
AASHTOWare BrDR 7.5.0
Prestress Tutorial 11
PS-11 Bridge Over Shoal Creek

PS11 – Bridge Over Shoal Creek

BrDR Superstructure Training

PS11 - Bridge Over Shoal Creek

Bridge Over Shoal Creek

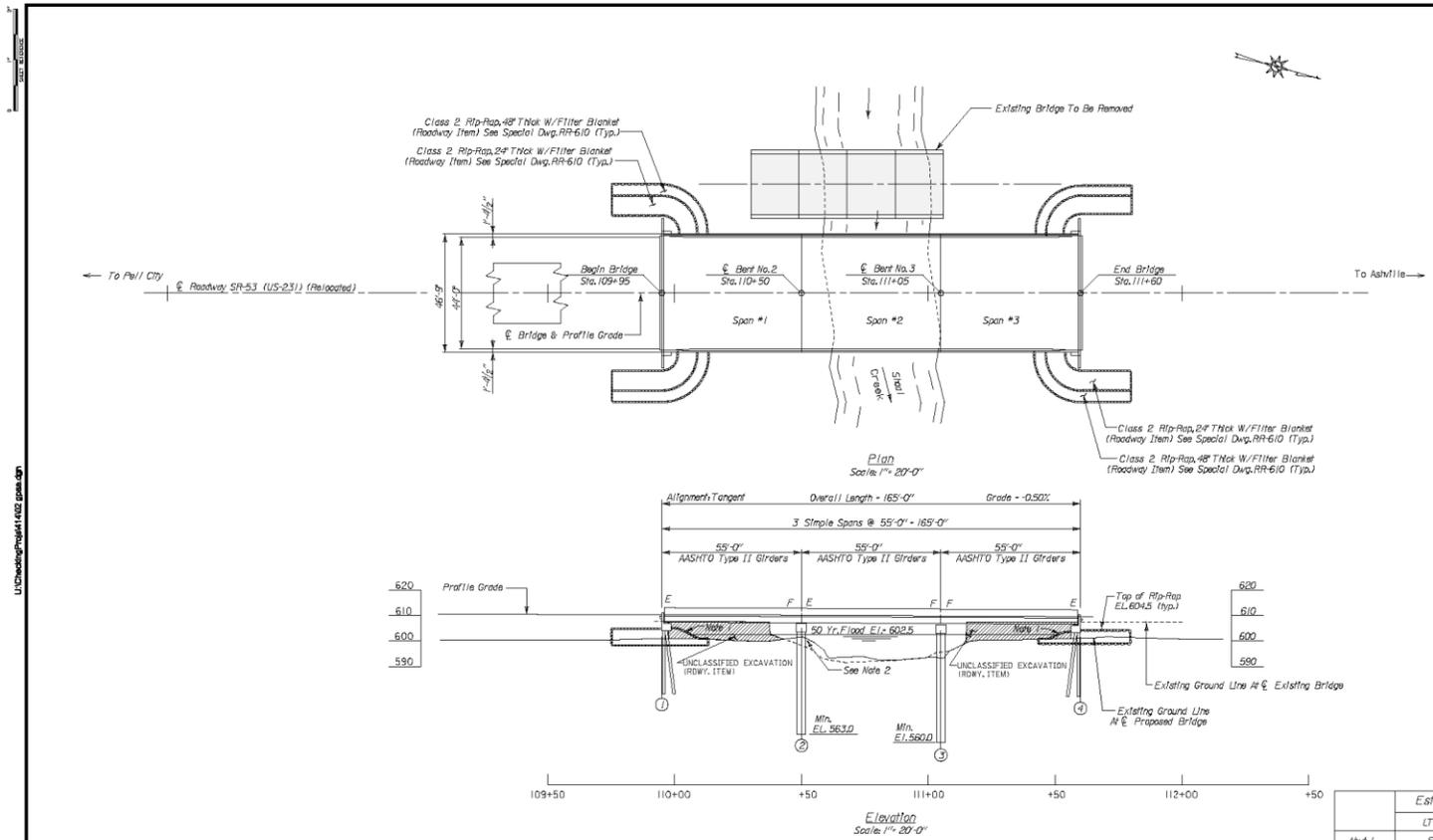
- Bridge Sheet No. 2 - General Plan and Elevation
- Bridge Sheet No. 3 - Span No's. 1, 2, & 3 Details
- Bridge Sheet No. 5 - Girder Details - Span No's. 1, 2, & 3

BrDR Modeling Strategy

1. Create one BrDR superstructure definition (Span 1 and Span 3 Definition) for Span No. 1 and Span No. 3
 - Complete one exterior girder (G1)
 - Copy the exterior girder to an interior girder (G2) and check the Deck Profile and Haunch Profile.
 - Link all other interior girders (G3, G4 and G5) to G2.
 - Link the other exterior girder (G6) to G1.
2. Create another BrDR Superstructure Definition (Span 2 Definition) for Span No. 2 by copying Span 1 and 3 Definition.
 - Modify the span length in Superstructure Definition.
 - Repopulate the diaphragm spacing using the Diaphragm Wizard.
 - Modify the length of the range in Beam Details, Deck Profile and Haunch Profile.
 - Modify the harp point distance in Strand Layout.
 - Reenter Shear Reinforcement Ranges.
3. Create one Bridge Alternative and three superstructures. The first superstructure is for Span No. 1, the second superstructure is for Span No. 2 and the third superstructure is for Span No. 3.
4. Assign Span 1 and 3 Definition to the first and third superstructure and assign Span 2 definition to the second superstructure.

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REFERENCE	FISCAL YEAR	SHEET NUMBER
PROJECT NUMBER BR-0053(513)	2008	101



HYDRAULIC DATA	
Drainage Area - 13.1 Sq.Mi.	
Opening Provided - 668.43 Sq.Ft.	
Q50 - 4110 cfs @ STAGE 602.5	
Q100 - 4735 cfs @ STAGE 602.2	
Q200 - 5400 cfs @ STAGE 603.1	
Q500 - 6300 cfs @ STAGE 603.4	
V50 - 6.15 fps	

Note 1: Slope 2:1 (Typ.)

Note 2: Minor Excavation That May Be Necessary To Construct Bent Case Shall Be Considered A Subsidiary Obligation Of Proj. Item 510-A "Culverts, Bridge Substructure Concrete."

Estimated Pile Tip Elevations		
	LT. of ξ	RT. of ξ
Abut. 1	585.0	581.0
Abut. 4	582.0	586.5

ALABAMA DEPARTMENT OF TRANSPORTATION

BRIDGE SHEET NO. 2 OF 10

PROJECT NO. BR-0053(513)

BRIDGE OVER SHOAL CREEK
ON SR-53 (US-231)
STATION 109+95

ST. CLAIR COUNTY

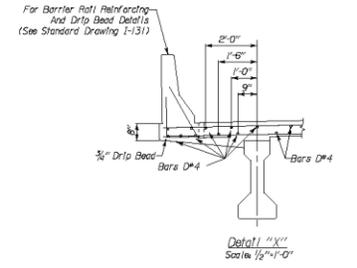
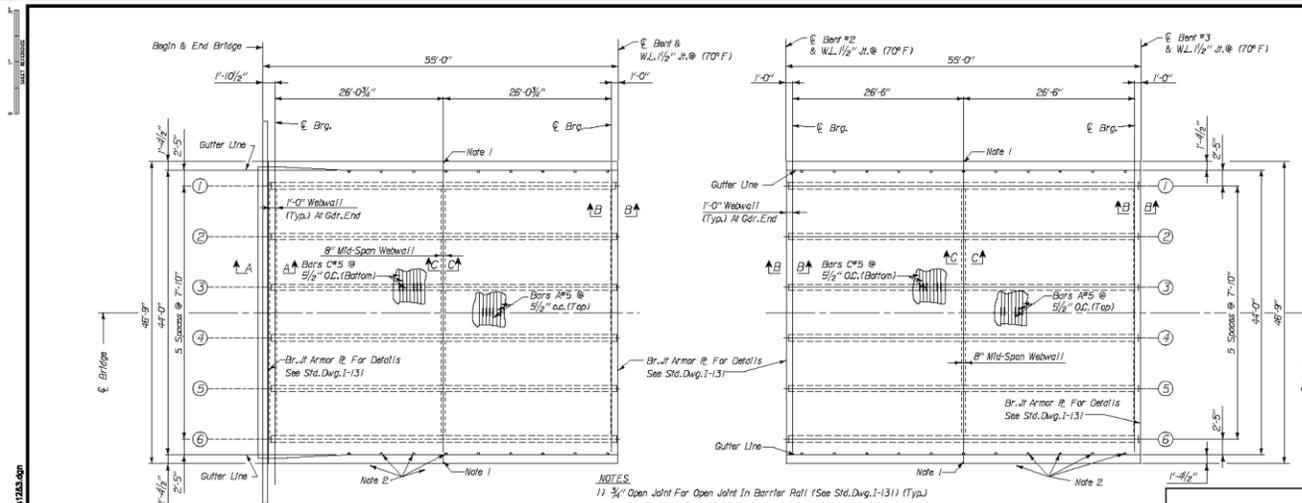
GENERAL PLAN & ELEVATION

ESTIMATED QUANTITIES	DESIGNED BY:	DRAWN BY:	LDL
COMPUTED BY:	CHECKED BY:	DATE DRAWN:	08/25/08
VERIFIED BY:	DATE CHECKED:	SCALE:	As Shown

U:\Chadwick\ps11\1002\ps11.dwg
Plot Date: 25-Sep-2008 01:37 PM

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REFERENCE: PROJECT NUMBER: BR-0053(13) FISCAL YEAR: 2006 SHEET NUMBER: 102



- NOTES**
- 1) 3/4" Open Joint For Open Joint In Barrier Rail (See Std. Dwg. I-131) (Typ.)
 - 2) 4" @ Drain Spaced @ 5'-0" o.c. (Both Sides) See Std. Dwg. I-131 For Details.
 - 3) For Weeball Details See Bridge SH.4
 - 4) For Section A-A, B-B & C-C Bridge See SH.4

Plan View Span No. 1 (Span No. 3 Opposite Hand) Scale: 1/8" = 1'-0"

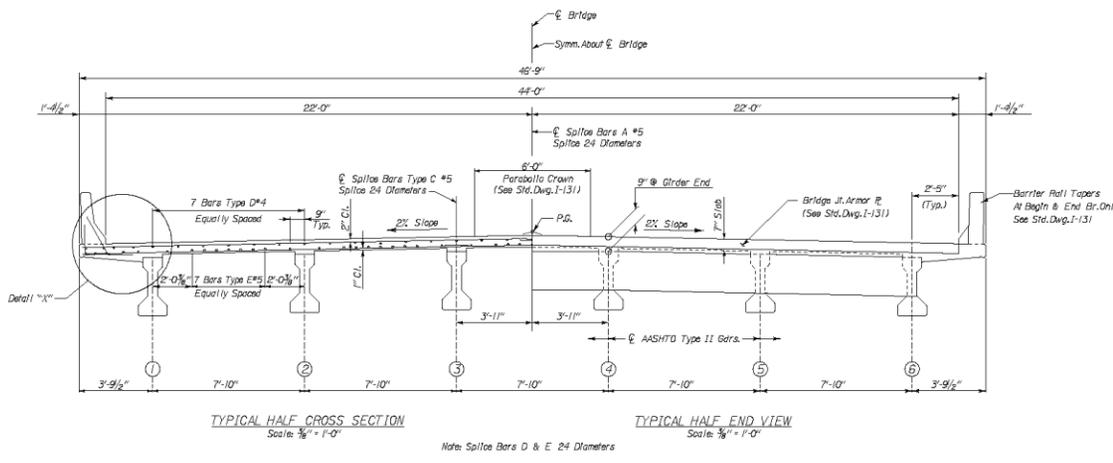
Plan View Span No. 2 Scale: 1/8" = 1'-0"

Estimated Quantities

Span 1	Span 2	Span 3	Description
75	76	75	Cu. Yds. Superstructure Concrete
19254	19445	19254	Lbs. Steel Reinforcement
1460	1480	1460	Lbs. Structural Steel
320	325	320	Ltn. Ft. Type II Grdcr

Finish Grade Elevation Table

Location	Begin Bridge Station 109+95	§ Bert No. 2 Station 110+50	§ Bert No. 3 Station 111+05	End Bridge Station 111+60
Lt Edge Slab	610.552	610.277	610.001	609.726
Tran Gutter	610.569			609.744
Lt Gutter		610.304	610.029	
Gdr No 1	610.628	610.352	610.077	609.802
Gdr No 2	610.784	610.509	610.234	609.959
Gdr No 3	610.941	610.666	610.391	610.115
§ Bridge	610.989	610.714	610.439	610.164
Gdr No 4	610.941	610.666	610.391	610.115
Gdr No 5	610.784	610.509	610.234	609.959
Gdr No 6	610.628	610.352	610.077	609.802
Rt Gutter		610.304	610.029	
Tran Gutter	610.569			609.744
Rt Edge Slab	610.552	610.277	610.001	609.726



Typical Half Cross Section Scale: 1/8" = 1'-0"

Typical Half End View Scale: 1/8" = 1'-0"

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BRIDGE SHEET NO. 3 OF 10 PROJECT NO. BR-0053(513)

BRIDGE OVER SHOAL CREEK ON SR-53 (US-231) STATION 109+95

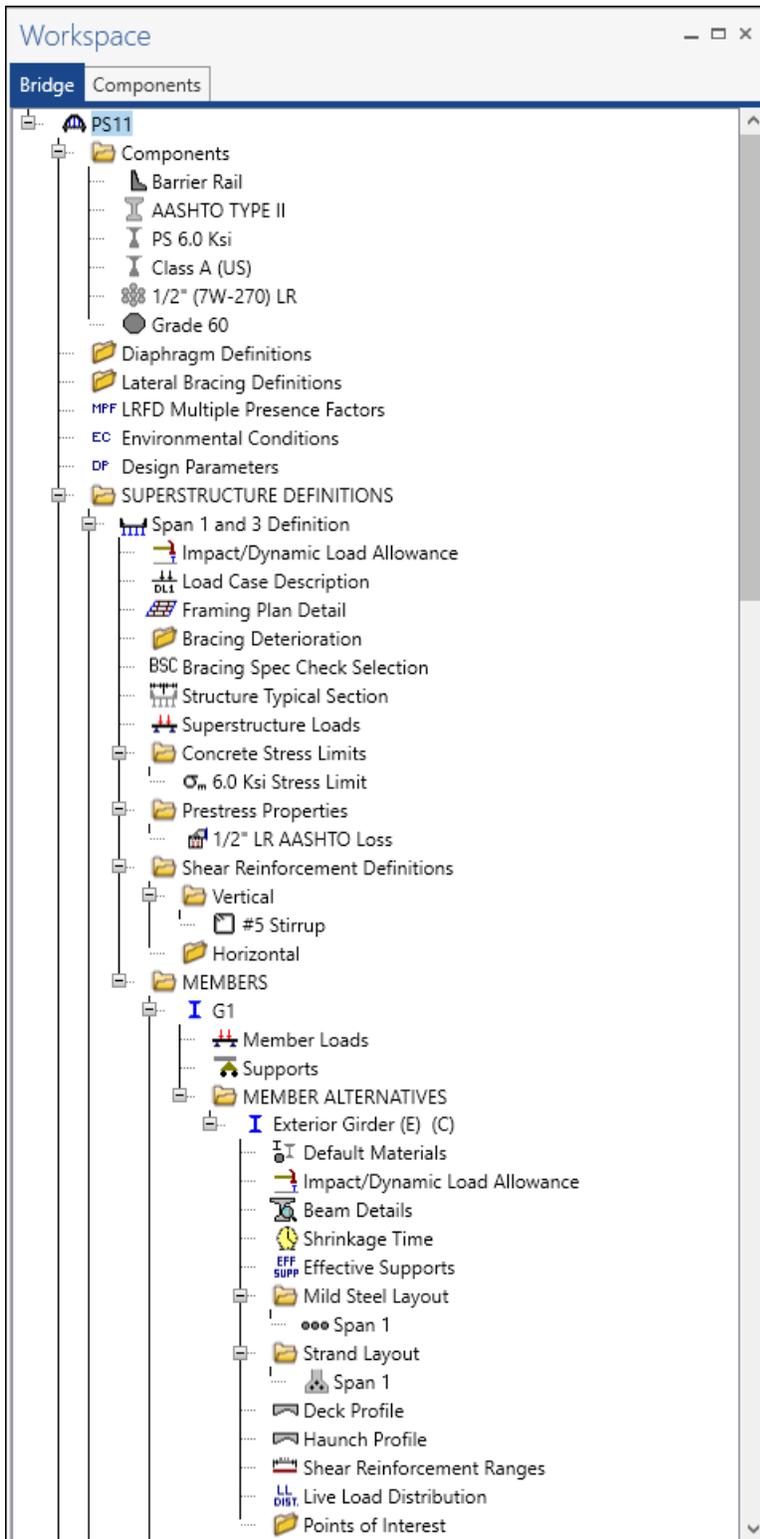
ST. CLAIR COUNTY

SPAN 1, 2 & 3 DETAILS

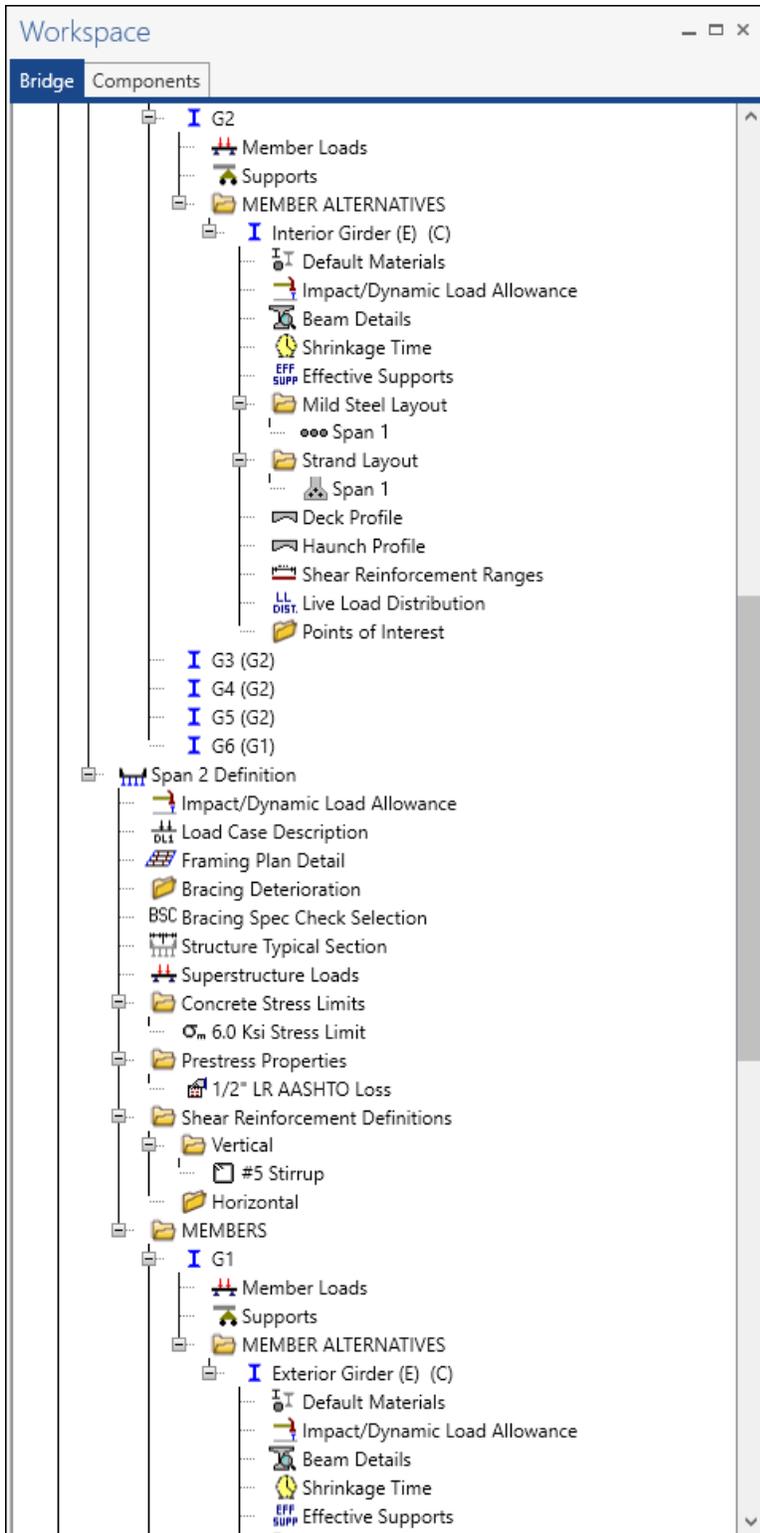
ESTIMATED QUANTITIES	DESIGNED BY:	PEP	DRAWN BY:	LRB
COMPUTED BY:	LRB	CHECKED BY:	DATE DRAWN:	05/14/06
VERIFIED BY:	PEP	DATE CHECKED:	SCALE:	AS SHOWN

