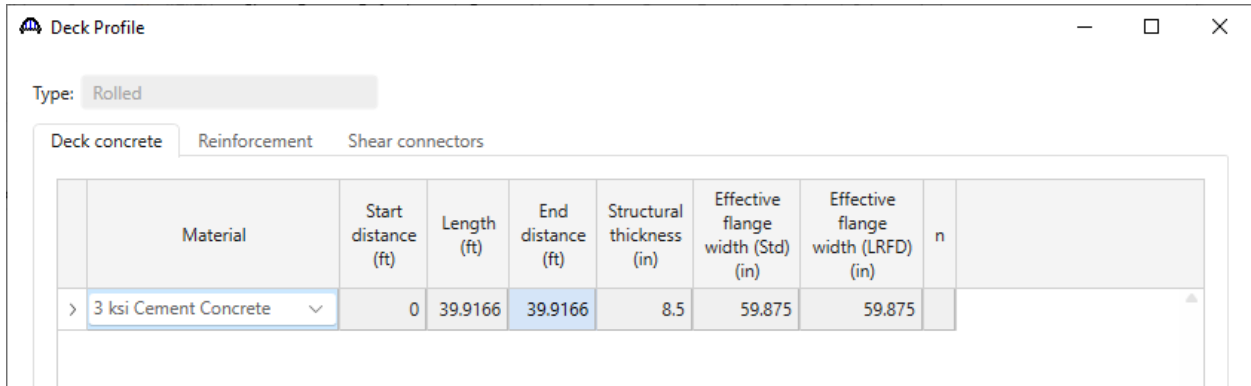


Click **OK** to apply the data and close the window

FS1 – Girder Floorbeam Stringer Example

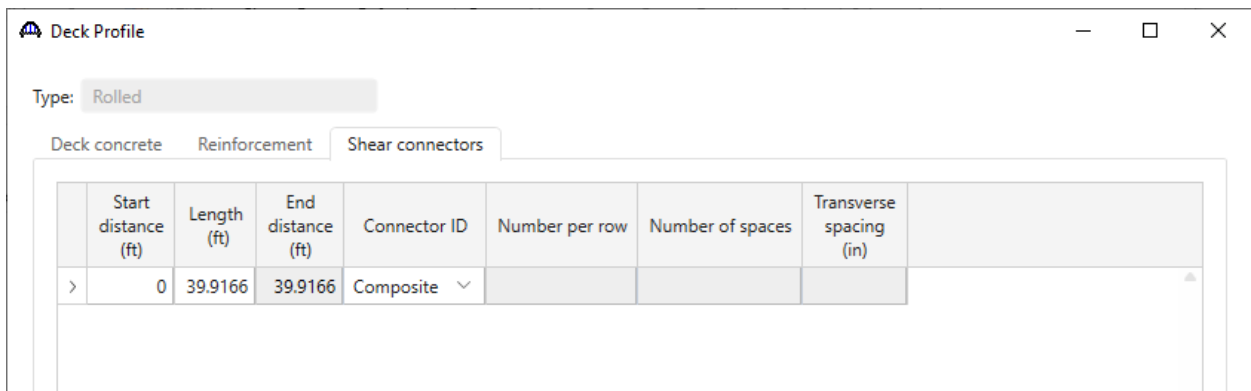
Deck Profile

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.

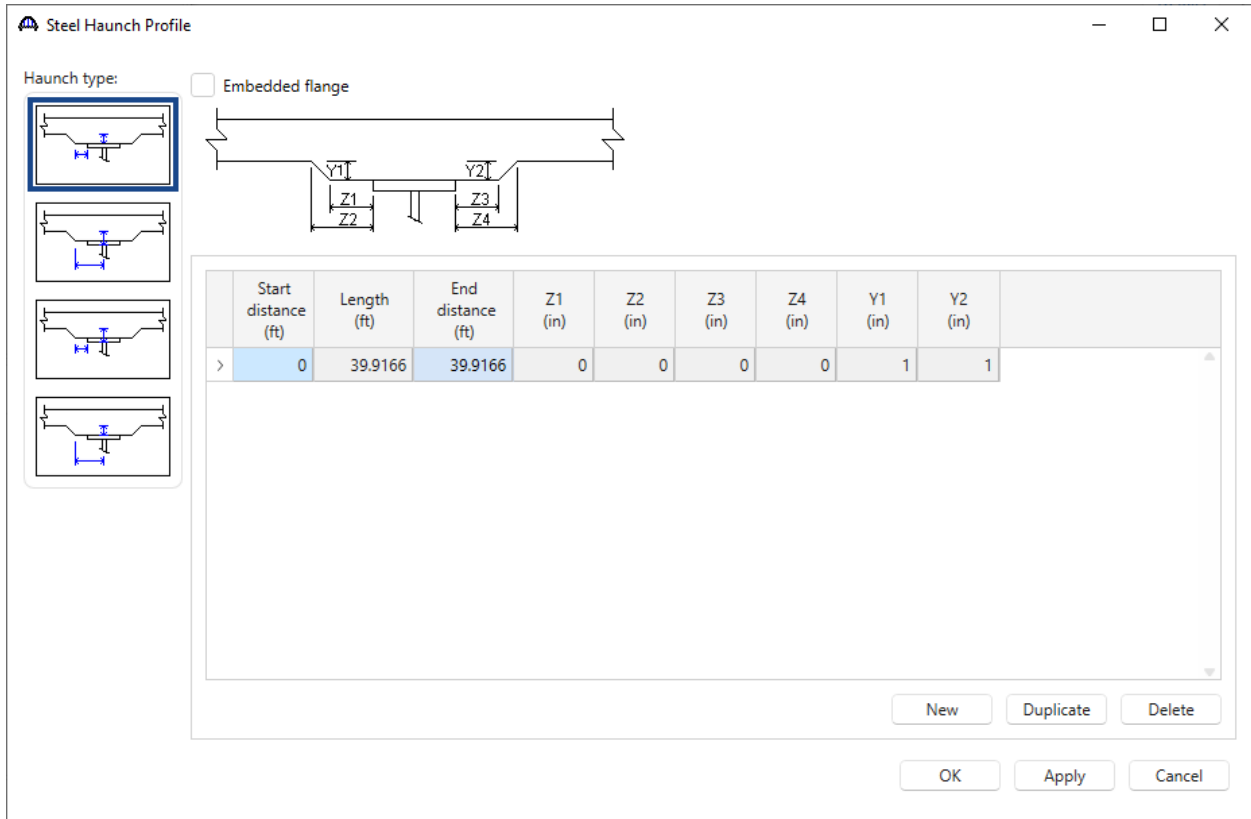


Click **OK** to apply the data and close the window

FS1 – Girder Floorbeam Stringer Example

Haunch Profile

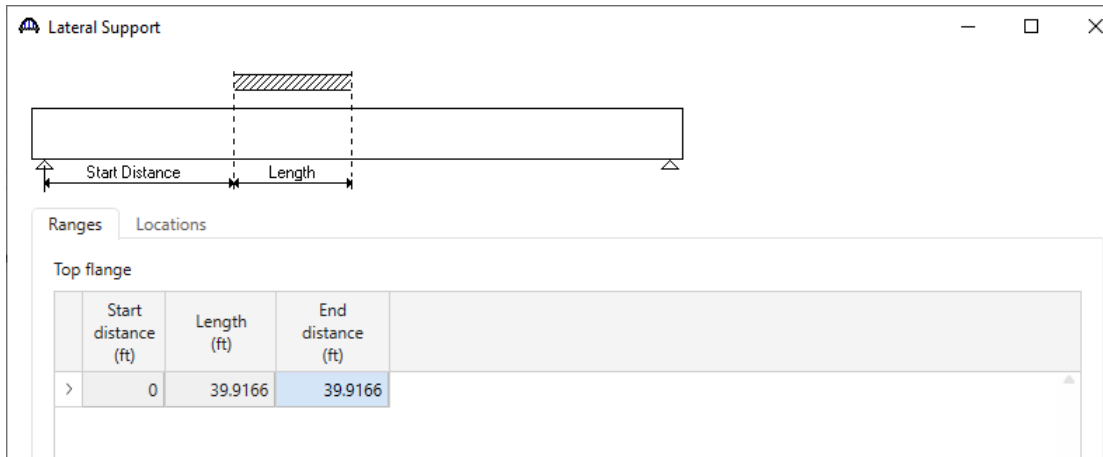
Double click on the **Haunch Profile** node in the **Bridge Workspace** tree and enter data in the **Haunch Profile** window as shown below.



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

FS1 – Girder Floorbeam Stringer Example

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.

Existing	Current	Member alternative name	Description
----------	---------	-------------------------	-------------

Number of spans: 2

Span no.	Span length (ft)
1	80.00
2	80.00

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**.

Material type: Steel

Girder type: Plate

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

FS1 – Girder Floorbeam Stringer Example

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

Member Alternative Description

Member alternative: Left Plate Girder

Description Specs Factors Engine Import Control options

Description: [] Material type: Steel
Girder type: Plate
Default units: US Customary

Girder property input method: Schedule based Cross-section based

End bearing locations: Simple DL, continuous LL
Left: [] in
Right: [] in

Self load: Load case: Engine Assigned
Additional self load: 0.010 kip/ft
Additional self load: [] %

Default rating method: LFR

OK Apply Cancel

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

FS1 – Girder Floorbeam Stringer Example

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

Begin depth (in)	Depth vary	End depth (in)	Thickness (in)	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Material	Weld at right
72.0000	None	72.0000	0.5000	1	0	55.00	55.00	FY 36ksi Steel	-- None --
72.0000	Parabolic Concave	108.0000	0.5000	1	55.00	24.25	79.25	FY 36ksi Steel	-- None --
108.0000	None	108.0000	0.5000	1	79.25	1.50	80.75	FY 36ksi Steel	-- None --
108.0000	Parabolic Concave	72.0000	0.5000	2	0.75	24.25	25.00	FY 36ksi Steel	-- None --
72.0000	None	72.0000	0.5000	2	25.00	55.00	80.00	FY 36ksi Steel	-- None --

Buttons: New, Duplicate, Delete, OK, Apply, Cancel

Describe the flanges as shown below.

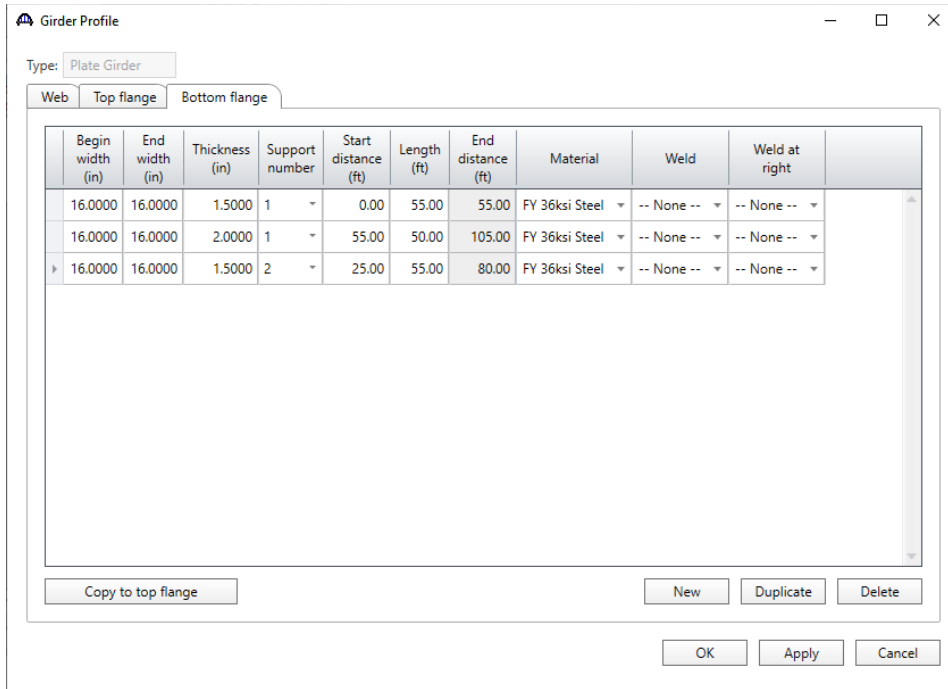
Top flange

Begin width (in)	End width (in)	Thickness (in)	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Material	Weld	Weld at right
16.0000	16.0000	1.5000	1	0.00	55.00	55.00	FY 36ksi Steel	-- None --	-- None --
16.0000	16.0000	2.0000	1	55.00	50.00	105.00	FY 36ksi Steel	-- None --	-- None --
16.0000	16.0000	1.5000	2	25.00	55.00	80.00	FY 36ksi Steel	-- None --	-- None --

Buttons: Copy to bottom flange, New, Duplicate, Delete, OK, Apply, Cancel

FS1 – Girder Floorbeam Stringer Example

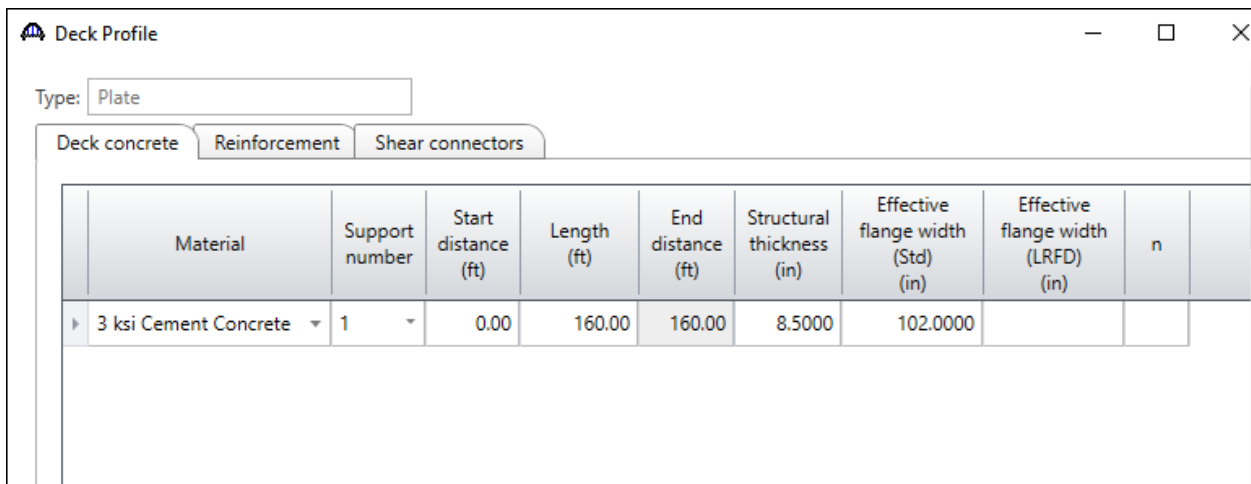
Bottom flange



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, $12 \times 8.5'' = 102''$. Twelve times the least thickness of the slab, 102'' controls. The window is shown below.



FS1 – Girder Floorbeam Stringer Example

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

Deck Profile

Type:

Deck concrete Reinforcement **Shear connectors**

Support number	Start distance (ft)	Length (ft)	End distance (ft)	Connector ID	Number of spaces	Number per row	Transverse spacing (in)
▶ 1	0.00	160.00	160.00	Composite			

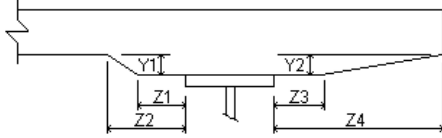
Click **OK** to apply the data and close the window

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.

Steel Haunch Profile

Haunch type: Embedded flange



The diagram shows a cross-section of a haunch profile. It is a trapezoidal shape with a flat top and a wider bottom. The top width is labeled Y1 and the bottom width is labeled Y2. The profile is divided into four segments along its length: Z1 (the left sloped side), Z2 (the bottom horizontal base), Z3 (the right sloped side), and Z4 (the right horizontal end section).

Support number	Start distance (ft)	Length (ft)	End distance (ft)	Z1 (in)	Z2 (in)	Z3 (in)	Z4 (in)	Y1 (in)	Y2 (in)
▶ 1	0.00	160.00	160.00	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000