PS11 – Bridge Over Shoal Creek

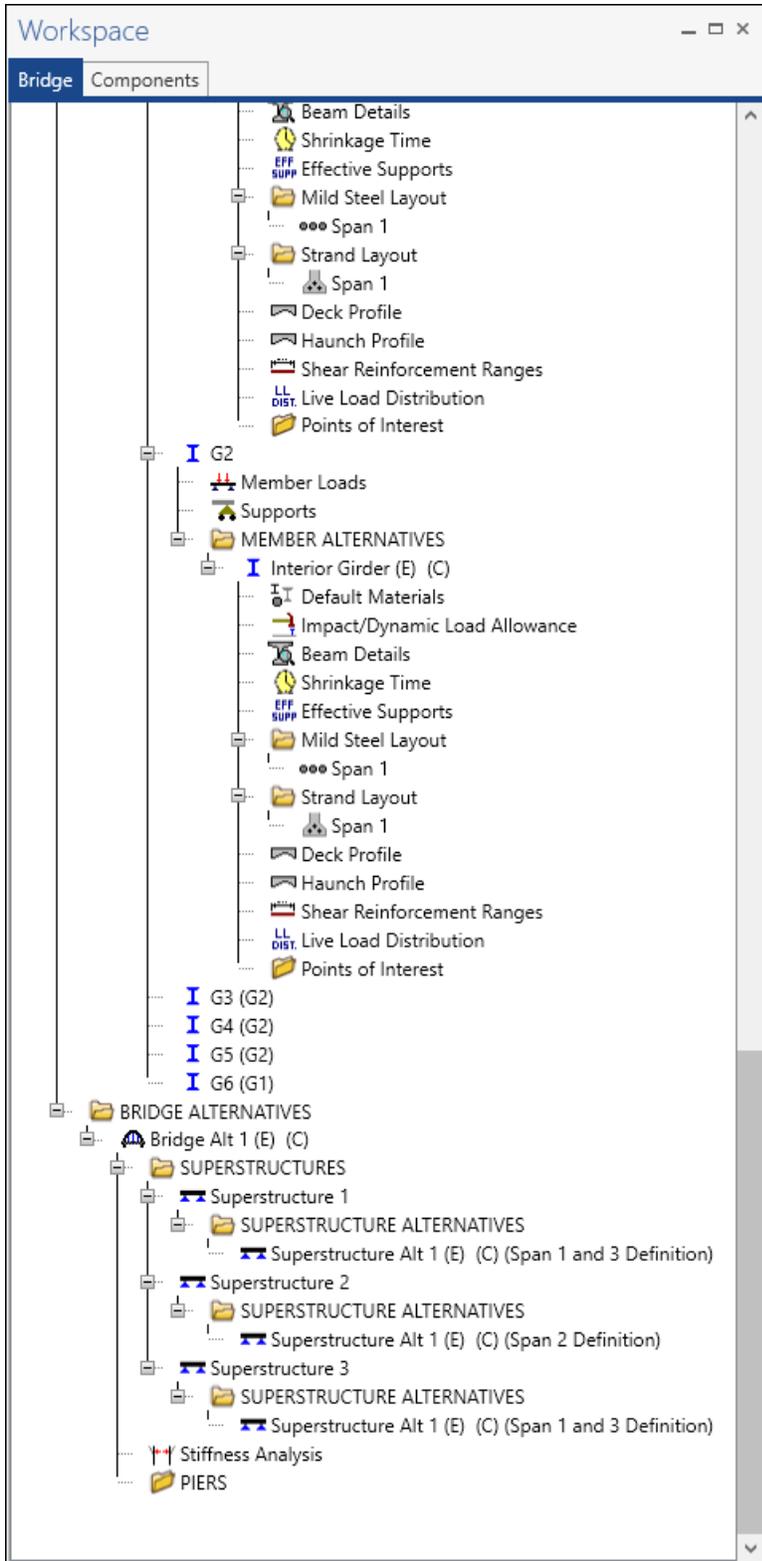
The completed Bridge Workspace tree for this bridge is as shown below.



PS11 – Bridge Over Shoal Creek



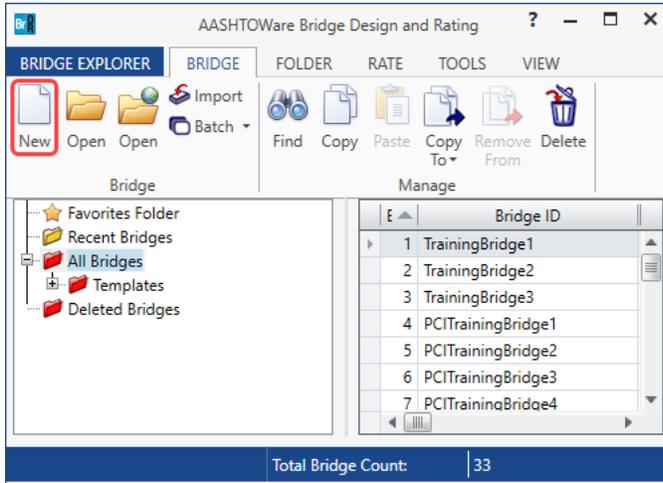
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Create one BrDR superstructure definition (Span 1 and Span 3 definitions) for Span No. 1 and Span No. 3

From the **Bridge Explorer** create a **new bridge**.



Enter the following bridge description data.

The 'New Bridge' dialog box is shown with the following data entered:

- Bridge ID: PS11
- NBI structure ID (8): PS11
- Template:
- Bridge completely defined:
- Superstructures:
- Culverts:
- Substructures:

The 'Description' tab is selected, showing the following fields:

- Name: Bridge Over Shoal Creek
- Year built: []
- Description: Project No. BR-0053(513)
- Location: St. Clair County
- Length: 165.00 ft
- Facility carried (7): SR-53
- Route number: SR-53
- Feat. intersected (6): []
- Mi. post: []
- Default units: US Customary

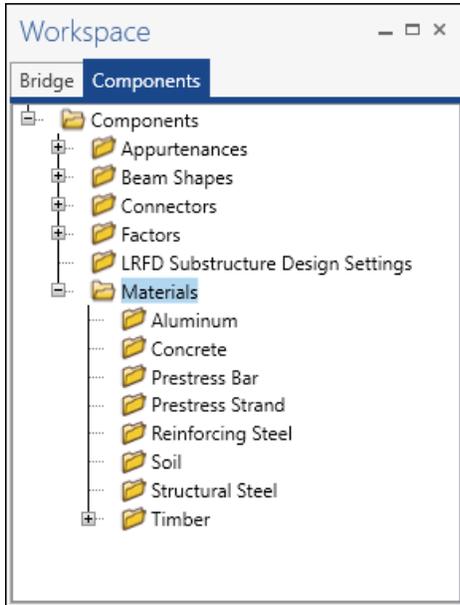
The 'Bridge association...' section is checked for BrR, BrD, and BrM. The 'OK' button is highlighted.

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

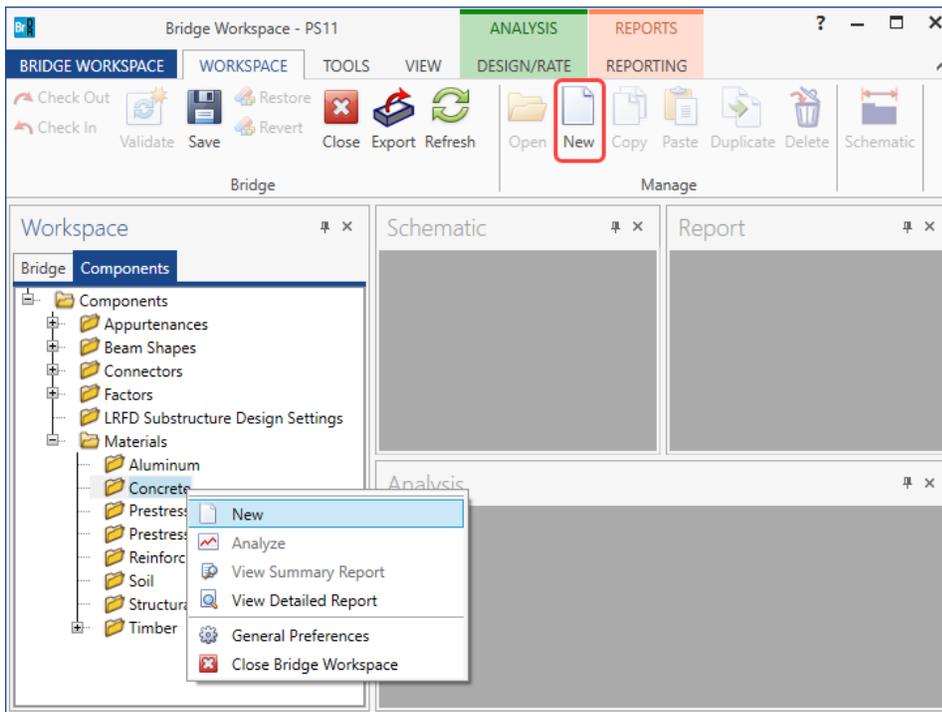
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Bridge Components

To enter the materials to be used by members of the bridge, open the **Components** tab, and click on the  button to expand the tree for **Materials**. The tree with the expanded **Materials** branch is shown below.



To add a new concrete material, in the **Components** tab of the **Bridge Workspace**, click 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.



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

Bridge Materials - Concrete

Name: PS 6.0 Ksi

Description: Girder Concrete

Compressive strength at 28 days (f'c): 6 ksi

Initial compressive strength (f'ci): 5 ksi

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 (fct): ksi

LRFD Maximum aggregate size: in

Compute

Std modulus of elasticity (Ec): 4463.150877 ksi

LRFD modulus of elasticity (Ec): 4557.295222 ksi

Std initial modulus of elasticity: 4074.280688 ksi

LRFD initial modulus of elasticity: 4291.186125 ksi

Std modulus of rupture: 0.580948 ksi

LRFD modulus of rupture: 0.587878 ksi

Shear factor: 1

Copy to library... Copy from library... OK Apply Cancel

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

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Similarly add another concrete material for the deck. Select a library concrete material by clicking on the **Copy from library...** button in the **Bridge Materials – Concrete** window. The following window opens.

Library Data: Materials - Concrete

Name	Description	Library	Units	f'c	f'ci	alpha	DL density	Modulus density	Std modulus of elasticity	LRFD modulus of elasticity	Poisson's ratio	Std Modulus of rupture	LRFD Modulus of rupture
Class A	Class A cement concrete	Standard	SI / Metric	28.00		0.0000108000	2400.00	2320.00	25426.08	27730.36	0.200	3.33	3.33
Class A (US)	Class A cement concrete	Standard	US Customary	4.000		0.0000060000	0.150	0.145	3644.15	3986.55	0.200	0.48	0.48
Class B	Class B cement concrete	Standard	SI / Metric	17.00		0.0000108000	2400.00	2320.00	19811.84	23520.23	0.200	2.60	2.60
Class B (US)	Class B cement concrete	Standard	US Customary	2.400		0.0000060000	0.150	0.145	2822.75	3368.12	0.200	0.37	0.37
Class C	Class C cement concrete	Standard	SI / Metric	28.00		0.0000108000	2400.00	2320.00	25426.08	27730.36	0.200	3.33	3.33
Class C (US)	Class C cement concrete	Standard	US Customary	4.000		0.0000060000	0.150	0.145	3644.15	3986.55	0.200	0.48	0.48
PS 6.5 ksi	PS 6.5 ksi (f'ci=5.5 ksi)	Agency...	US Customary	6.500	5...	0.0000060000	0.150	0.150	4887.73	5007.55	0.200	0.60	0.61

OK Apply Cancel

Select the **Class A (US)** material and click **OK**. The selected material properties are copied to the **Bridge Materials - Concrete** window.

Bridge Materials - Concrete

Name:

Description:

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

Initial compressive strength (f'ci):

Composition of concrete:

Density (for dead loads): kcf

Density (for modulus of elasticity): kcf

Poisson's ratio:

Coefficient of thermal expansion (α): 1/F

Splitting tensile strength (fct):

LRFD Maximum aggregate size:

Std modulus of elasticity (Ec): ksi

LRFD modulus of elasticity (Ec): ksi

Std initial modulus of elasticity: ksi

LRFD initial modulus of elasticity: ksi

Std modulus of rupture:

LRFD modulus of rupture: ksi

Shear factor:

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

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Add the following reinforcement material (**Grade 60**) and prestress strand (**1/2" (7W-270) LR**) using the same **Copy from library** technique. The windows will be populated as shown below.

The dialog box is titled "Bridge Materials - Reinforcing Steel". It contains the following fields and options:

- Name: Grade 60
- Description: 60 ksi reinforcing steel
- Material properties:
 - Specified yield strength (fy): 60.0000087 ksi
 - Modulus of elasticity (Es): 29000.004206 ksi
 - Ultimate strength (Fu): 90.0000131 ksi
- Type: Plain (selected), Epoxy, Galvanized
- Buttons: Copy to library..., Copy from library..., OK, Apply, Cancel

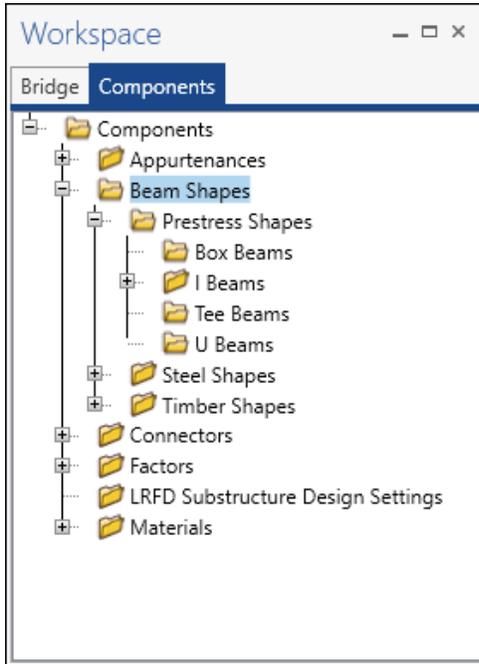
The dialog box is titled "Bridge Materials - PS Strand". It contains the following fields and options:

- Name: 1/2" (7W-270) LR
- Description: Low relaxation 1/2"/Seven Wire/fpu = 270
- Strand diameter: 0.5000 in
- Strand area: 0.153 in²
- Strand type: Low Relaxation
- Ultimate tensile strength (Fu): 270.000 ksi
- Yield strength (fy): 243.000 ksi
- Modulus of elasticity (E): 28500.00 ksi
- Buttons: Compute
- Transfer length (Std): 25.0000 in
- Transfer length (LRFD): 30.0000 in
- Unit load per length: 0.520 lb/ft
- Epoxy coated
- Buttons: Copy to library..., Copy from library..., OK, Apply, Cancel

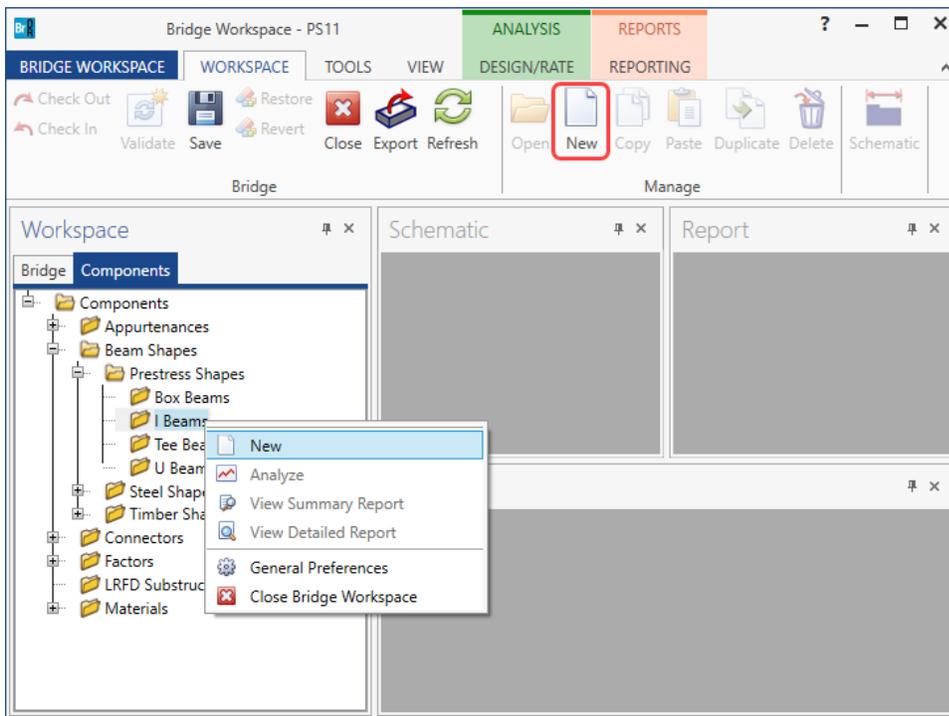
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Beam Shapes

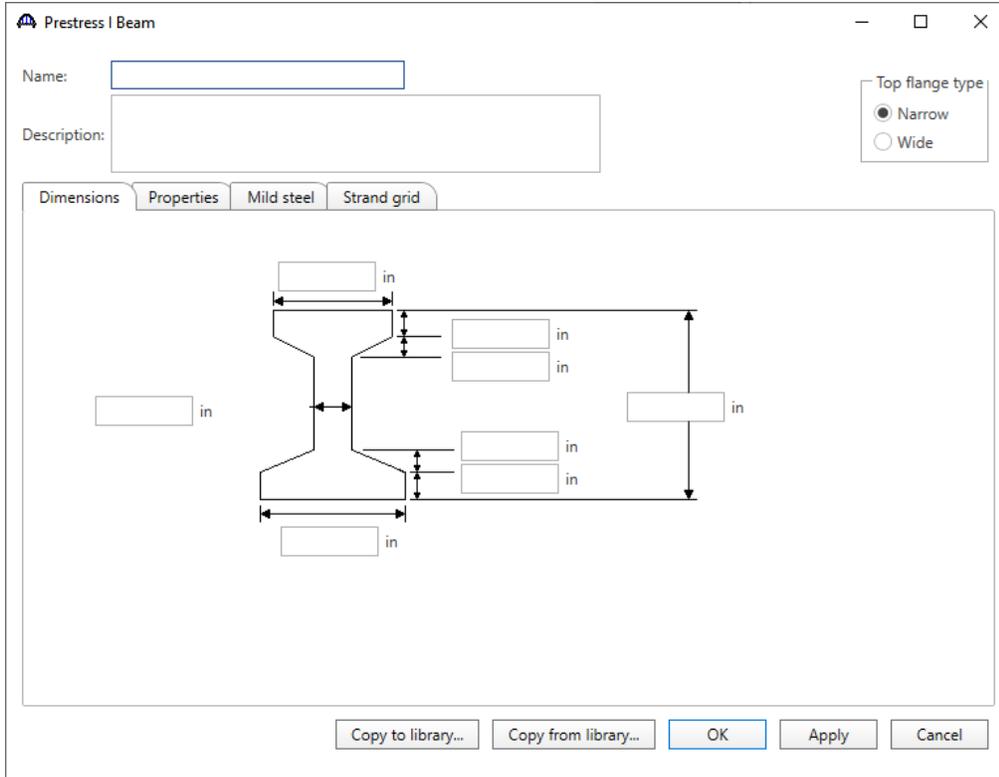
To enter a prestress beam shape to be used in this bridge, expand the **Beam Shapes** node and **Prestress Shapes** node in the **Componentets** tree as shown below.