New Duplicate Delete

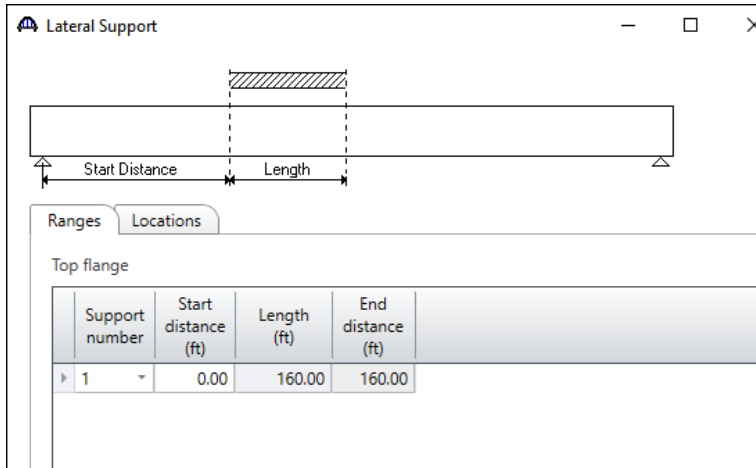
OK Apply Cancel

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

FS1 – Girder Floorbeam Stringer Example

Lateral Support

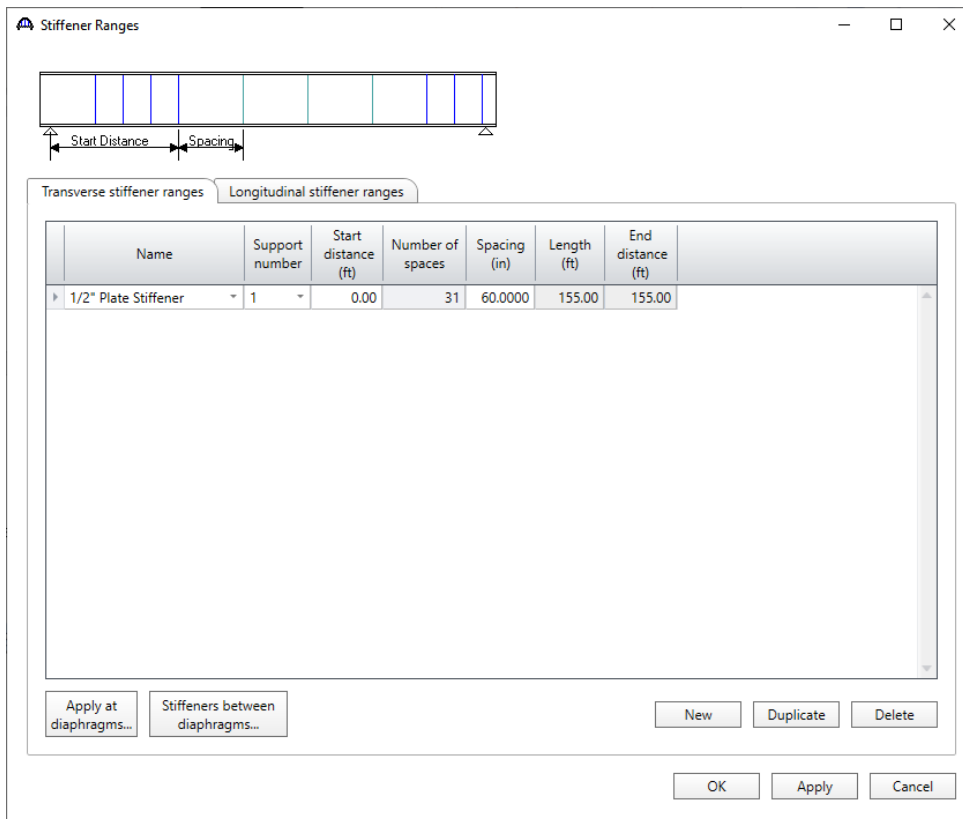
Open the **Lateral Support** window by double clicking on the **Lateral Support** node in the **Bridge Workspace** tree. Regions where the slab is considered to provide lateral support for the top flange are defined as shown below.



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.

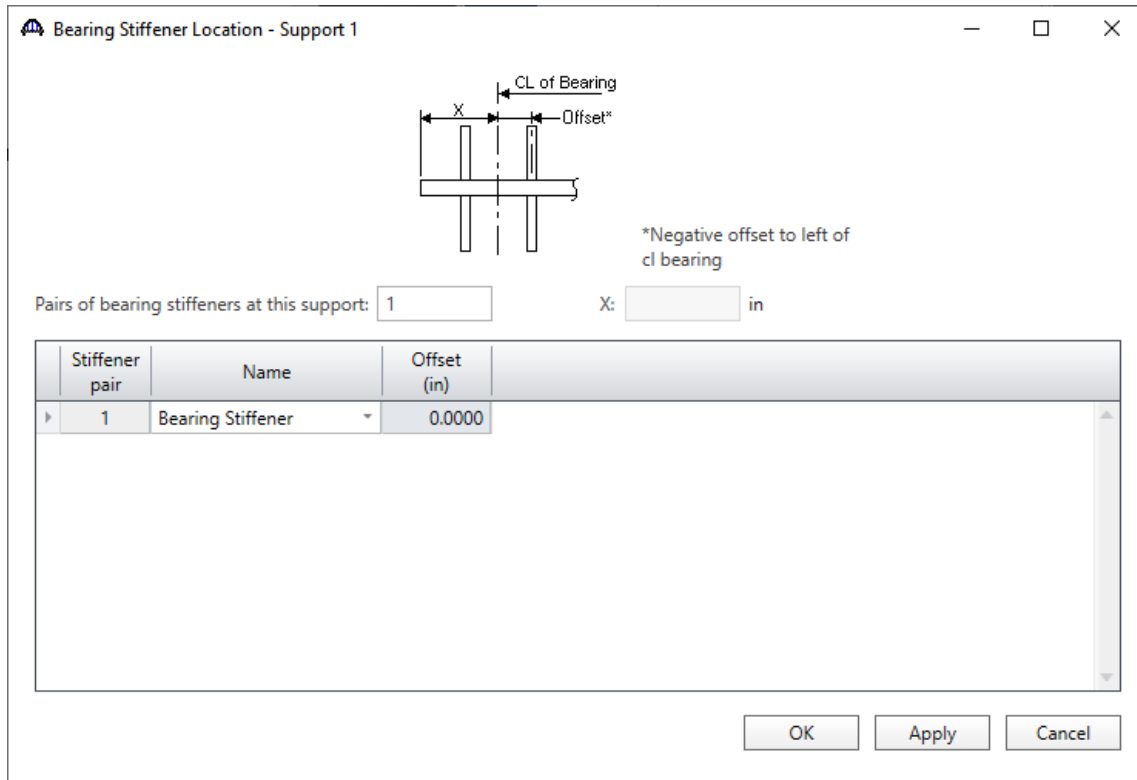


Click **OK** to apply the data and close the window

FS1 – Girder Floorbeam Stringer Example

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**.

FS1 – Girder Floorbeam Stringer Example

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.

Standard | LRFD

Distribution factor input method

Use simplified method Use advanced method Use advanced method with 1994 guide specs

Allow distribution factors to be used to compute effects of permit loads with routine traffic

	Lanes loaded	Distribution factor (wheels)			
		Shear	Shear at supports	Moment	Deflection
>	1 Lane	1.6666667	1.6666667	1.6666667	1
	Multi-lane	2.5333333	2.5333333	2.5333333	2

Compute from typical section... View calcs

OK Apply Cancel

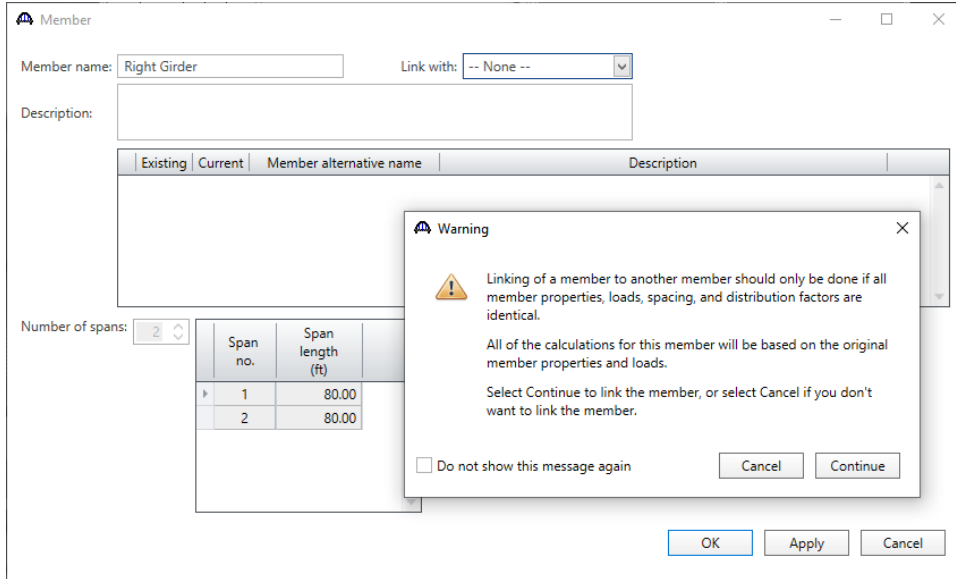
Click **OK** to apply the data and close the window

The description of the girder member is complete.