Click on the **I Beams** node in the **Components** tree and select **New** from the **Manage** group of the **WORKSPACE** ribbon (or right mouse click on **I Beams** and select **New** or double click on **I Beams** in the **Components** tree). The window shown below will open.



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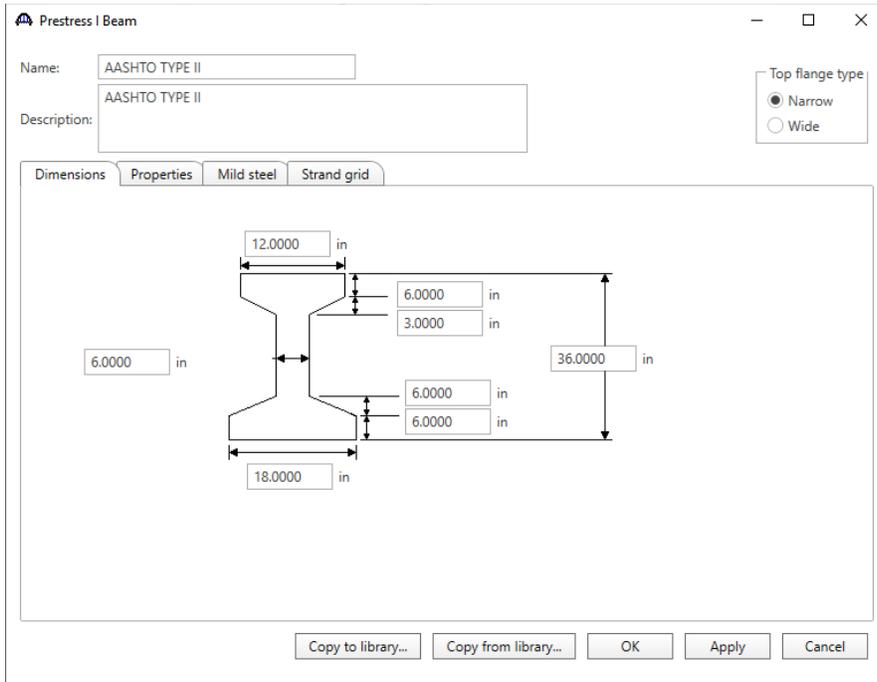
Select the **Top flange type** as **Narrow** and click the **Copy from library...** button. Select **AASHTO Type II** and click **OK**.

Library Data: Prestress I Beam Shapes

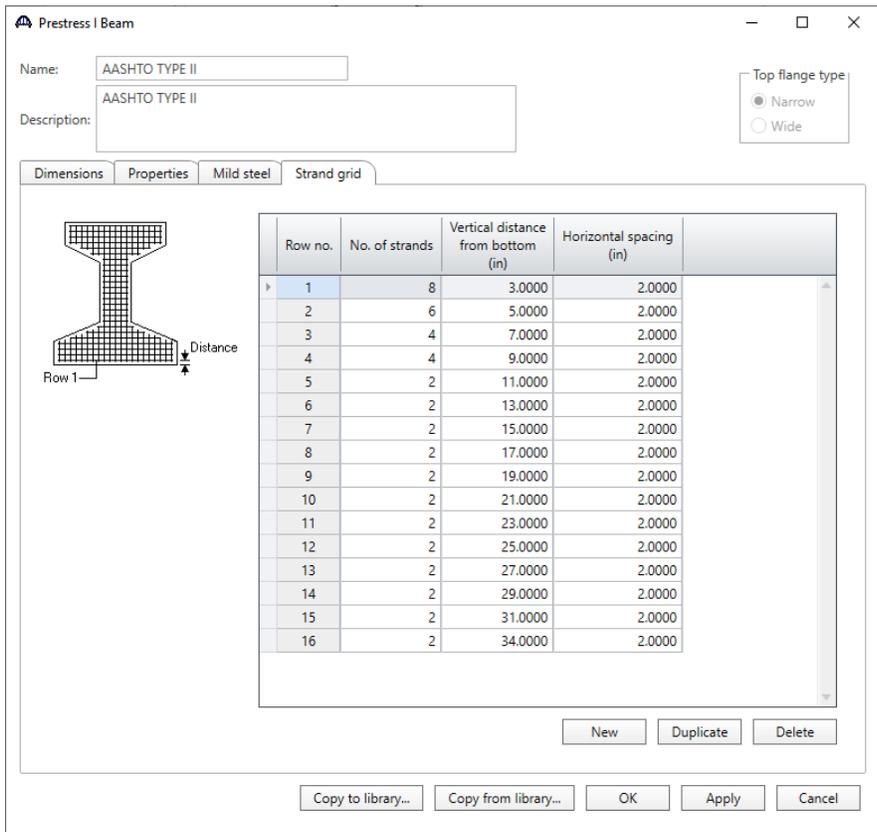
Name	Description	Library	Units	Depth	Top flange thickness	Top flange width	Bottom flange thickness	Bottom flange width	Top hauch height	Bottom hauch height
AASHTO TYPE I	AASHTO TYPE I	Standard	US Customary	28	4.0000	12.0000	5.0000	16.0000	3.0000	5.0000
▶ AASHTO TYPE II	AASHTO TYPE II	Standard	US Customary	36	6.0000	12.0000	6.0000	18.0000	3.0000	6.0000
AASHTO TYPE III	AASHTO TYPE III	Standard	US Customary	45	7.0000	16.0000	7.0000	22.0000	4.5000	7.5000
AASHTO TYPE IV	AASHTO TYPE IV	Standard	US Customary	54	8.0000	20.0000	8.0000	26.0000	6.0000	9.0000

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The beam properties are copied to the **PS I Beam** window as shown below.



Select the **Strand grid** tab and modify the possible prestress strand locations as shown below.

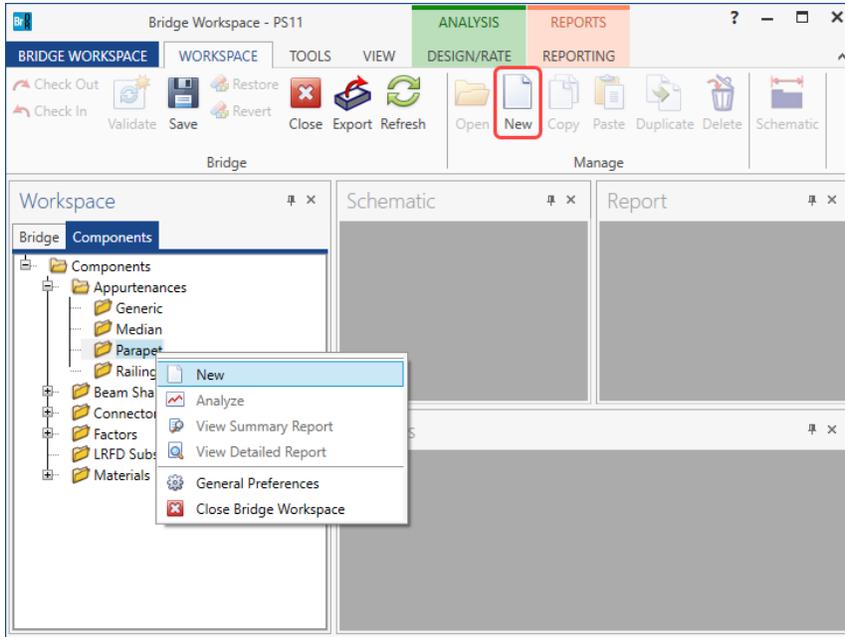


Click **OK** to apply the data and close the window.

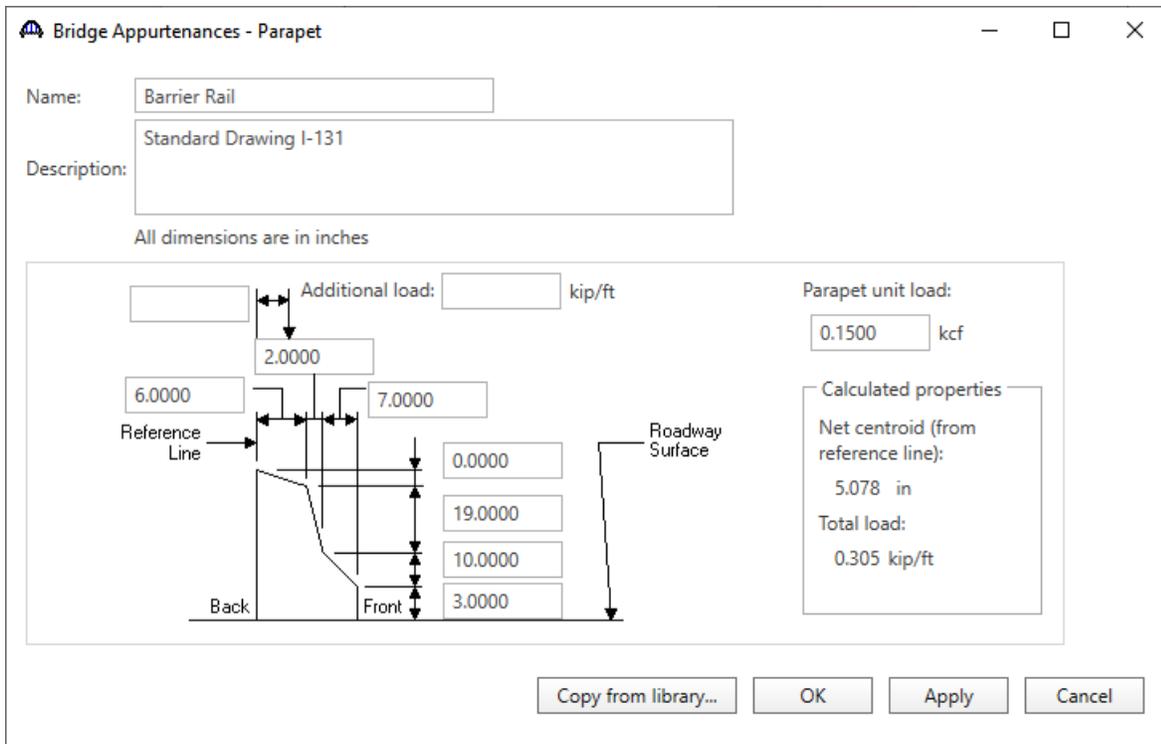
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Bridge - Appurtenances

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



Enter the parapet details as shown below.

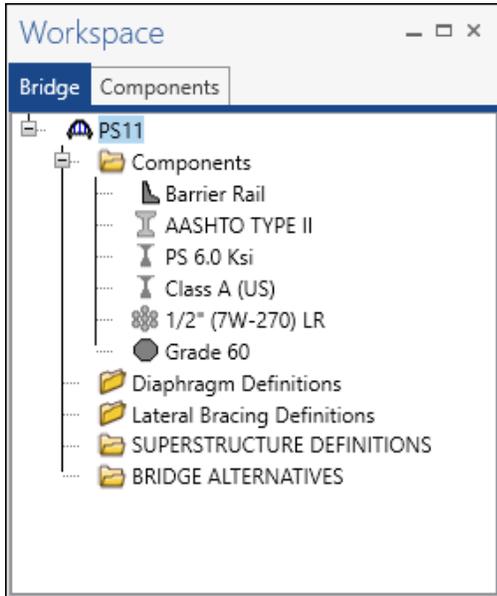


Click **OK** to apply the data and close the window.

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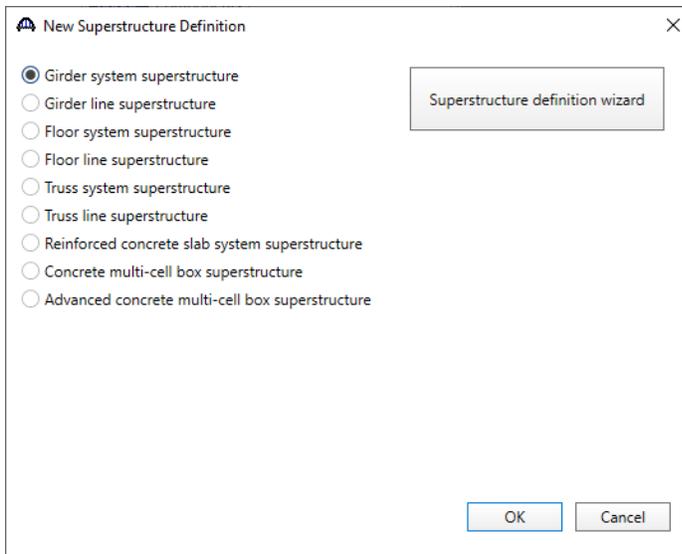
The default LRFD dynamic load allowance and default LRFD factors will be used.

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



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.



Select **Girder system superstructure**, click **OK** and the **Girder System Superstructure Definition** window will open.

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Enter the data as shown below.

Girder System Superstructure Definition

Definition Analysis Specs Engine

Name: Span 1 and 3 Definition

Description:

Default units: US Customary

Number of spans: 1

Number of girders: 6

Span	Length (ft)
1	52.125

Modeling

Multi-girder system MCB

With frame structure simplified definition

Deck type: Concrete Deck

For PS/PT only

Average humidity: %

Member alt. types

Steel

P/S

R/C

Timber

P/T

Horizontal curvature along reference line

Horizontal curvature

Superstructure alignment

Curved

Tangent, curved, tangent

Tangent, curved

Curved, tangent

Distance from PC to first support line: ft

Start tangent length: ft

Radius: ft

Direction: Left

End tangent length: ft

Distance from last support line to PT: ft

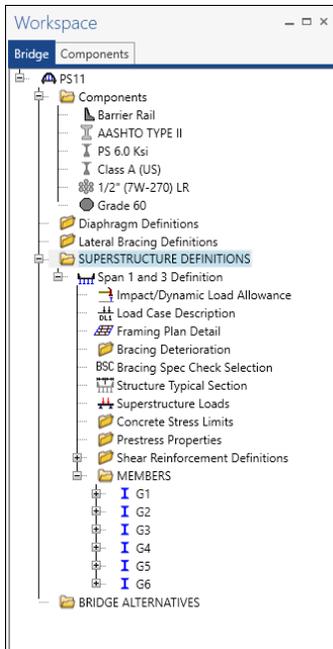
Design speed: mph

Superelevation: %

OK Apply Cancel

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

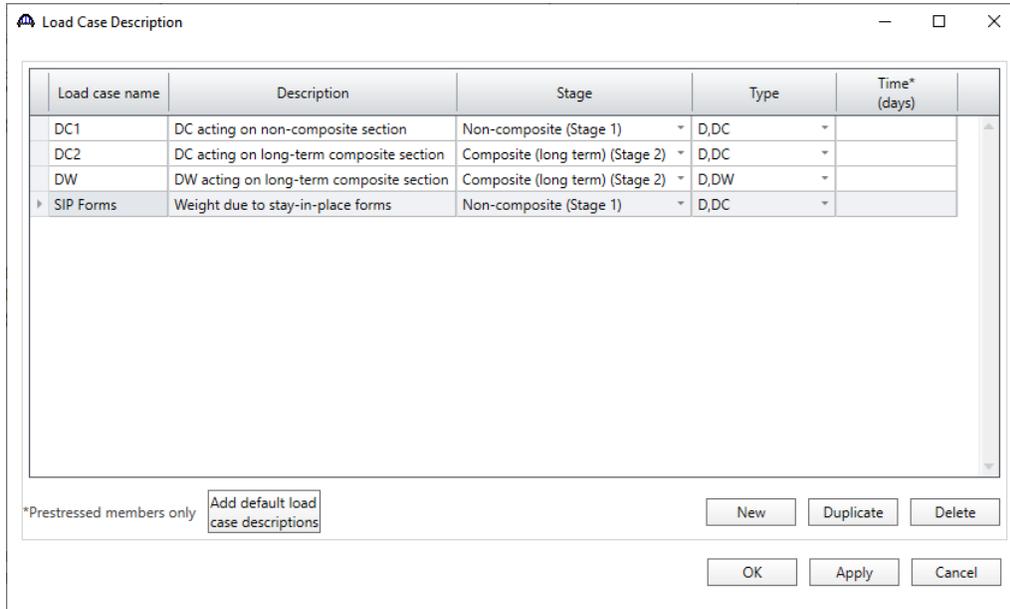
The partially expanded **Bridge Workspace** tree is shown below.



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Load Case Description

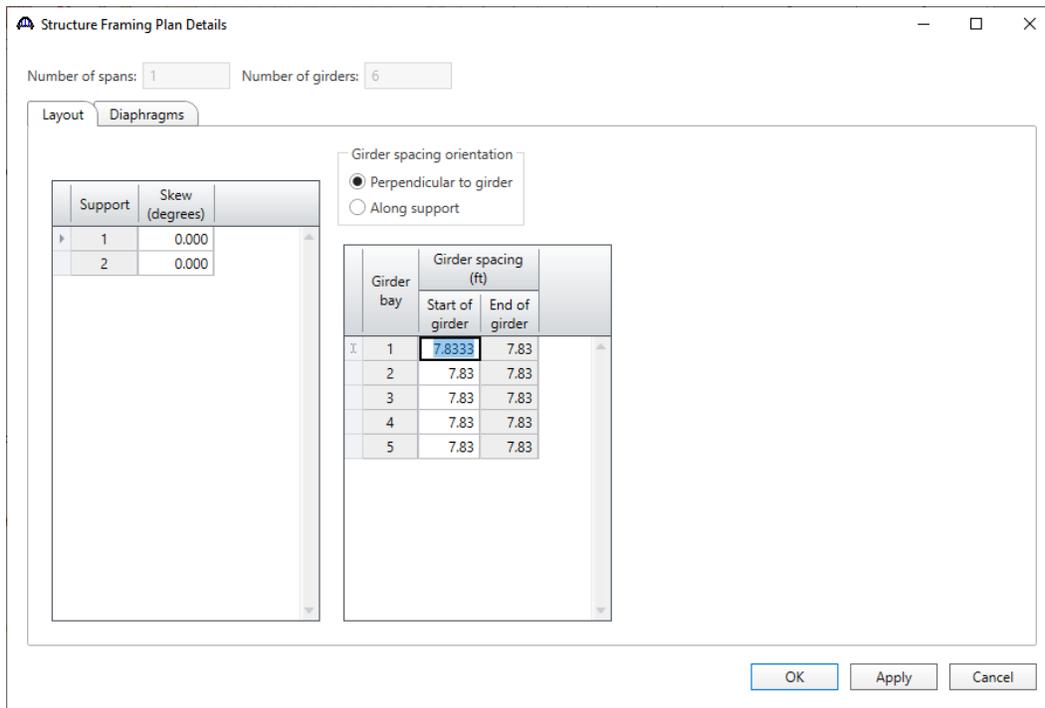
Double-click on the **Load Case Description** node in the **Bridge Workspace** tree to open the **Load Case Description window**. Click on the **Add default load case descriptions** button to create the following load cases.



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

Structure Framing Plan Detail – Layout

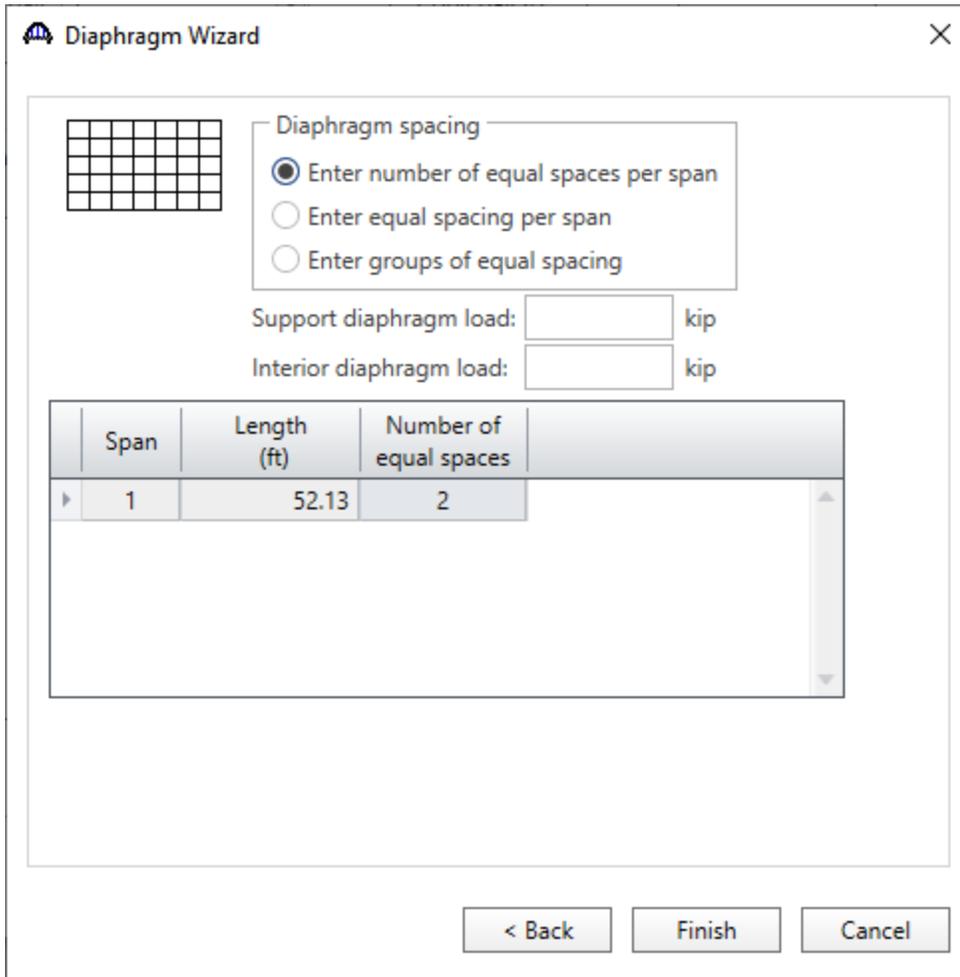
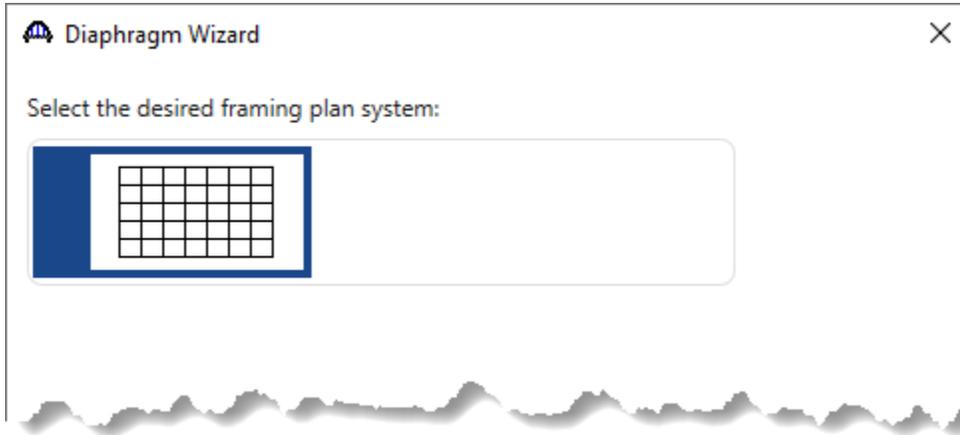
Double-click on **Framing Plan Detail** in the **Bridge Workspace** tree to describe the framing plan in the **Structure Framing Plan Details** window. Enter the data as shown below.



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Structure Framing Plan Detail – Diaphragms

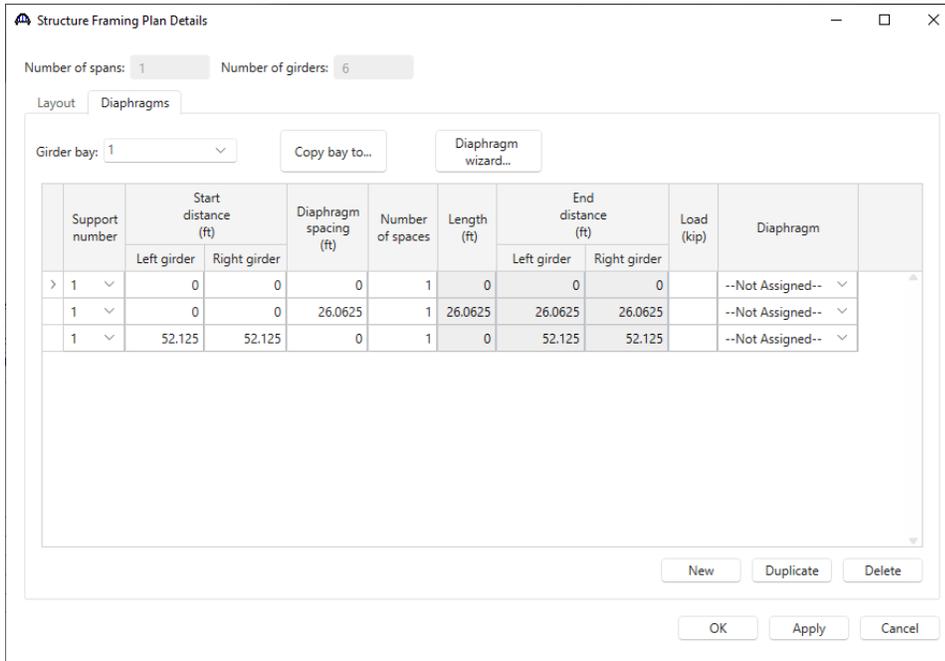
Switch to the **Diaphragms** tab to enter diaphragm spacing. Click the **Diaphragm wizard...** button to add diaphragms for the entire structure. **Select the desired framing plan system** and click the **Next** button. Enter the following data on the window shown below.



Click the **Finish** button to add the diaphragms. The **Diaphragm Wizard** will create diaphragms for all the girder bays in the structure.

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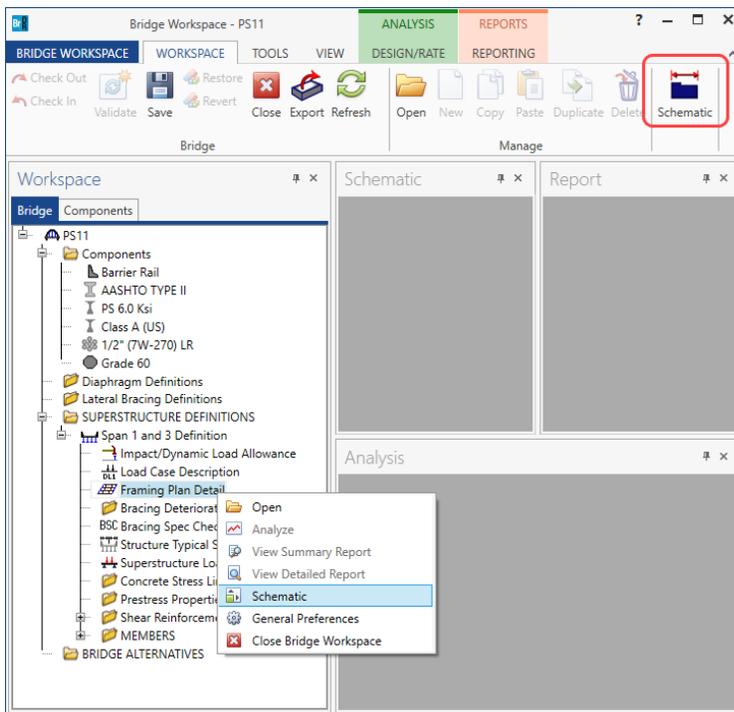
The diaphragms created for **Girder bay 1** are shown below.



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

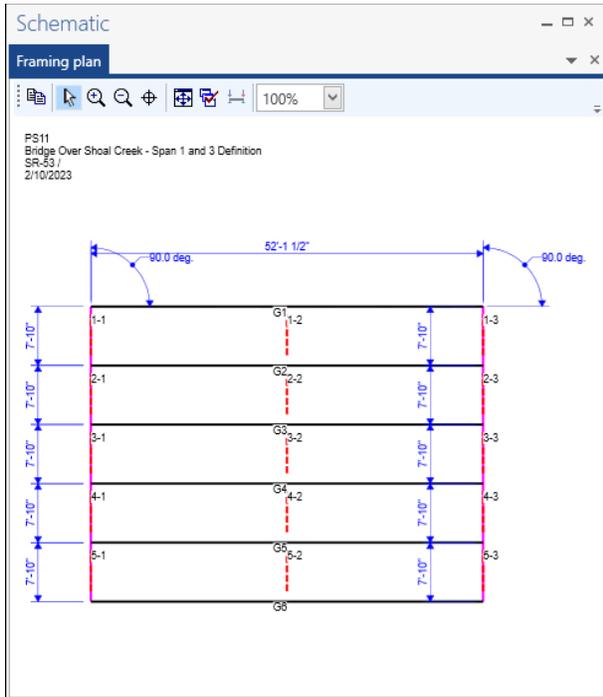
Schematic - Framing Plan Detail

While **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).



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The following schematic will be displayed.



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

Deck thickness

Superstructure Definition Reference Line

Left overhang

Right overhang

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

Superstructure definition reference line is the bridge deck.

Start End

Distance from left edge of deck to superstructure definition reference line: ft ft

Distance from right edge of deck to superstructure definition reference line: ft ft

Left overhang: ft ft

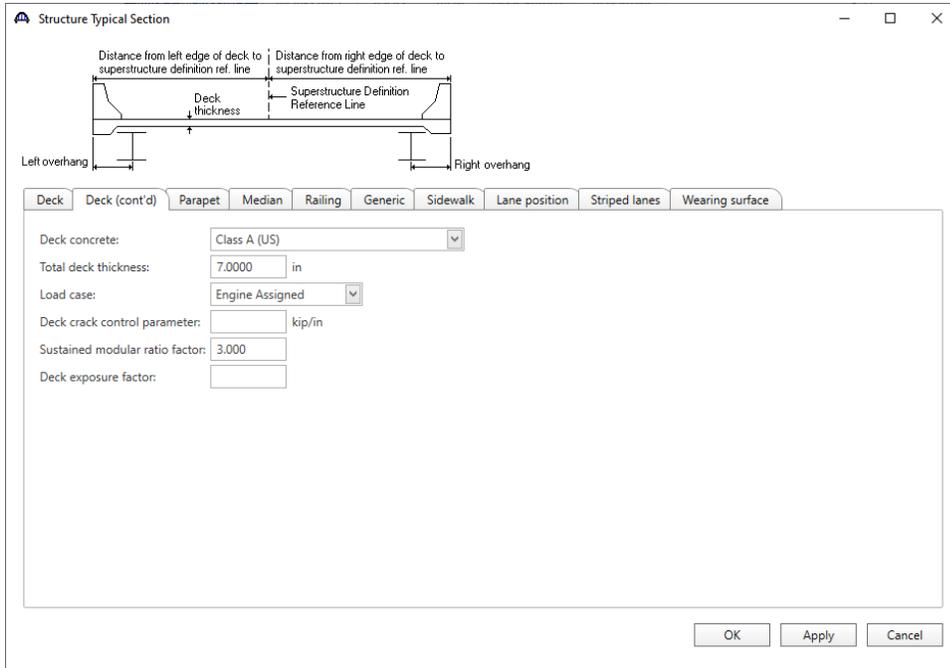
Computed right overhang: ft ft

OK Apply Cancel

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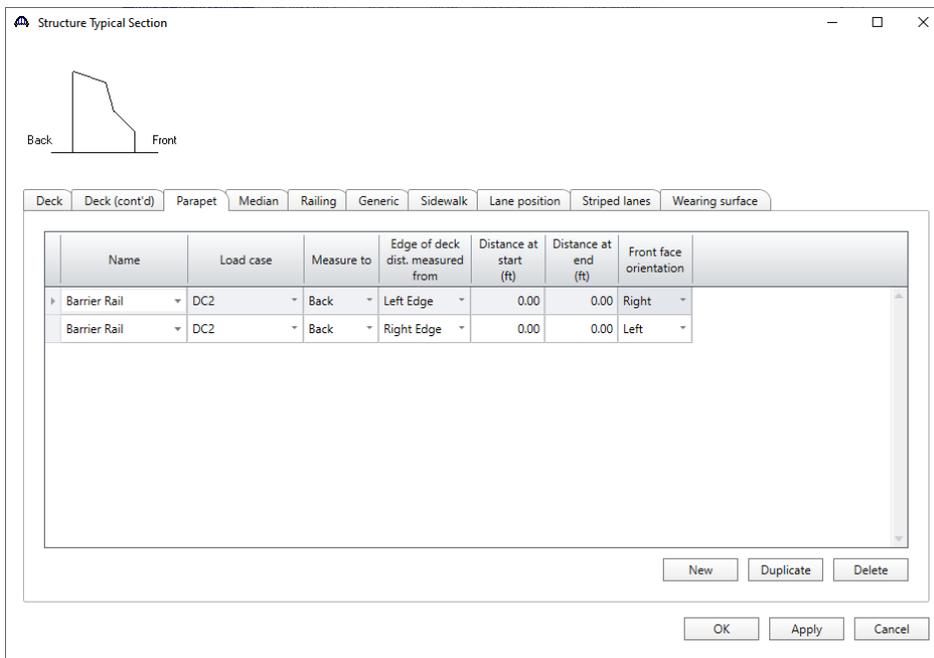
Structure Typical Section – Deck (cont'd)

The **Deck (cont'd)** tab is used to enter information about the **Deck concrete** and the **Total deck thickness**. The Total deck thickness is used to compute the dead load for the deck. 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 – Parapets

Add two parapets as shown below.



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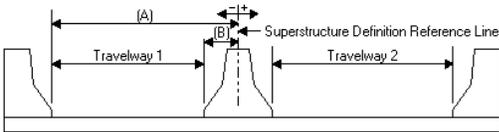
Structure Typical Section – Lane Positions

Select the **Lane position** tab and 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.

Compute Lane Positions ✕

Travelway number	Distance from left edge of travelway to superstructure definition reference line at start (A) (ft)	Distance from right edge of travelway to superstructure definition reference line at start (B) (ft)	Distance from left edge of travelway to superstructure definition reference line at end (A) (ft)	Distance from right edge of travelway to superstructure definition reference line at end (B) (ft)
> 1	-22.125	22.125	-22.125	22.125

Structure Typical Section - □ ✕



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

Travelway number	Distance from left edge of travelway to superstructure definition reference line at start (A) (ft)	Distance from right edge of travelway to superstructure definition reference line at start (B) (ft)	Distance from left edge of travelway to superstructure definition reference line at end (A) (ft)	Distance from right edge of travelway to superstructure definition reference line at end (B) (ft)
> 1	-22.125	22.125	-22.125	22.125

LRFD fatigue

Lanes available to trucks:

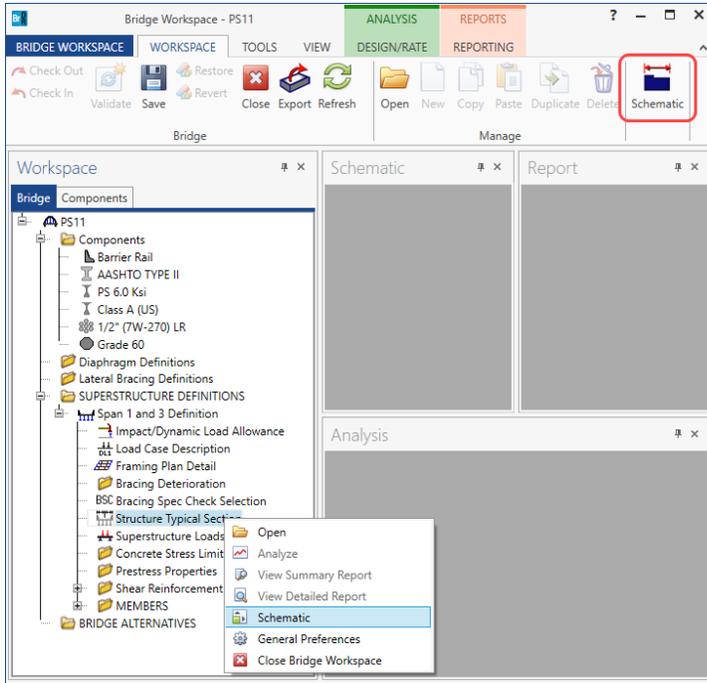
Override Truck fraction:

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

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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).



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Concrete Stress Limits

A Stress Limit defines the allowable concrete stresses for a given concrete material. Double click on the **Concrete Stress Limits** node in the **Bridge Workspace** tree to open the **Stress Limit Sets – Concrete** window. Enter the data shown above the **Compute** button and select the **PS 6.0 ksi** material from the drop-down menu of the **Concrete material**. Click the **Compute** button. Default values for the allowable stresses will be computed based on the **Concrete material** selected and the AASHTO Specifications. A default value for the **Final allowable slab compression** is not computed since the deck concrete is typically different from the concrete used in the beam.