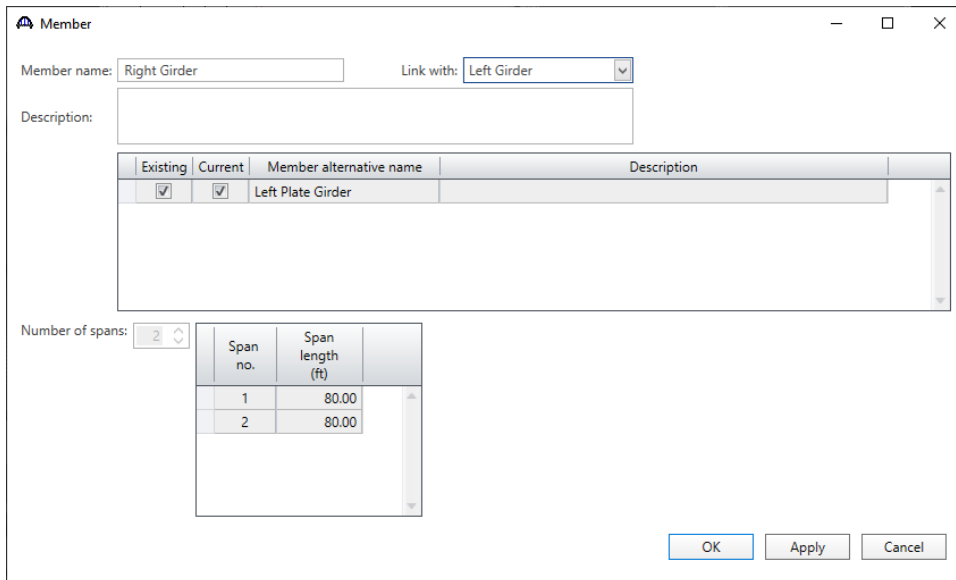
FS1 – Girder Floorbeam Stringer Example

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.



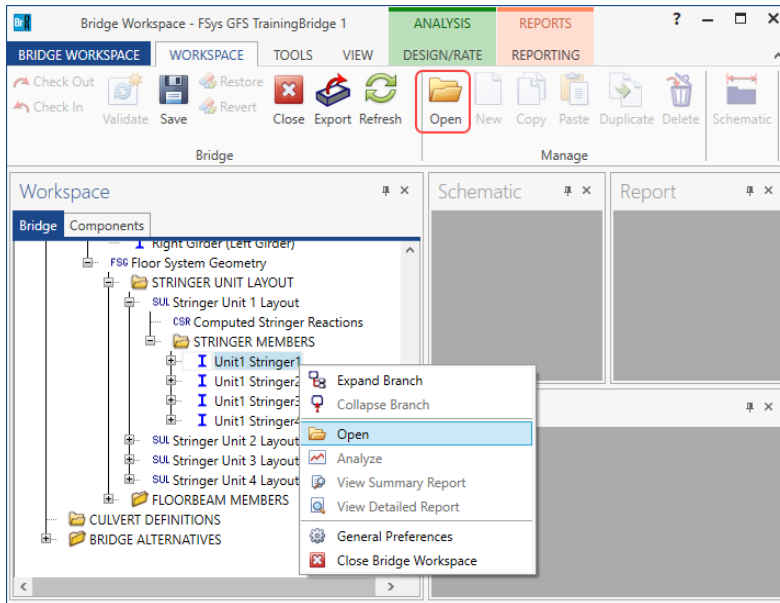
Click **OK** to apply the data and close the window

The description of the second girder member is complete.

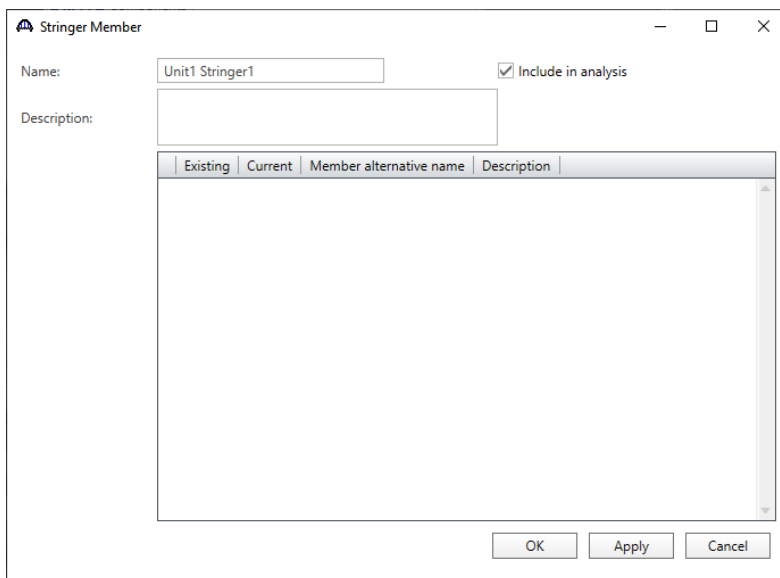
FS1 – Girder Floorbeam Stringer Example

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.



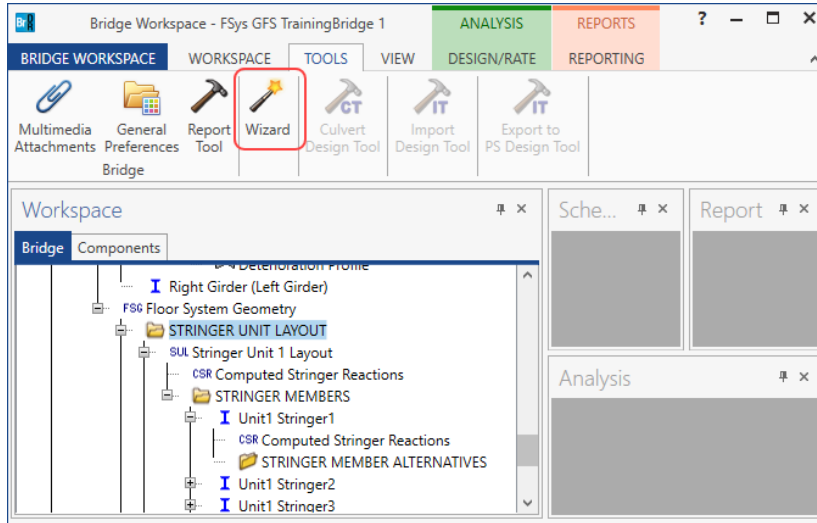
Click **OK** to apply the data and close the window

FS1 – Girder Floorbeam Stringer Example

Defining a Stringer Member Alternative

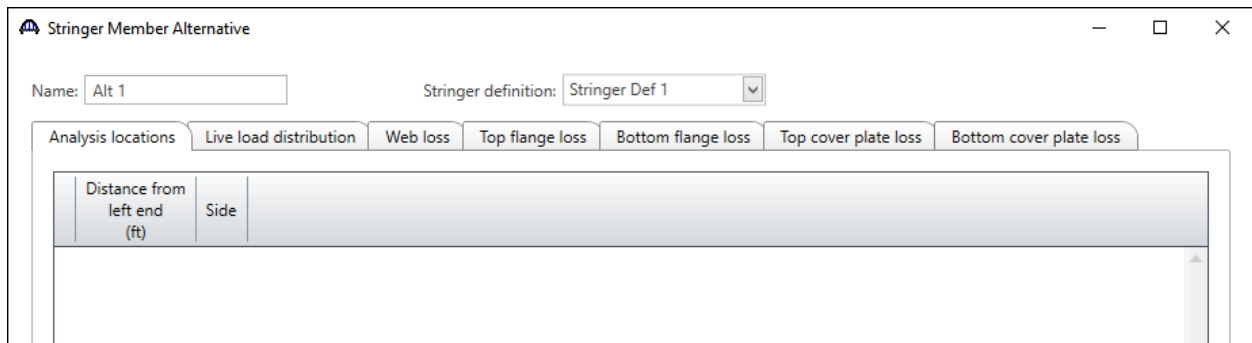
There are two methods to create stringer member alternatives for the stringer members in the structure:

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.