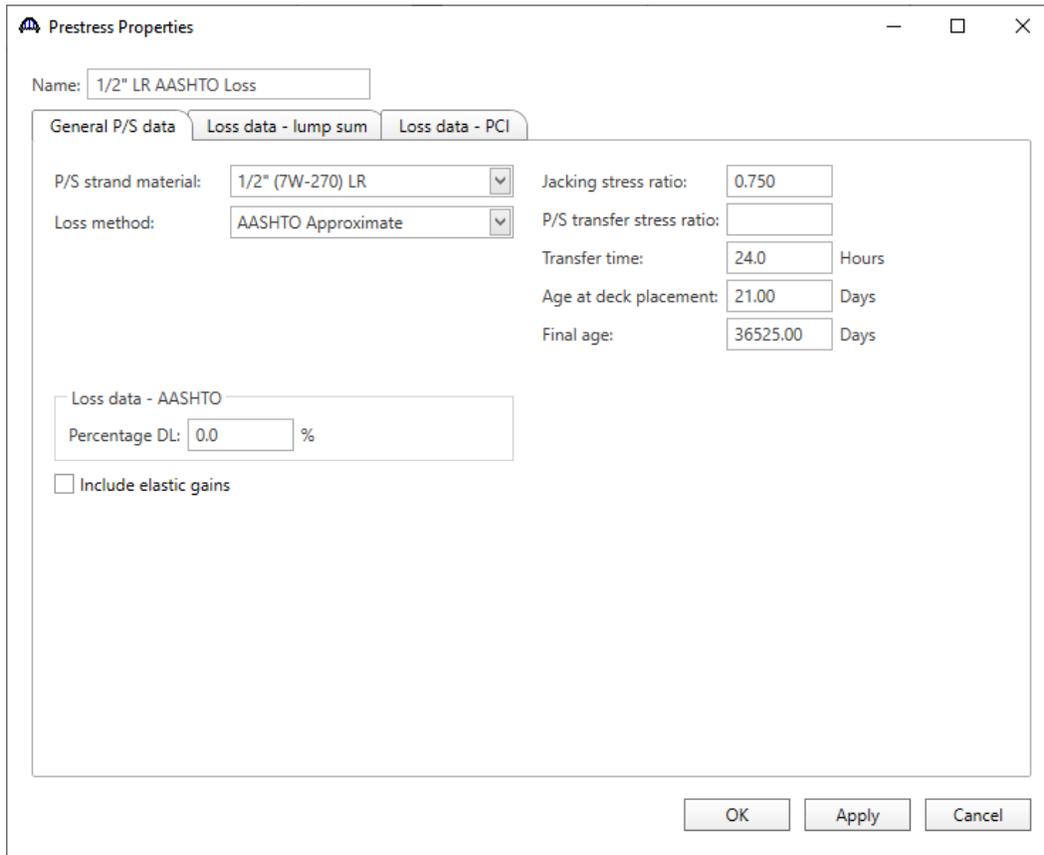
	LFD	LRFD
Initial allowable compression:	3 ksi	3.25 ksi
Initial allowable tension:	0.2 ksi	0.2 ksi
Final allowable compression:	3.6 ksi	3.6 ksi
Final allowable tension:	0.4654031 ksi	0.4654031 ksi
Final allowable DL compression:	2.4 ksi	2.7 ksi
Final allowable slab compression:		
Final allowable compression: (LL+1/2(Pe+DL))	2.4 ksi	2.4 ksi

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

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Prestress Properties

Double click on the **Prestress Properties** node in the **Bridge Workspace** tree to open the **Prestress Properties** window. Define the prestress properties as shown below. Since the **AASHTO Approximate** method is used to compute the losses, only the information on the **General P/S data** tab is required.



The screenshot shows the 'Prestress Properties' dialog box with the following settings:

- Name: 1/2" LR AASHTO Loss
- General P/S data tab is selected.
- P/S strand material: 1/2" (7W-270) LR
- Loss method: AASHTO Approximate
- Jacking stress ratio: 0.750
- P/S transfer stress ratio: (empty)
- Transfer time: 24.0 Hours
- Age at deck placement: 21.00 Days
- Final age: 36525.00 Days
- Loss data - AASHTO: Percentage DL: 0.0 %
- Include elastic gains:

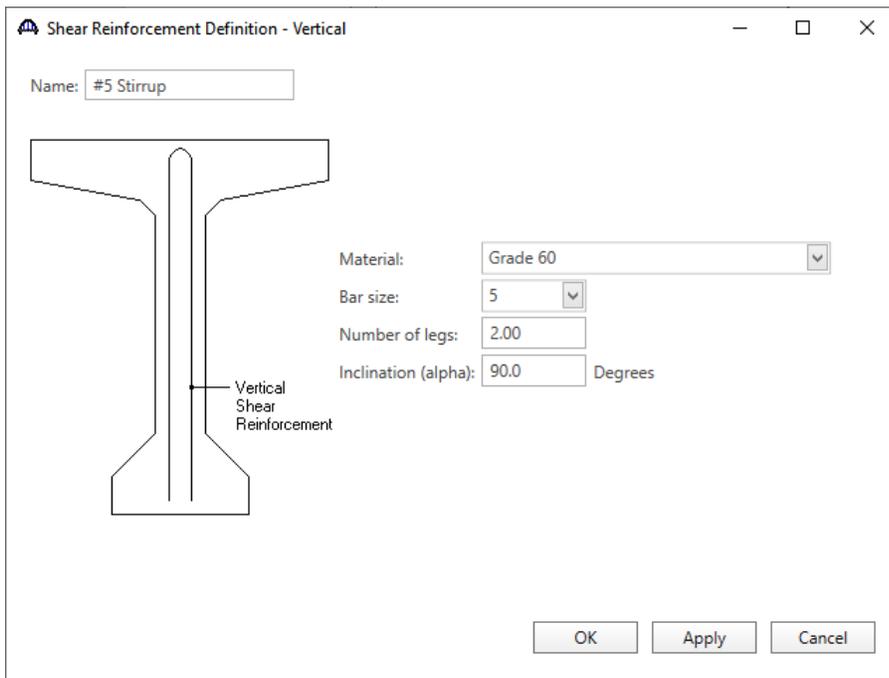
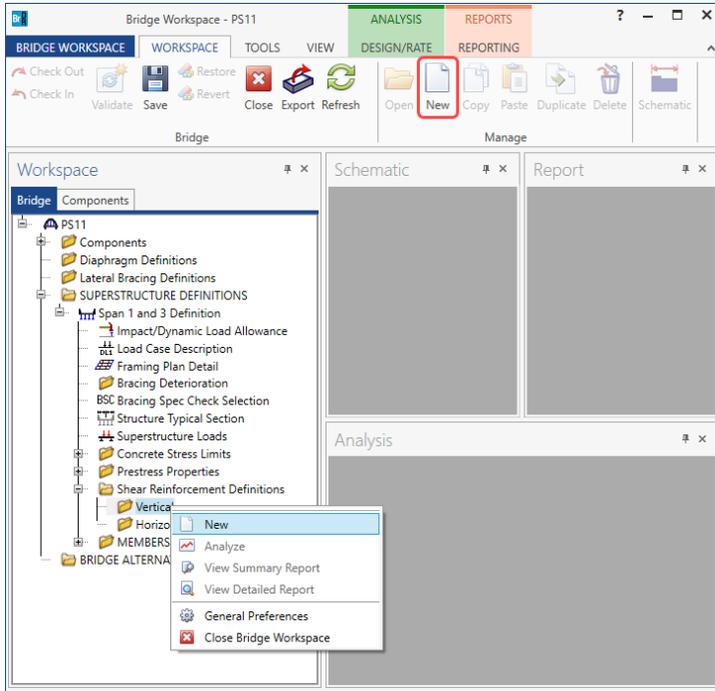
Buttons at the bottom: OK, Apply, Cancel

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

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Shear Reinforcement

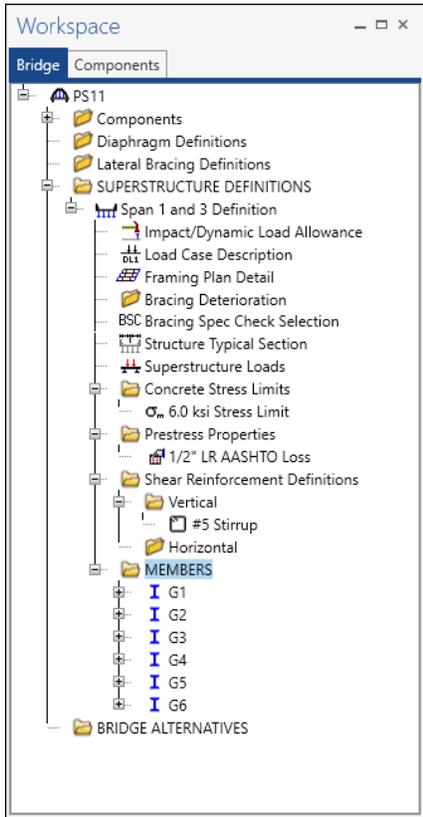
Define shear reinforcement to be used by the girders. Expand the **Shear Reinforcement Definitions** on the **Bridge Workspace** tree, select the **Vertical** node and click on **New** from the **Manage** group of the **WORKSPACE** ribbon (or double click on **Vertical**).



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

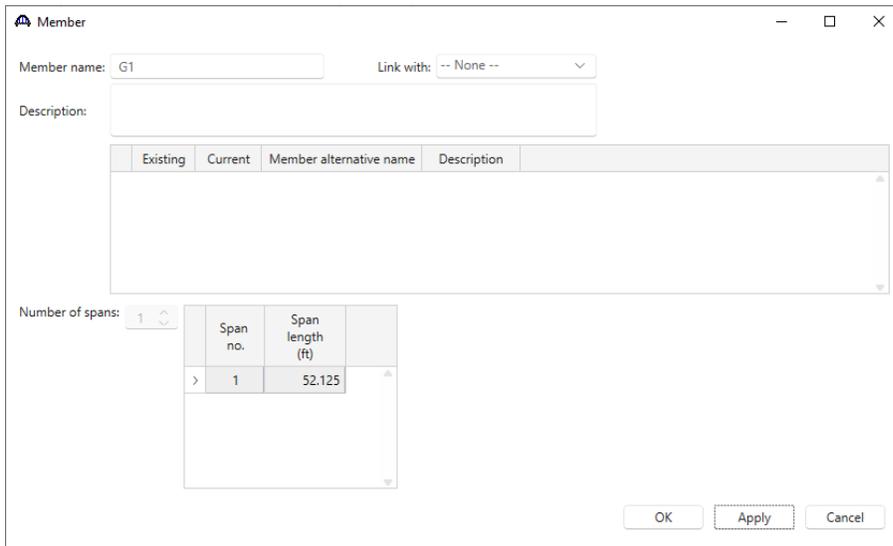
PS11 – Bridge Over Shoal Creek

A partially expanded **Bridge Workspace** is shown below.



Describing a member

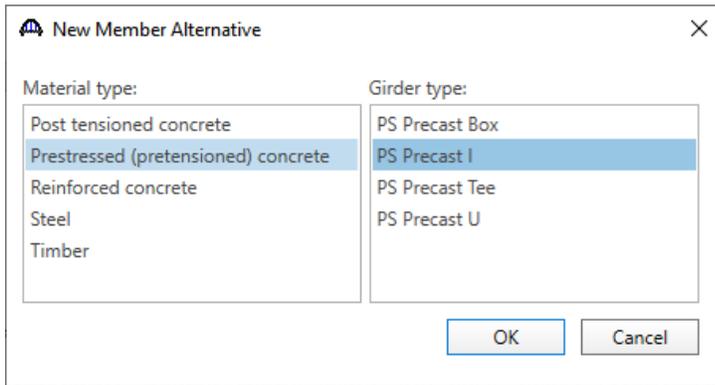
Double-click on the member **G1** in the **Bridge Workspace** tree to open the **Member** window. The **Member** window shows the data that was generated when the structure definition was created. No changes are required in this window. The first Member Alternative created will automatically be assigned as the **Existing** and **Current member alternative** for this Member.



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Defining a Member Alternative

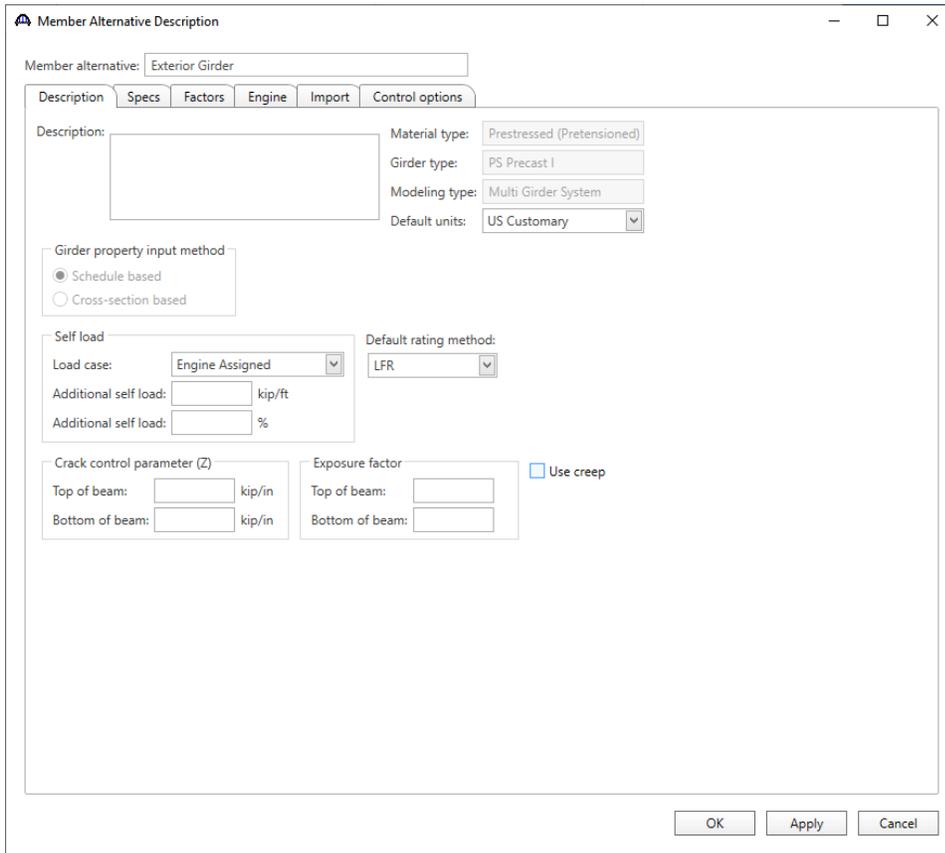
Double-click on **MEMBER ALTERNATIVES** in the **Bridge Workspace** tree for member **G1** to create a new member alternative. The **New Member Alternative** window shown below will open. Select **Prestressed (pretensioned) concrete** for the **Material type** and **PS Precast I** for the **Girder Type**.



The 'New Member Alternative' dialog box contains two lists. The 'Material type' list includes: Post tensioned concrete, **Prestressed (pretensioned) concrete**, Reinforced concrete, Steel, and Timber. The 'Girder type' list includes: PS Precast Box, **PS Precast I**, PS Precast Tee, and PS Precast U. At the bottom are 'OK' and 'Cancel' buttons.

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. The **Schedule based Girder property input method** is the only input method available for a prestressed concrete girder.



The 'Member Alternative Description' dialog box shows the following configuration: Member alternative: Exterior Girder. Description: [empty]. Material type: Prestressed (Pretensioned). Girder type: PS Precast I. Modeling type: Multi Girder System. Default units: US Customary. Girder property input method: Schedule based, Cross-section based. Self load: Load case: Engine Assigned. Additional self load: [] kip/ft, [] %. Default rating method: LFR. Crack control parameter (Z): Top of beam: [] kip/in, Bottom of beam: [] kip/in. Exposure factor: [] Top of beam: [], Bottom of beam: []. Use creep. Buttons: OK, Apply, Cancel.

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

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Beam Details – Span Detail

Next describe the beam by double clicking on the **Beam Details** node in the **Bridge Workspace** tree. Enter the data as shown below.

Span number	Beam shape	Girder material	Prestress properties	n	Beam projection	
					Left end (in)	Right end (in)
1	AASHTO TYPE II	PS 6.0 Ksi	1/2" LR AASHTO Loss		7.5000	7.5000

Beam Details – Stress limit ranges

Select the **Stress limit ranges** tab and enter the data as shown below. Note that stress limit ranges are defined over the entire length of the precast girder, including the projections of the girder past the centerline of bearing which were entered on the **Span detail** tab.

Span number	Name	Start distance (ft)	Length (ft)	End distance (ft)
1	6.0 Ksi Stress Limit	0	53.375	53.375

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Beam Details – Slab interface

Select the **Slab interface** tab and select **Intentionally Roughened** as the **Interface type**.

The screenshot shows the 'Beam Details' dialog box with the 'Slab interface' tab selected. The 'Interface type' is set to 'Intentionally Roughened'. The 'Default interface width to beam widths' checkbox is checked. The 'Interface width' is set to an empty field followed by 'in'. The 'Cohesion factor' is set to '0.280' with 'ksi' units. The 'Friction factor' is set to '1.000'. 'K1' is set to '0.300' and 'K2' is set to '1.800' with 'ksi' units. At the bottom right, there are three buttons: 'OK', 'Apply', and 'Cancel'.

Parameter	Value	Units
Interface type	Intentionally Roughened	
Default interface width to beam widths	<input checked="" type="checkbox"/>	
Interface width		in
Cohesion factor	0.280	ksi
Friction factor	1.000	
K1	0.300	
K2	1.800	ksi

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

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Strand Layout

Expand the **Strand Layout** node in the **Bridge Workspace** tree and open the **Span 1** window. Use the **Zoom** buttons on the right side of this window to shrink/expand the schematic of the beam shape so that the entire beam is visible.

Select the **Description type** as **Strands in rows** and the **Strand configuration type** as **Harped**. Define the following strand layout at midspan by selecting the strand positions in the right hand schematic.

Strand Layout - Span 1

Description type
 P and CGS only Strands in rows

Strand configuration type
 Straight/Debonded Harped Harped and straight debonded

Symmetry

Mid span

Left end
 Right end

Harp point locations		
Harp point	Distance (ft)	Radius (in)
Left	0.00	0.0000
Right	0.00	0.0000

Number of strands = 24
Number of harped strands = 0
CG of strands (measured from bottom of section) = 9.08 in

Legend:

- X No strand at this position at the current section location.
- X No strand at this position at the current location but a strand is harped to this position.
- A strand occupies this position at the current section location.
- The strand is debonded from the end of the beam to the current section location.
- The strand is debonded from the mid-span to the current section location.
- The strand is debonded at other section location. Hover over the strand for more information.
- The harped position of a harped strand.
- The mid-span position of a harped strand.
- The mid-span position of one strand and the harped position of another strand.
- Mild steel.

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Now select the **Left end** radio button and enter the following harped point locations at the left end of the precast girder. The harped strands can be defined at the left end of the span by selecting harped strand locations in the right hand schematic. Define the following harped strands in the position as shown below.

Strand Layout - Span 1
160%

Description type

P and CGS only Strands in rows

Strand configuration type

Straight/Debonded Harped Harped and straight debonded

Symmetry

Mid span

Left end Right end

Harped point locations		
Harped point	Distance (ft)	Radius (in)
> Left	16.6875	0
Right	16.6875	0

Notes:
Strand positions generated by the REVISED method.
Please refer to Help for a description of this method.

Number of strands = 24
Number of harped strands = 4
CG of strands (measured from bottom of section) = 11.42 in

Legend:

- x No strand at this position at the current section location.
- x No strand at this position at the current location but a strand is harped to this position.
- o A strand occupies this position at the current section location.
- o The strand is debonded from the end of the beam to the current section location.
- o The strand is debonded from the mid-span to the current section location.
- o The strand is debonded at other section location. Hover over the strand for more information.
- o The harped position of a harped strand.
- o The mid-span position of a harped strand.
- o The mid-span position of one strand and the harped position of another strand.
- o Mild steel.