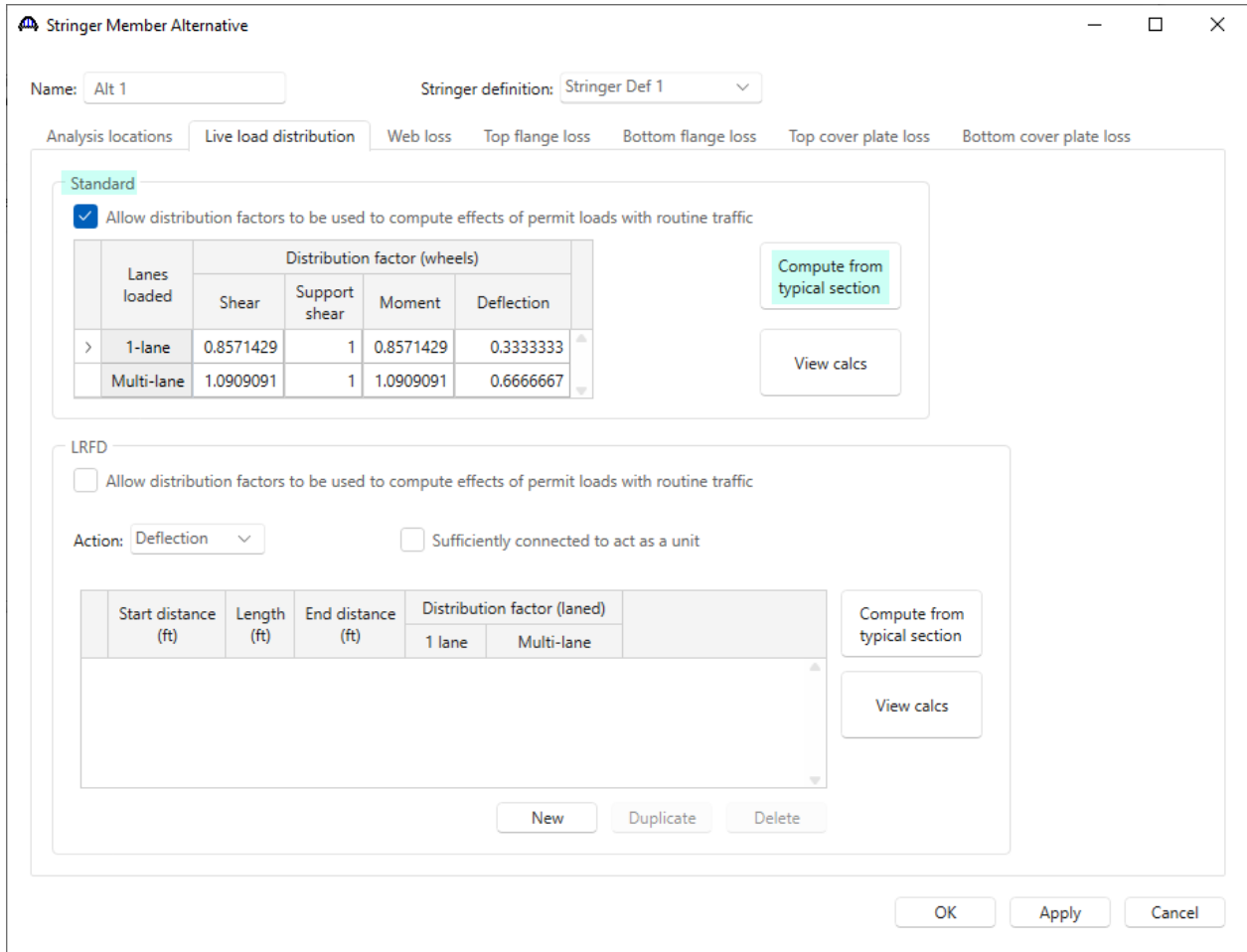
Double click on the **STRINGER MEMBER ALTERNATIVES** node in the **Bridge Workspace** tree to create a new member alternative for **Unit1 Stringer1**. The **Stringer Member Alternative** window shown below will open. Enter **Alt1** for the **Name** of the alternative. Note that **Stringer Def 1** is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



FS1 – Girder Floorbeam Stringer Example

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.

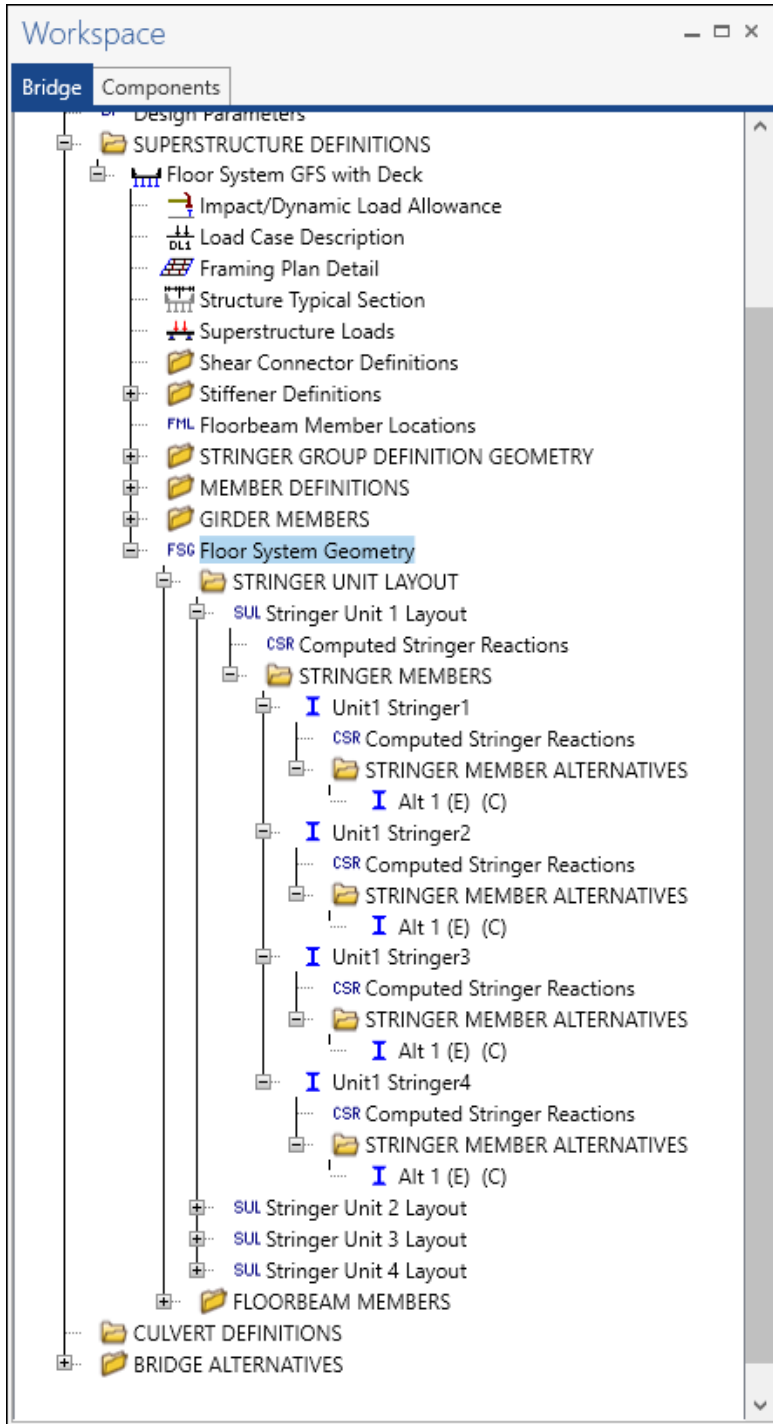


Click **OK** to apply the data and close the window

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

FS1 – Girder Floorbeam Stringer Example

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



FS1 – Girder Floorbeam Stringer Example

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

Stringer group definition: Mirrored status:

Number of stringers in unit:

Stringer member	Existing stringer member alternative	Existing stringer definition	Current stringer member alternative	Current stringer definition	Include in analysis
Unit1 Stringer1	Alt 1	Stringer Def 1	Alt 1	Stringer Def 1	<input checked="" type="checkbox"/>
Unit1 Stringer2	Alt 1	Stringer Def 1	Alt 1	Stringer Def 1	<input checked="" type="checkbox"/>
Unit1 Stringer3	Alt 1	Stringer Def 1	Alt 1	Stringer Def 1	<input checked="" type="checkbox"/>
Unit1 Stringer4	Alt 1	Stringer Def 1	Alt 1	Stringer Def 1	<input checked="" type="checkbox"/>

OK Apply Cancel

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

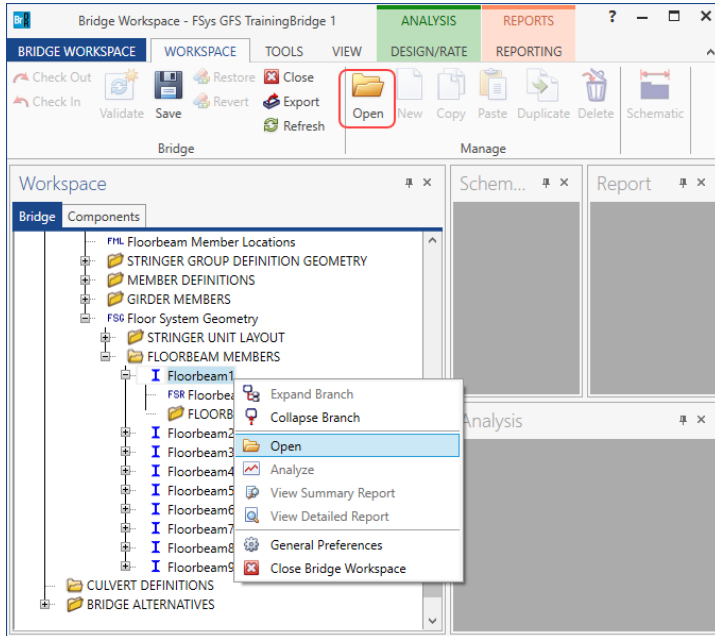
The description of the **Stringer Unit 1 Layout** is complete.

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.