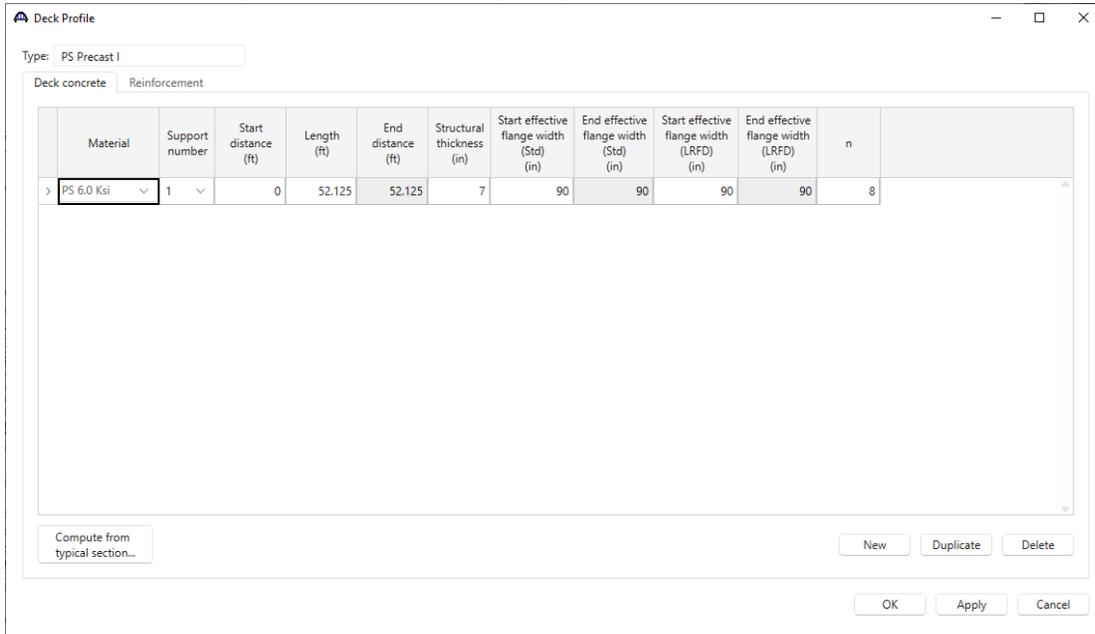
OK
Apply
Cancel

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

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Deck Profile

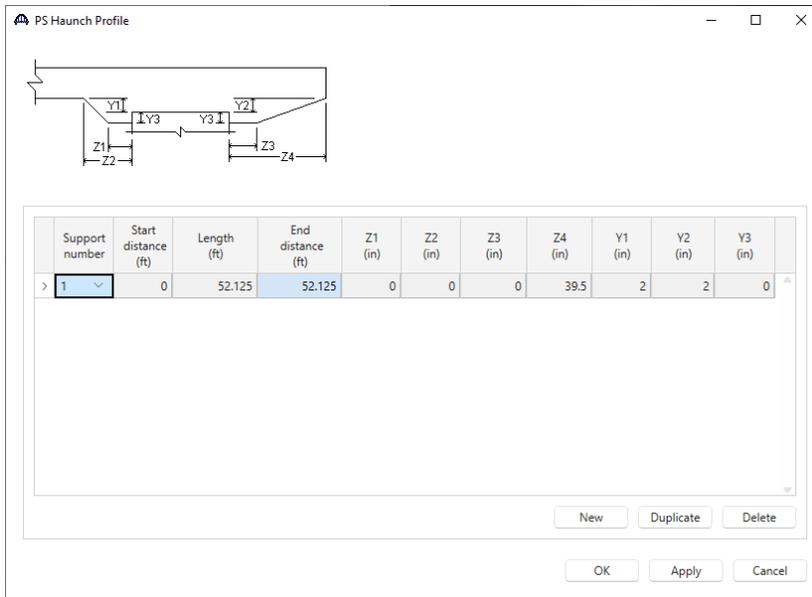
Next open the **Deck Profile** window by double-clicking the **Deck Profile** node in the **Bridge Workspace** tree and enter the data describing the structural properties of the deck. The window is shown below.



No deck reinforcement is described. Close the window by clicking **OK**.

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.

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Shear Reinforcement Ranges

Double-click on the **Shear Reinforcement Ranges** node in the **Bridge Workspace** tree to open the **PS Shear Reinforcement Ranges** window. The PS shear reinforcement ranges are entered as described below. The vertical shear reinforcement is defined as extending into the deck on the **Vertical** tab of this window. This indicates composite action between the beam and the deck. Data does not have to be entered on the **Horizontal** tab to indicate composite action since that has been defined by extending the vertical bars into the deck. Create a new row after completing the current row. The **Start distance** of the new row will be populated with the **End distance** of the current row.

PS Shear Reinforcement Ranges

Vertical Horizontal

Span: 1

Name	Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)
> #5 Stirrup	<input checked="" type="checkbox"/>	0	1	1.5	0.125	0.125
#5 Stirrup	<input checked="" type="checkbox"/>	0.125	13	3	3.25	3.375
#5 Stirrup	<input checked="" type="checkbox"/>	3.375	5	6	2.5	5.875
#5 Stirrup	<input checked="" type="checkbox"/>	5.875	6	12	6	11.875
#5 Stirrup	<input checked="" type="checkbox"/>	11.875	9	18	13.5	25.375
#5 Stirrup	<input checked="" type="checkbox"/>	25.375	2	15.75	2.625	28
#5 Stirrup	<input checked="" type="checkbox"/>	28	9	18	13.5	41.5
#5 Stirrup	<input checked="" type="checkbox"/>	41.5	6	12	6	47.5
#5 Stirrup	<input checked="" type="checkbox"/>	47.5	5	6	2.5	50
#5 Stirrup	<input checked="" type="checkbox"/>	50	13	3	3.25	53.25

Stirrup wizard... Stirrup design tool... View calcs New Duplicate Delete

OK Apply Cancel

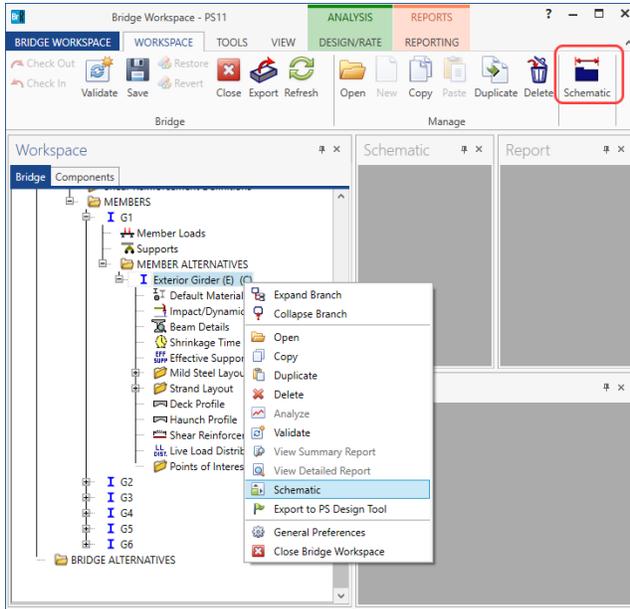
Click **OK** to apply the data and close the window.

The description of the exterior girder for this superstructure definition is completed.

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Schematic – Exterior Girder (E) (C) (member alternative)

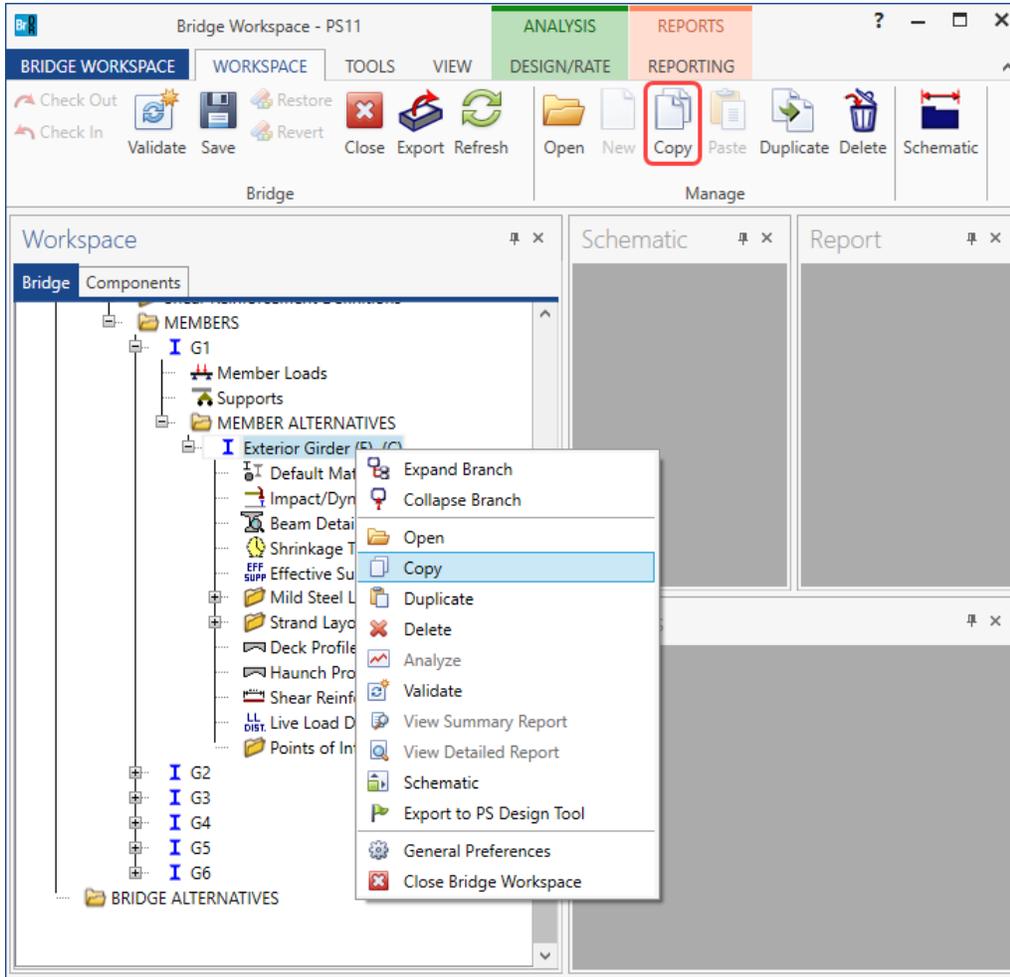
While **Exterior Girder (E) (C)** member alternative is selected in the **Bridge Workspace** tree, open the schematic for the member alternative by selecting the **Schematic** button on the **WORKSPACE** ribbon (or right click on **Exterior Girder (E) (C)** in the **Bridge Workspace** and select **Schematic** from the menu).



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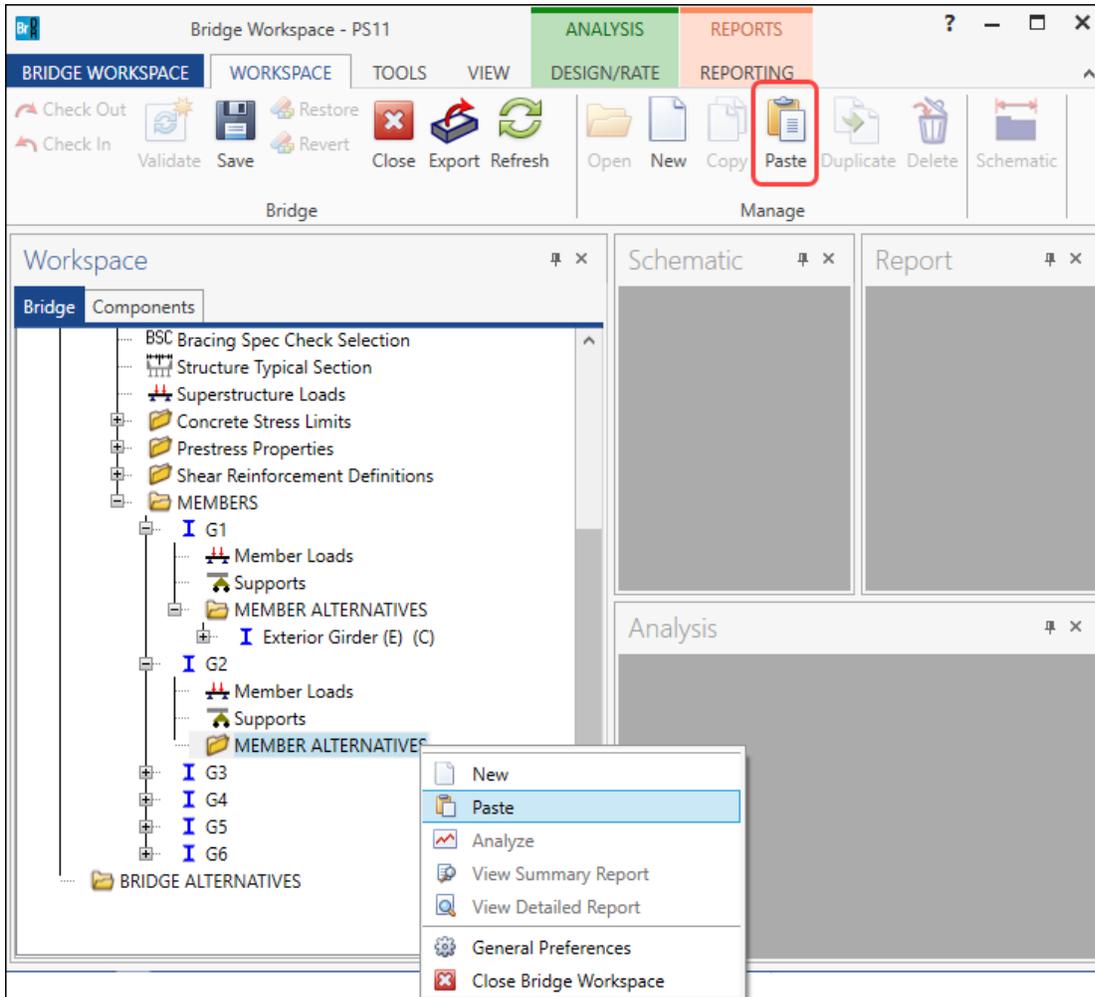
Copy of exterior girder to an interior girder (G2) and check the Deck Profile and Haunch Profile

Create a copy of the **Exterior Girder** member alternative. To make a copy, click on the **Exterior Girder (E) (C)** member alternative in the **Bridge Workspace** tree and click the **Copy** button from the **Manage** group of the **WORKSPACE** ribbon (or right-click on **Exterior Girder** and select **Copy** from the menu).



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Now click on the **MEMBER ALTERNATIVES** node under the member **G2** in the **Bridge Workspace** tree and click the **Paste** button from the **Manage** group of the **WORKSPACE** ribbon (or right-click on **MEMBER ALTERNATIVES** and select **Paste** from the drop-down menu).



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Double click on the copied member alternative and rename it as shown below.

Member Alternative Description

Member alternative: Interior Girder

Description Specs Factors Engine Import Control options

Description:

Material type: Prestressed (Pretensioned)

Girder type: PS Precast I

Modeling type: Multi Girder System

Default units: US Customary

Girder property input method

Schedule based

Cross-section based

Self load

Load case: Engine Assigned

Additional self load: kip/ft

Additional self load: %

Default rating method: LFR

Crack control parameter (Z)

Top of beam: kip/in

Bottom of beam: kip/in

Exposure factor

Top of beam:

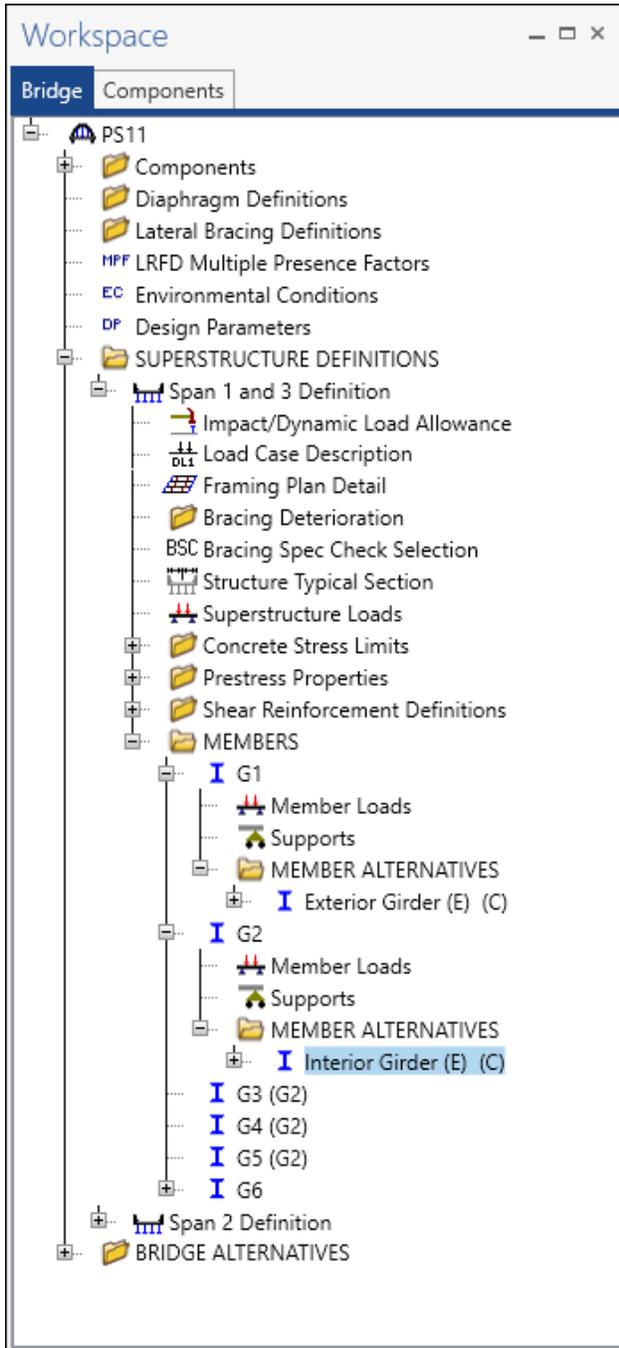
Bottom of beam:

Use creep

OK Apply Cancel

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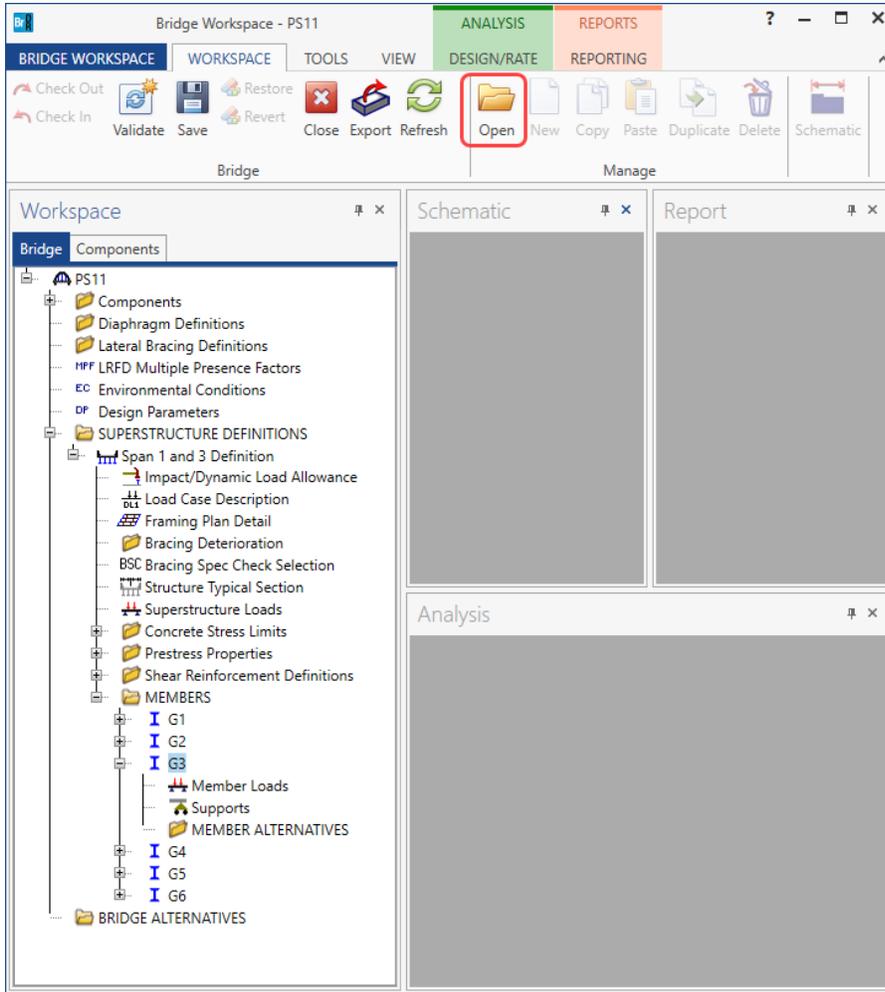
The **Bridge Workspace** tree will be updated with the new copy as shown below.