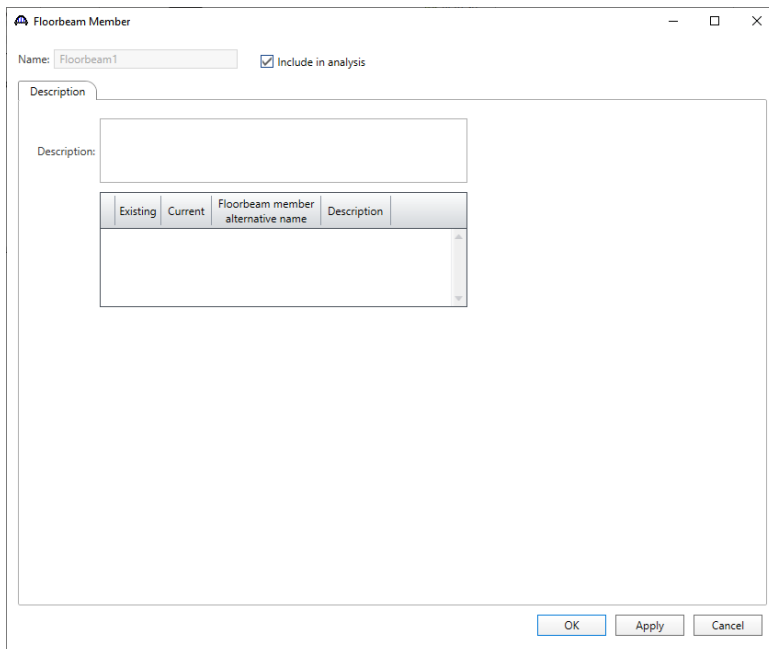
FS1 – Girder Floorbeam Stringer Example

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.



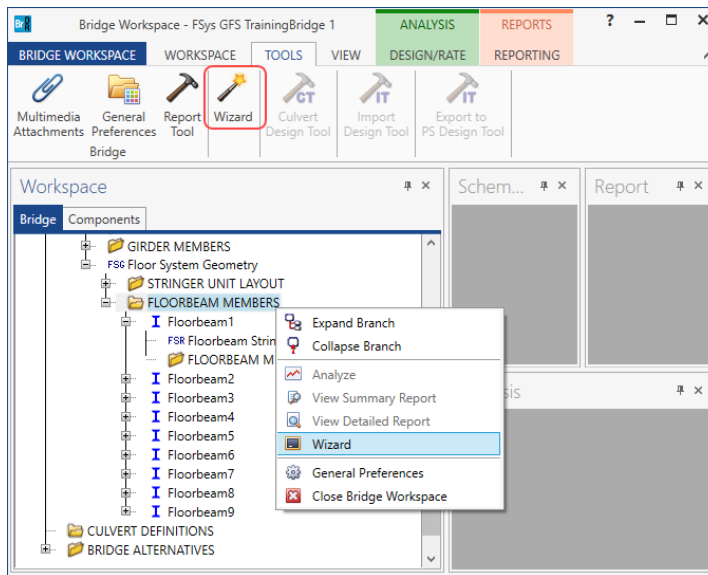
Click **OK** to apply the data and close the window

FS1 – Girder Floorbeam Stringer Example

Defining a Floorbeam Member Alternative

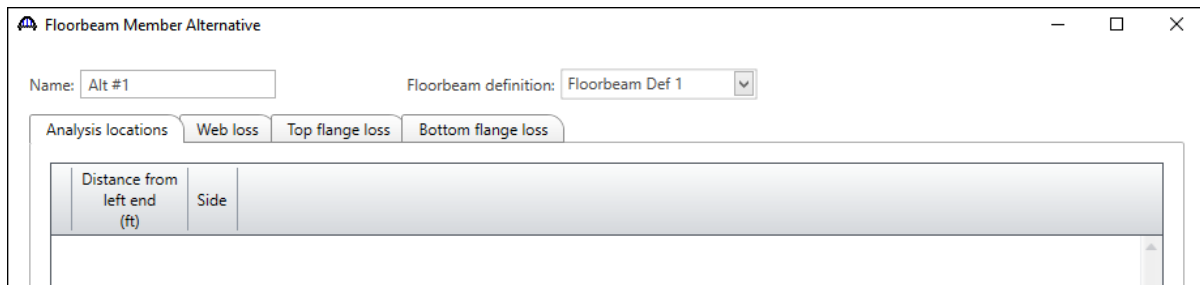
There are two methods to create floorbeam member alternatives for the floorbeam members in the structure:

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.

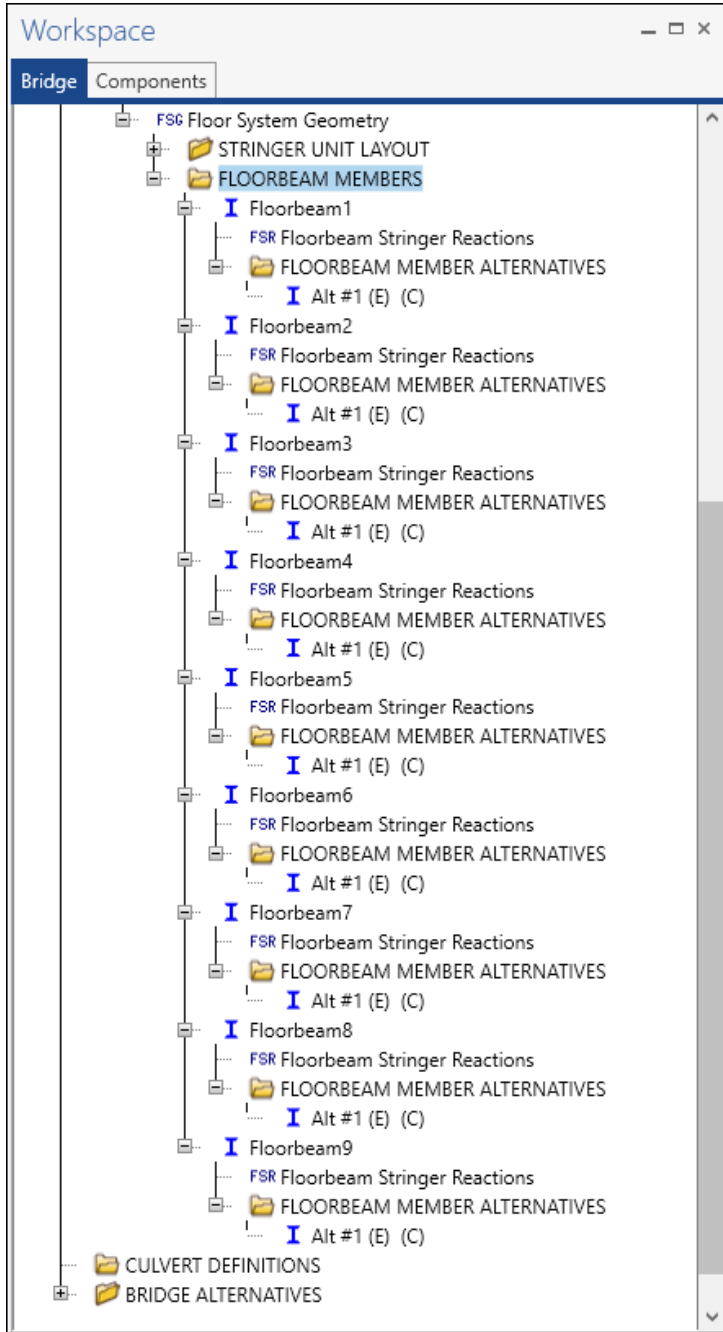


Click **OK** to apply the data and close the window

FS1 – Girder Floorbeam Stringer Example

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.

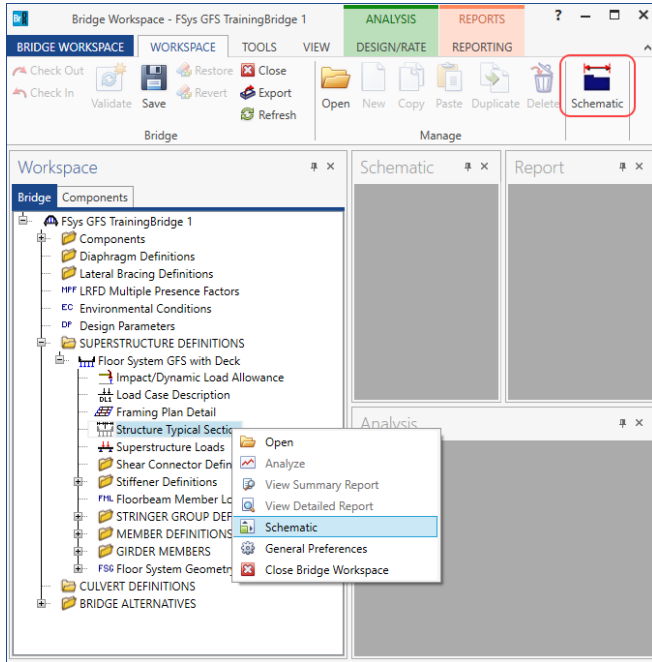


The description of the bridge is complete.