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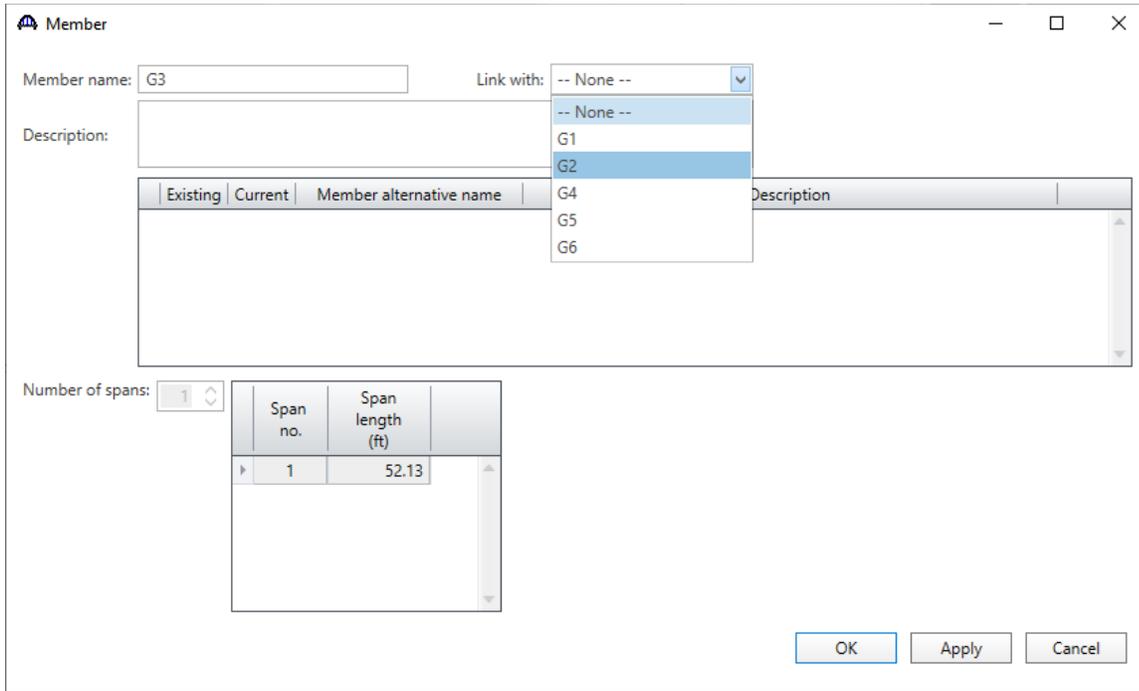
[Link all other interior girders \(G3, G4 and G5\) to G2](#)

To link the interior girder **G3** to **G2**, double click on the **G3** node in the **Bridge Workspace** tree (or select **G3** and click the **Open** button from the **Manage** group of the **WORKSPACE** ribbon). This opens the **Member** window for this girder as shown below.

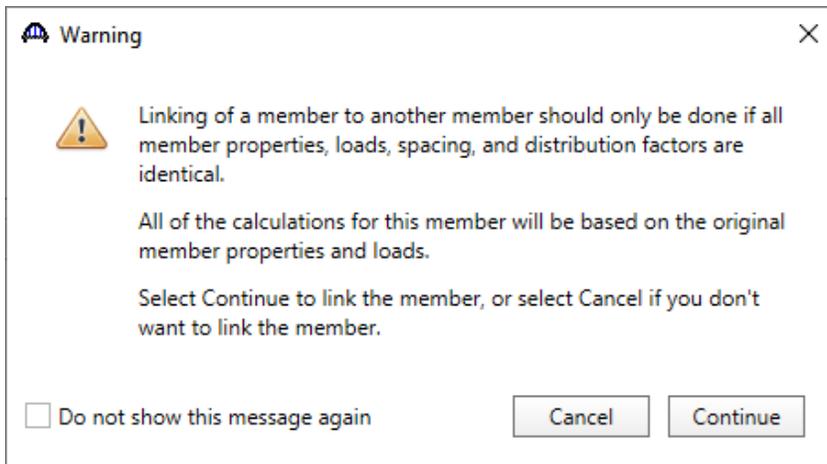


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From the menu options under **Link with**, select **G2** as shown below.



The following warning message shows up. Review the message and click **Continue** to link the member.



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The **Member** window for **G3** will now be updated with the details from girder member **G2** indicating that the member has been linked. (See below)

Member

Member name: G3 Link with: G2

Description:

Existing	Current	Member alternative name	Description
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Interior Girder	

Number of spans: 1

Span no.	Span length (ft)
1	52.13

OK Apply Cancel

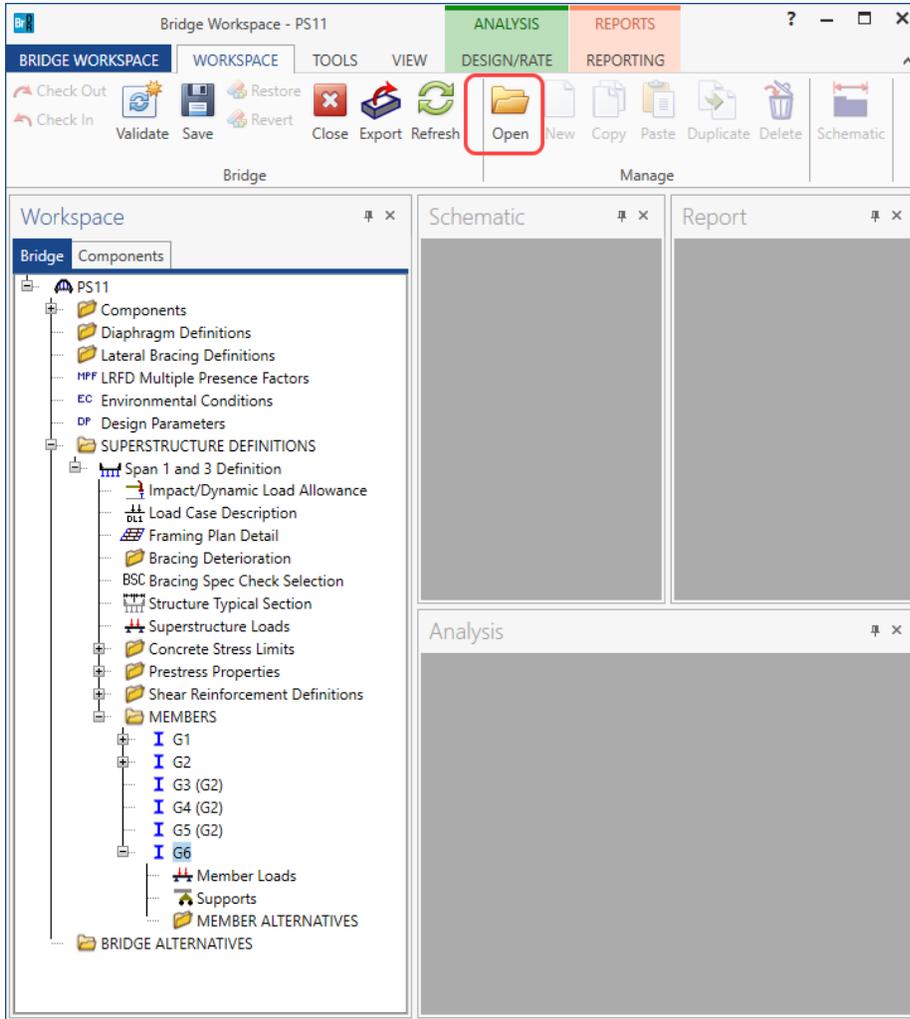
Click **OK** to apply the data and close the window.

Repeat this process for the remaining interior girders (**G4** and **G5**)

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[Link other exterior girders \(G6\) to G1](#)

Linking exterior girder follows the same procedure as shown previously to link the interior girder. Open the **Member** window for girder **G6** by double clicking on the **G6** node in the **Bridge Workspace** tree (or select **G6** and click the **Open** button from the **Manage** group of the **WORKSPACE** ribbon).



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In the Member window, under Link with, select **G1**. The options will not include the other interior girder (**G3**, **G4** and **G5**) since they are already linked with girder **G2**.

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

Span no.	Span length (ft)
1	52.13

The following warning message shows up. Review the message and click **Continue** to link the member.

Warning

Linking of a member to another member should only be done if all member properties, loads, spacing, and distribution factors are identical.

All of the calculations for this member will be based on the original member properties and loads.

Select Continue to link the member, or select Cancel if you don't want to link the member.

Do not show this message again

Cancel Continue

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The **Member** window for **G6** will now be updated with the details from girder member **G1** indicating that the member has been linked. (See below)

The screenshot shows a software window titled "Member" with the following fields and controls:

- Member name:
- Link with:
- Description:
- A table with columns: Existing, Current, Member alternative name, Description.
- Number of spans:
- A sub-table with columns: Span no., Span length (ft).
- Buttons: OK, Apply, Cancel.

Existing	Current	Member alternative name	Description
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Exterior Girder	

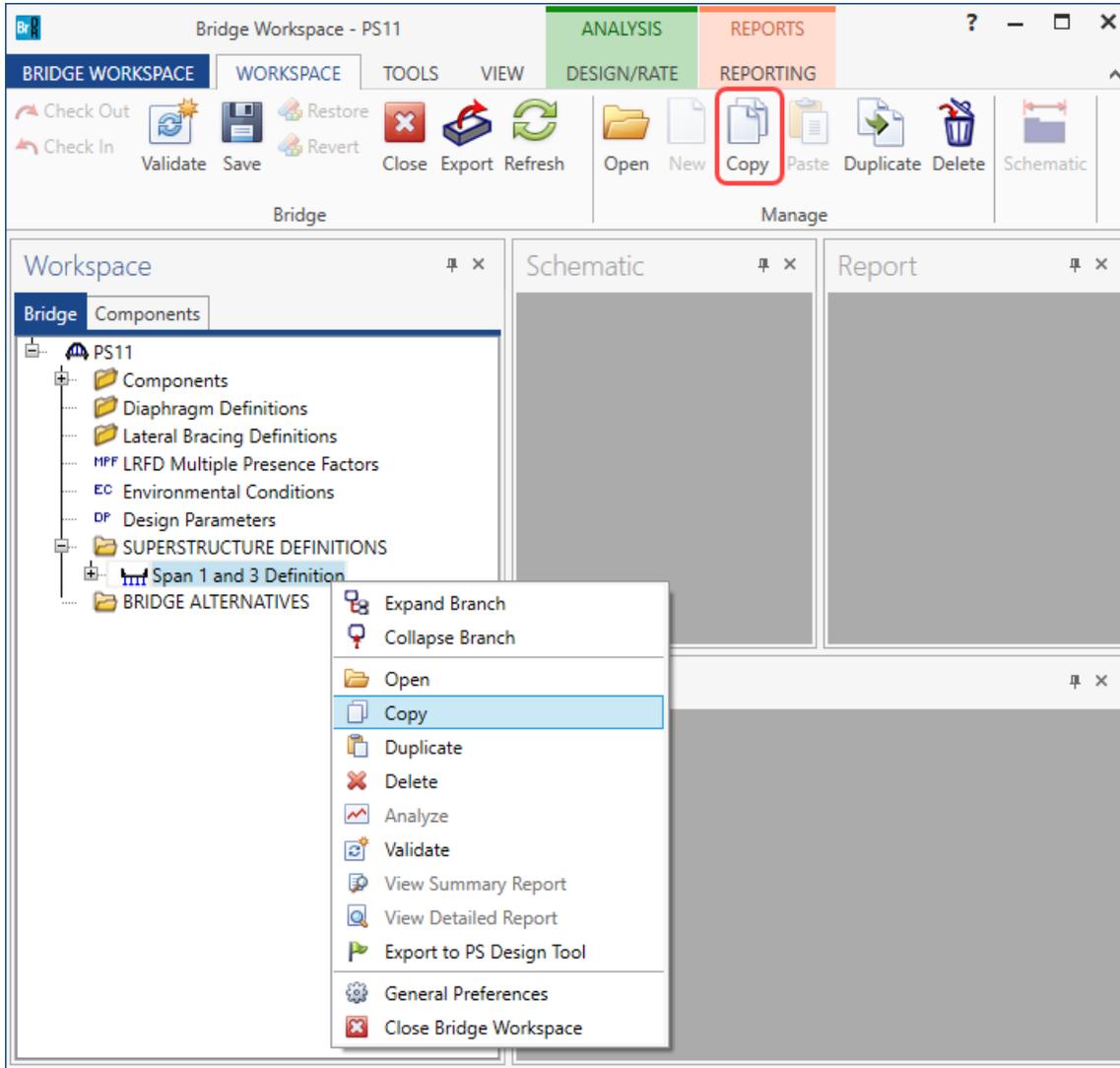
Span no.	Span length (ft)
1	52.13

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

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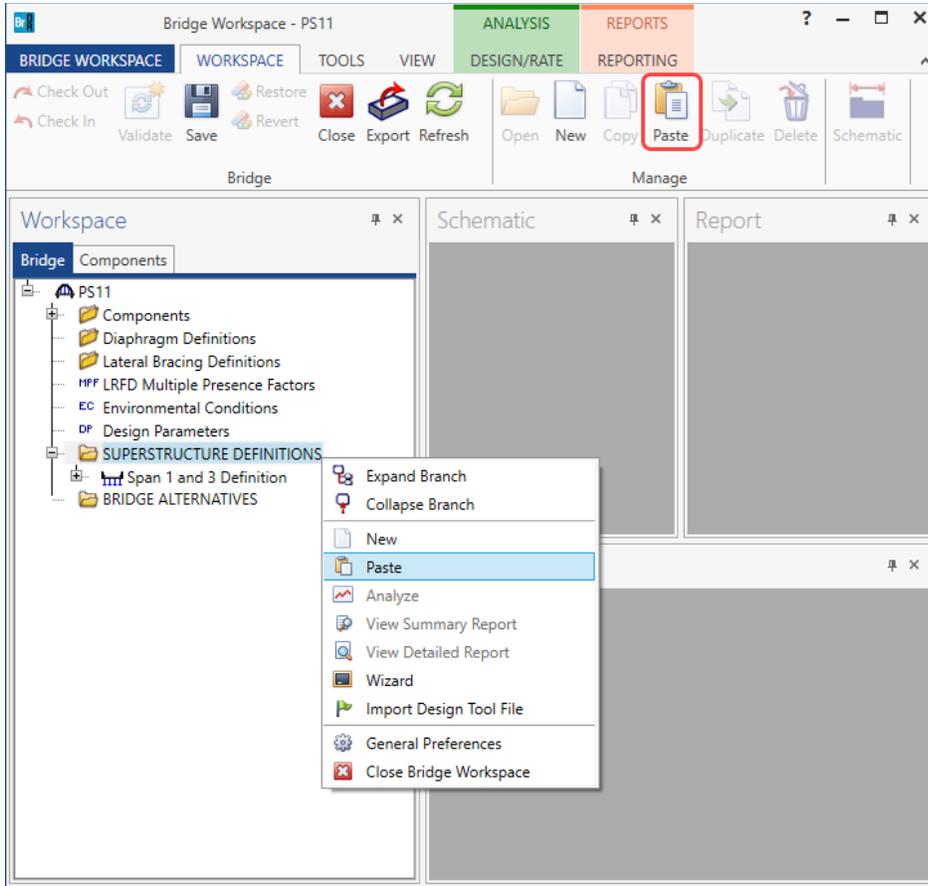
Create another BrDR Superstructure Definition (Span 2 Definition) for Span No. 2 by copying Span 1 and 3 Definition

To copy a superstructure definition, select the **Span 1 and 3 Definition** node in the **Bridge Workspace** tree and click the **Copy** button from the **Manage** group of the **WORKSPACE** ribbon (or right-click on **Span 1 and 3 Definition** and select **Copy** from the menu) as shown below.

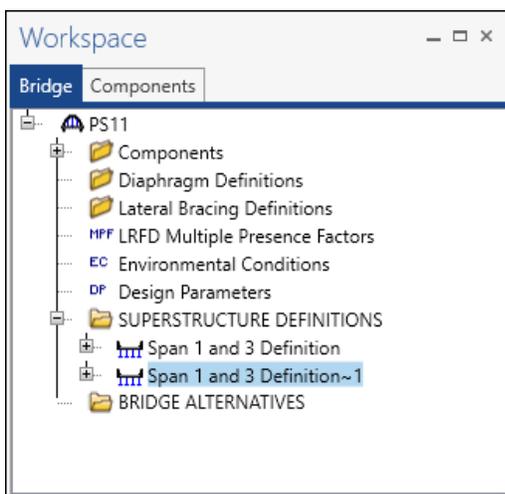


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Now click on the **SUPERSTRUCTURE DEFINITIONS** node in the **Bridge Workspace** tree and click the **Paste** button from the **Manage** group of the **WORKSPACE** ribbon (or right-click on **SUPERSTRUCTURE DEFINITIONS** and select **Paste** from the menu) as shown below.



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



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Double click on the newly created **Span 1 and 3 Definition ~ 1** superstructure definition to open the **Girder System Superstructure Definition** window. Rename this superstructure definition to **Span 2 Definition** as shown below.