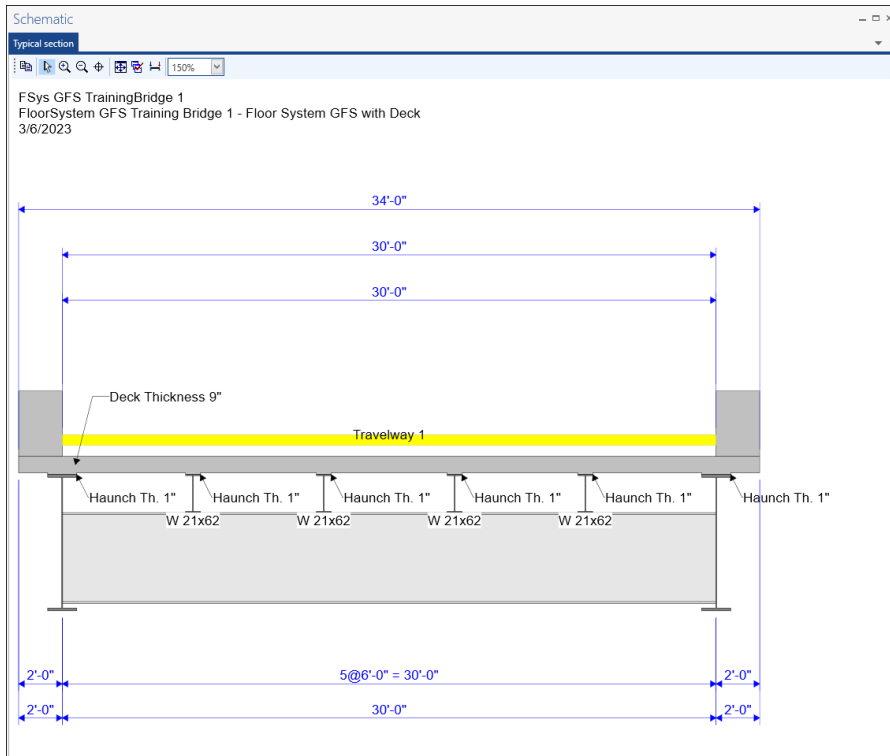
FS1 – Girder Floorbeam Stringer Example

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).



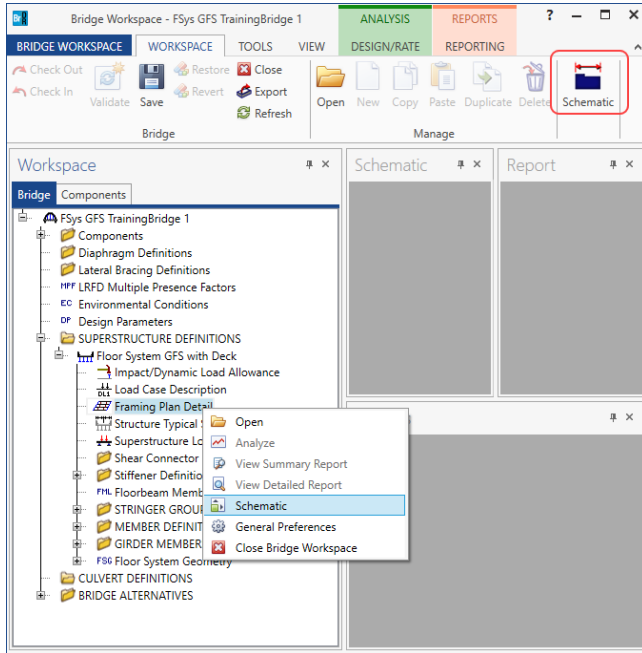
The following schematic will be displayed.



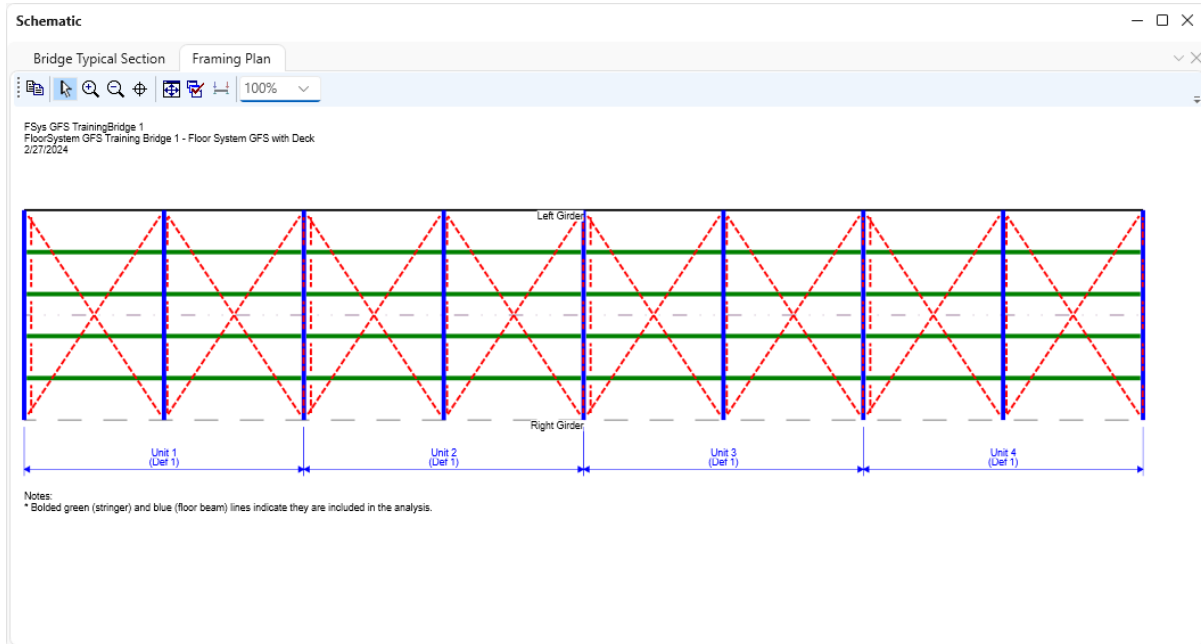
FS1 – Girder Floorbeam Stringer Example

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).



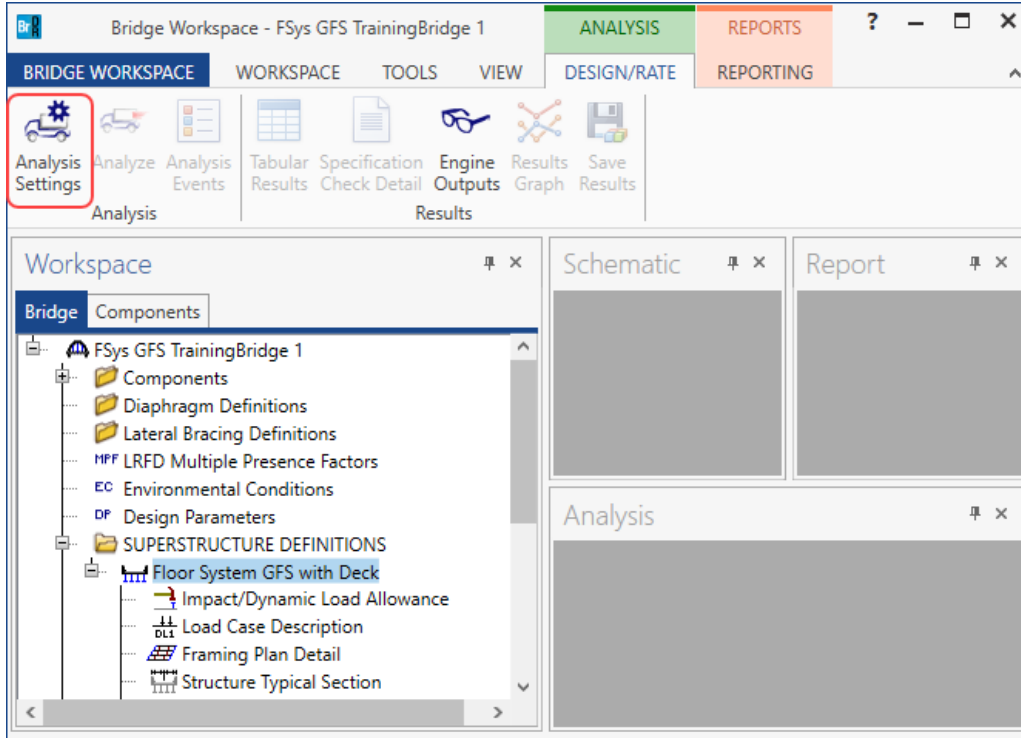
The following schematic will be displayed.



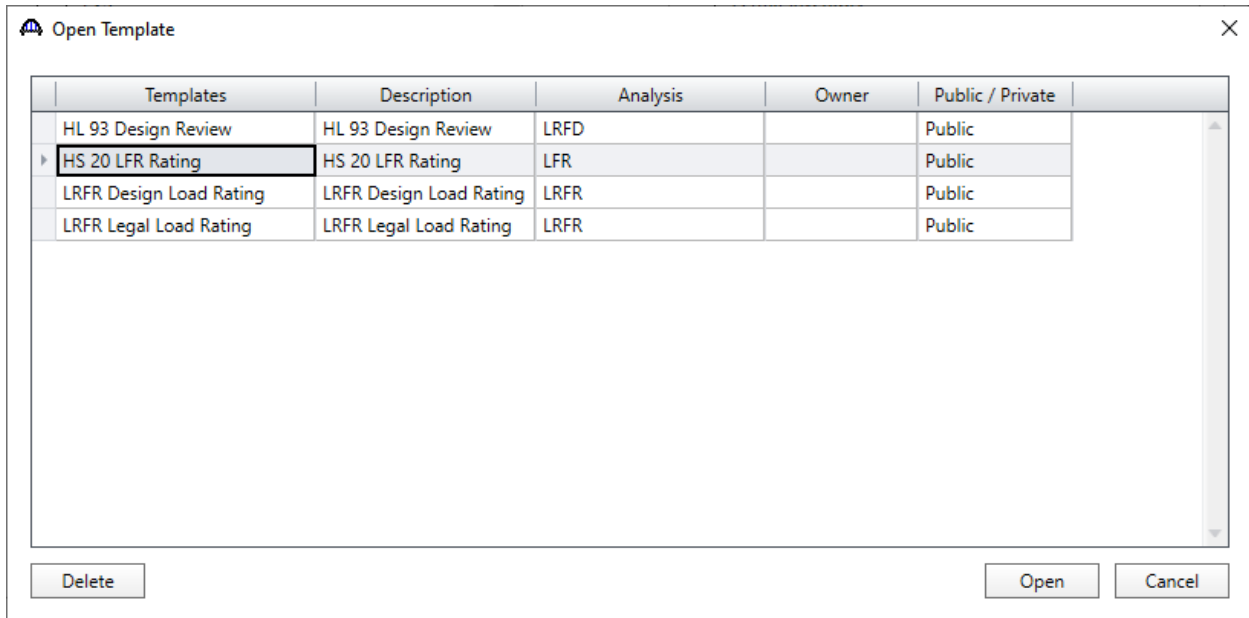
FS1 – Girder Floorbeam Stringer Example

LFR Analysis

To 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.

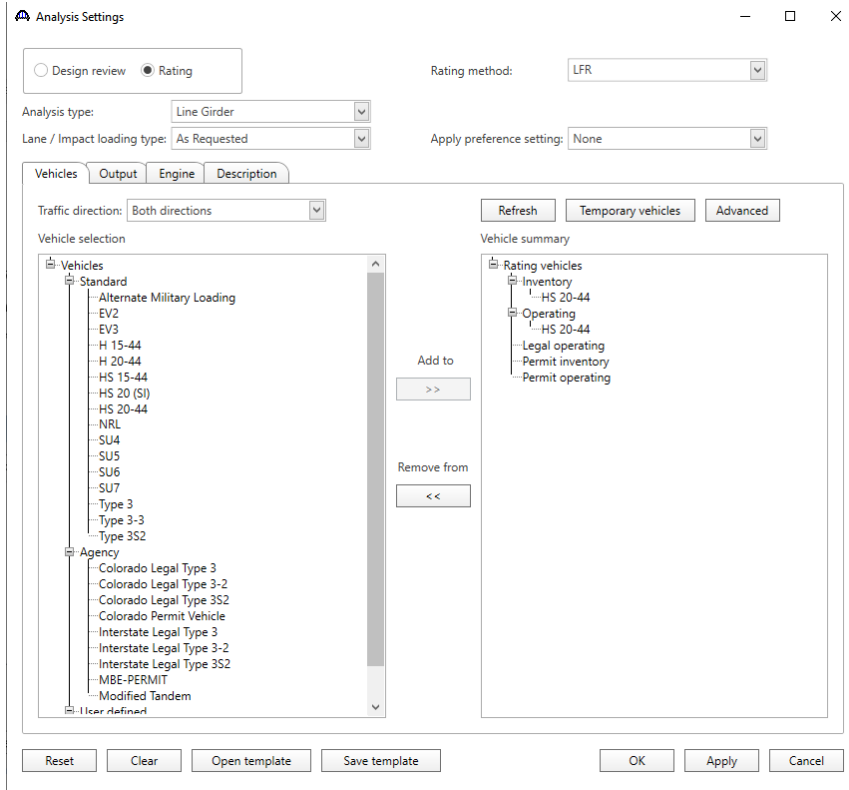


Click the **Open Template** button and select the **HS 20 LFR Rating** to be used in the rating and click **Open**.



FS1 – Girder Floorbeam Stringer Example

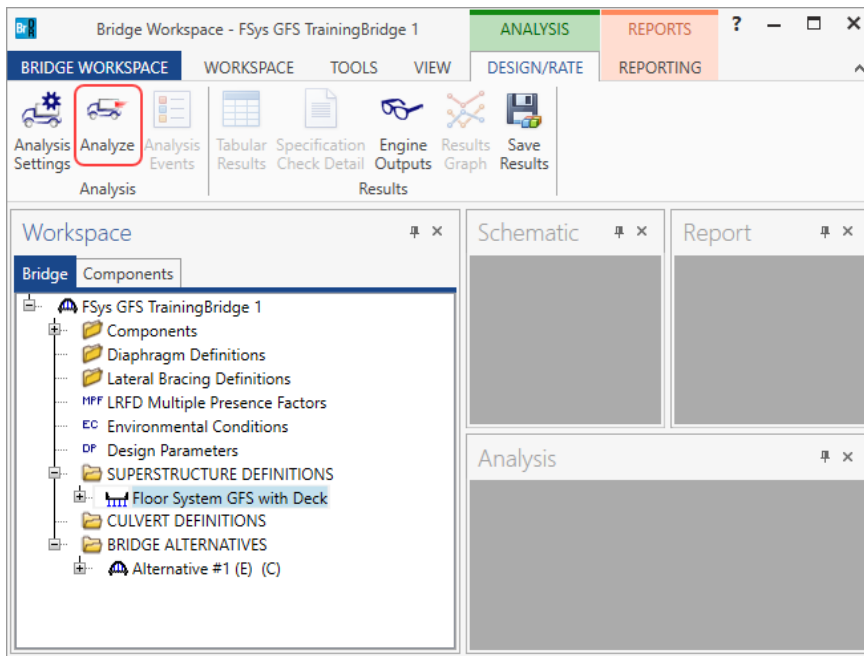
The **Analysis Settings** window will be populated as shown below.



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

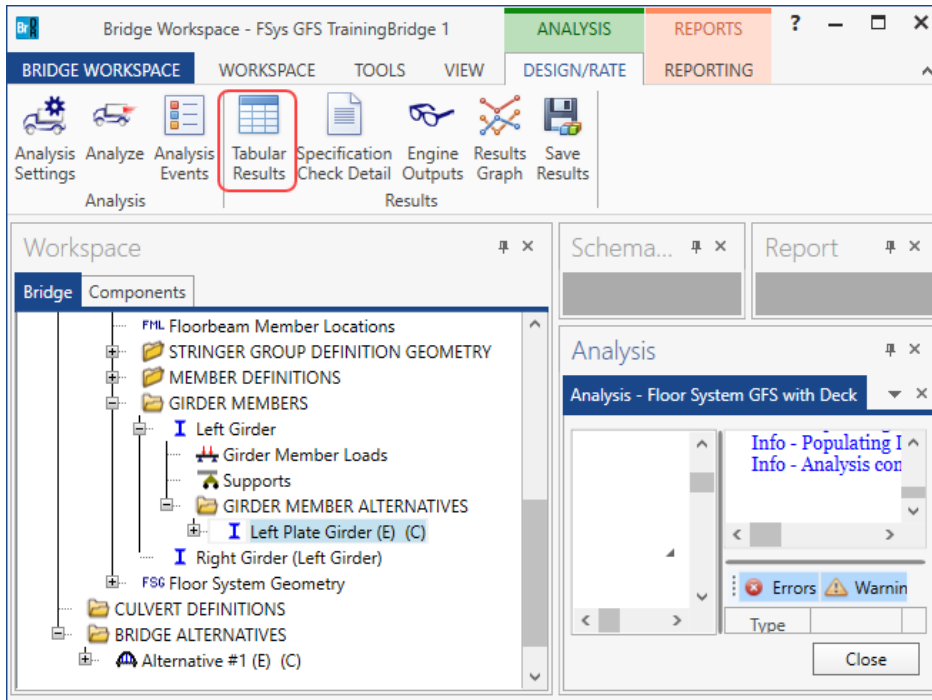
Tabular Results

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



FS1 – Girder Floorbeam Stringer Example

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.