Girder System Superstructure Definition

Definition Analysis Specs Engine

Name: **Span 2 Definition**

Description:

Default units: US Customary

Number of spans: 1

Number of girders: 6

Enter span lengths along the reference line:

Span	Length (ft)
1	52.13

Horizontal curvature along reference line

Horizontal curvature

Superstructure alignment

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

Distance from PC to first support line: _____ ft

Start tangent length: _____ ft

Radius: _____ ft

Direction: Left

End tangent length: _____ ft

Distance from last support line to PT: _____ ft

Design speed: _____ mph

Superelevation: _____ %

Modeling

- Multi-girder system
- MCB
- With frame structure simplified definition

Deck type: Concrete Deck

For PS/PT only

Average humidity: _____ %

Member alt. types

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

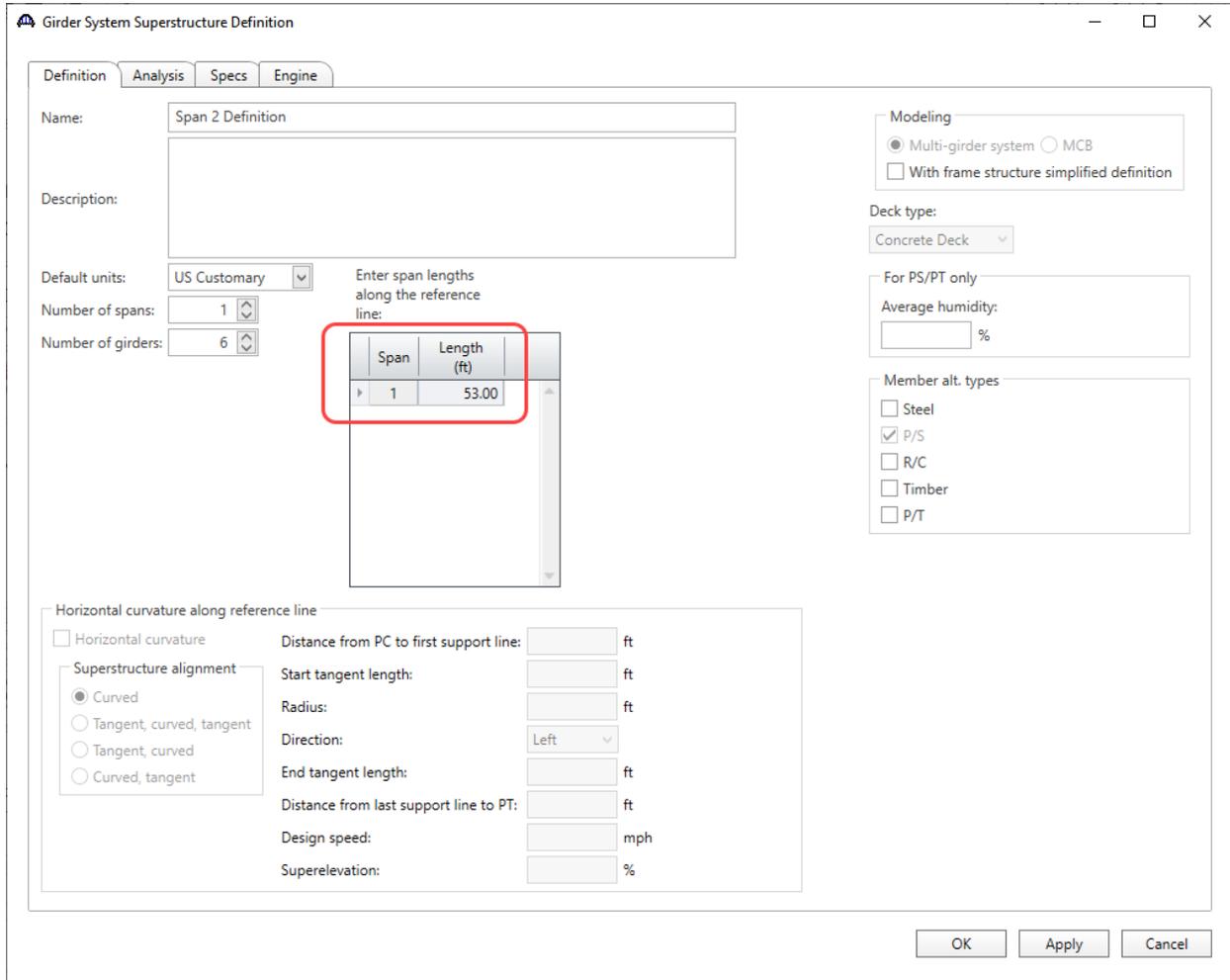
OK Apply Cancel

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

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Modify the span length in Superstructure Definition

Double click on the **Span 2 Definition** node in the **Bridge Workspace** tree to open the **Girder System Superstructure Definition** window. Change the span length of this superstructure as shown below.

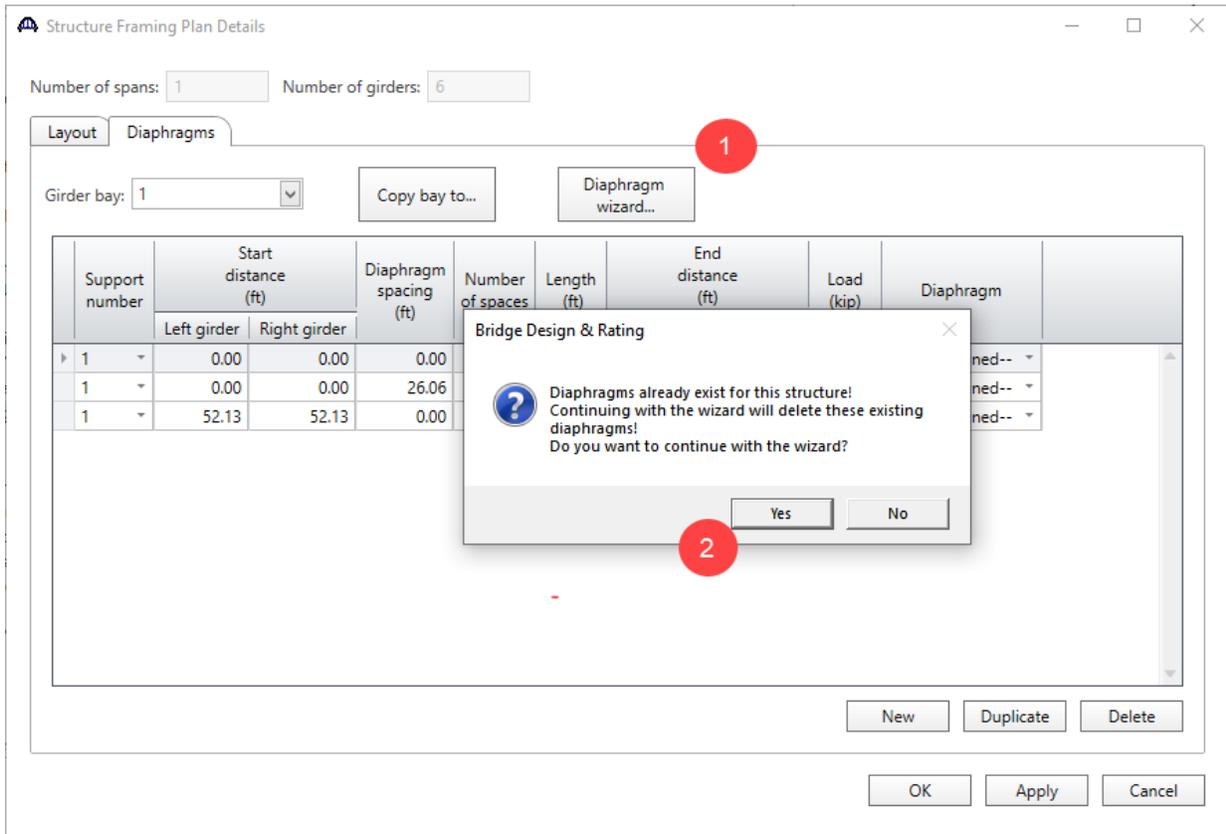


Click **OK** to apply the data and close the window.

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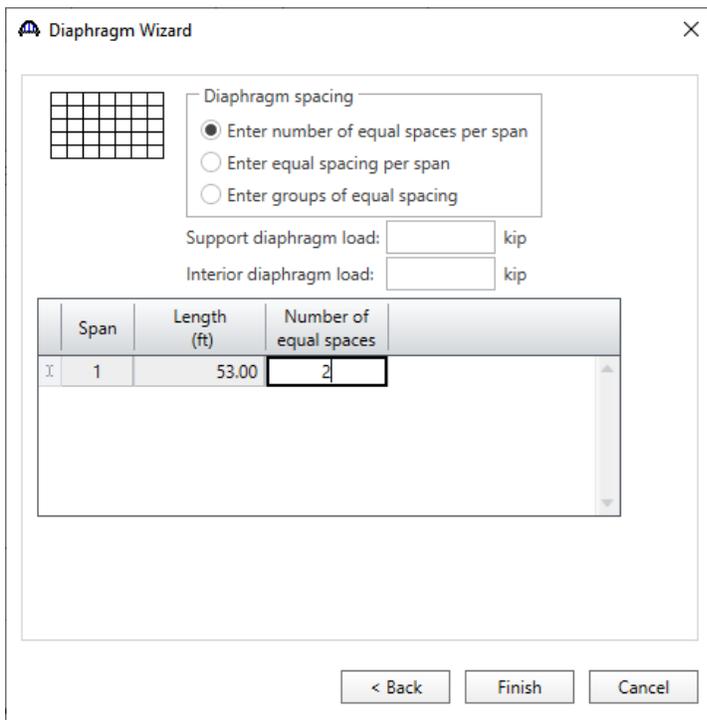
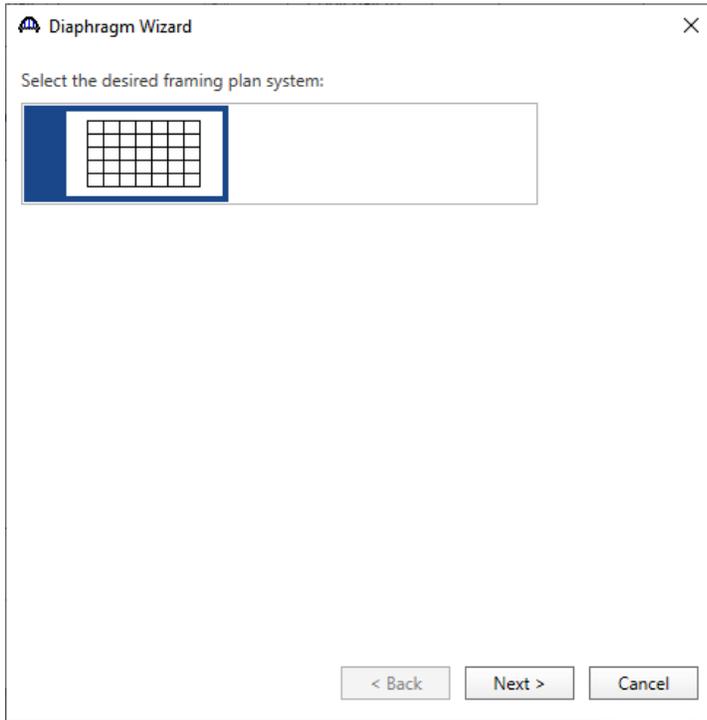
Repopulate the diaphragm spacing using the Diaphragm Wizard

Double-click on **Framing Plan Detail** in the **Bridge Workspace** tree to describe the framing plan in the **Structure Framing Plan Details** window. Switch to the **Diaphragms** tab to enter diaphragm spacing. Click the **Diaphragm wizard...** button to add diaphragms for the entire structure. A window appears warning the user that continuing with the wizard will delete the existing diaphragms. Click **Yes** to continue as shown below.



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Select the desired framing plan system and click the **Next** button. Enter the following data on the window shown below.



Click the **Finish** button to add the diaphragms. The **Diaphragm Wizard** will create diaphragms for all the girder bays in the structure.

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The diaphragms created for **Girder bay 1** are shown below.

Structure Framing Plan Details

Number of spans: 1 Number of girders: 6

Layout Diaphragms

Girder bay: 1 Copy bay to... Diaphragm wizard...

Support number	Start distance (ft)		Diaphragm spacing (ft)	Number of spaces	Length (ft)	End distance (ft)		Load (kip)	Diaphragm
	Left girder	Right girder				Left girder	Right girder		
1	0.00	0.00	0.00	1	0.00	0.00	0.00		--Not Assigned--
1	0.00	0.00	26.50	1	26.50	26.50	26.50		--Not Assigned--
1	53.00	53.00	0.00	1	0.00	53.00	53.00		--Not Assigned--

New Duplicate Delete

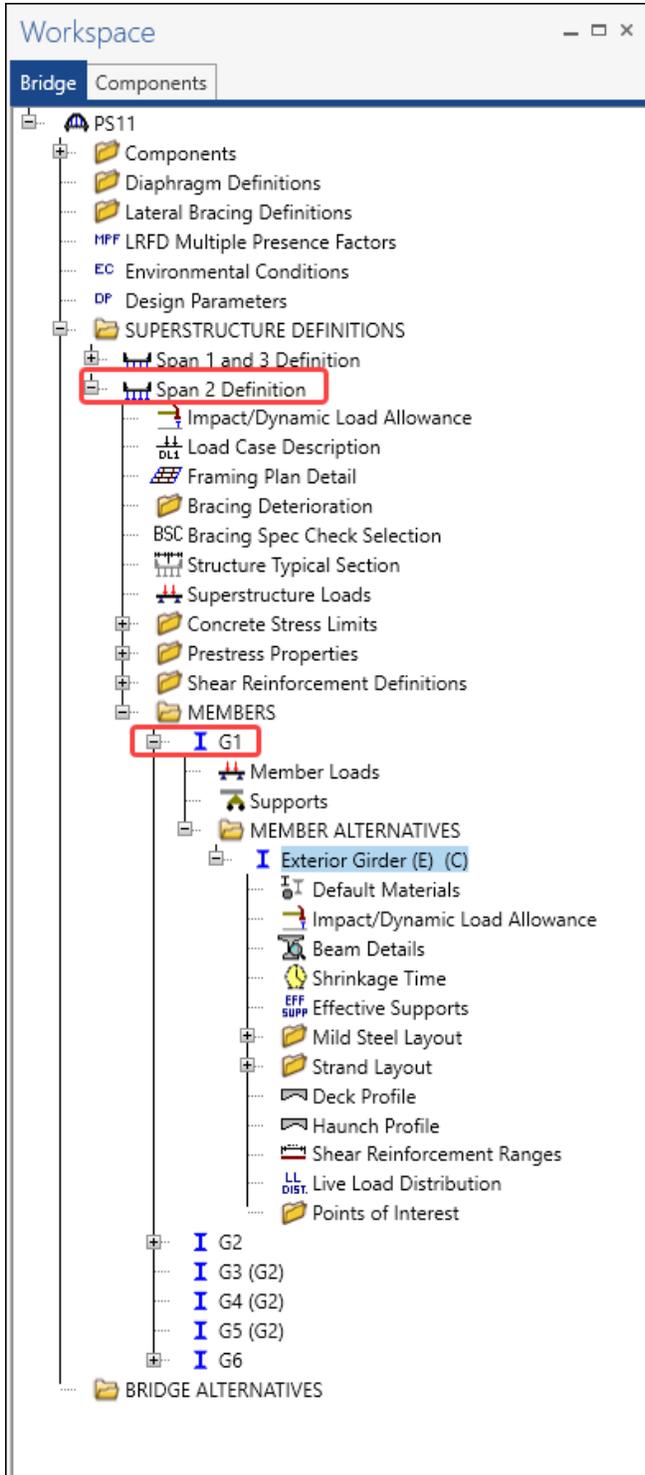
OK Apply Cancel

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

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Modify the length of the range in Beam Details, Deck Profile and Haunch Profile.

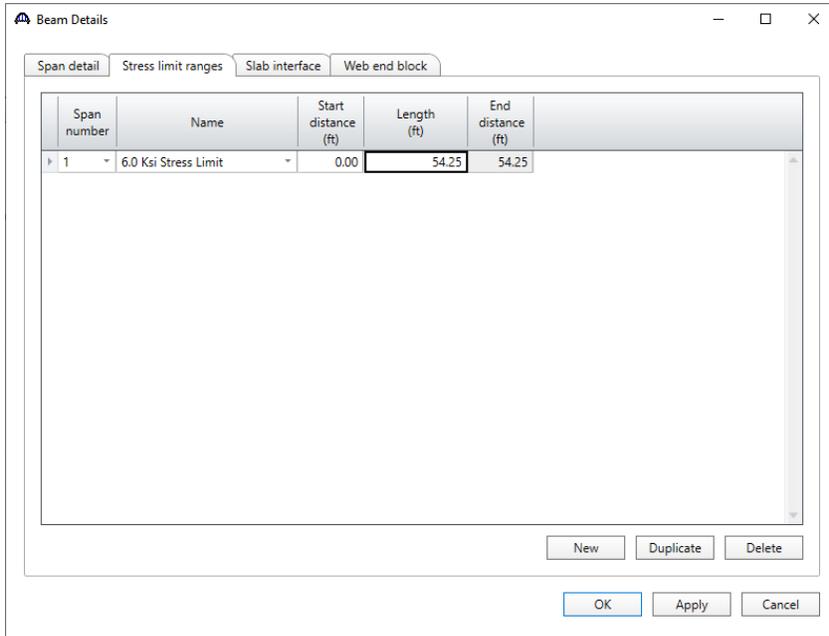
Expand **MEMBERS**, **G1**, **Exterior Girder (E)(C)** nodes in the **Bridge Workspace** tree to modify data of the exterior girder of the **Span 2 Definition** superstructure as shown below.



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Beam Details

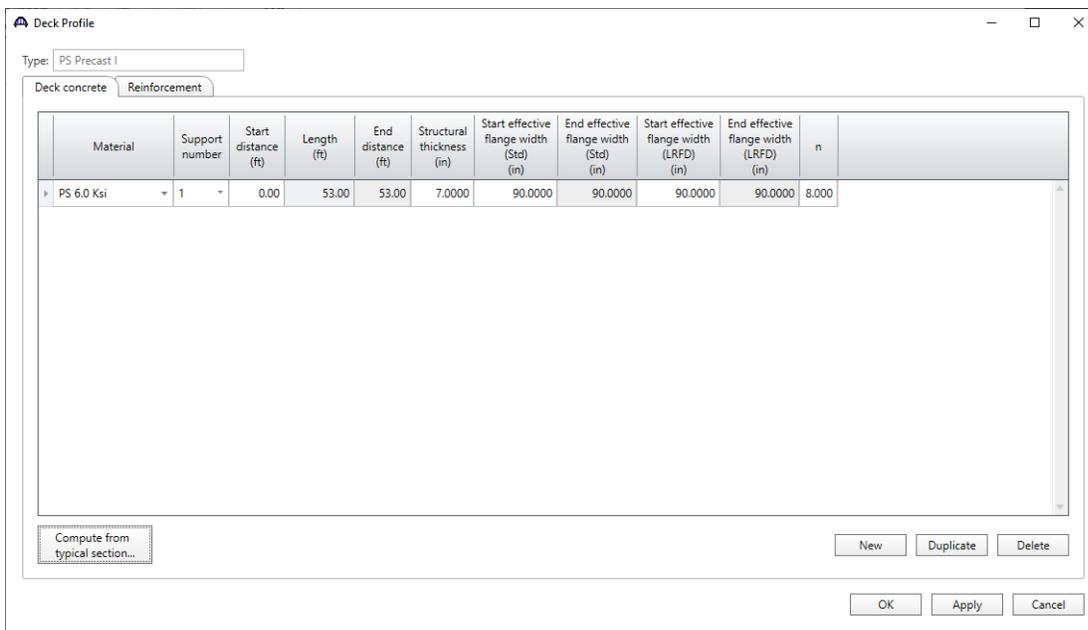
Double click on the **Beam Details** node in the **Bridge Workspace** tree to open the **Beam Details** window. Navigate to the **Stress limit ranges** tab and modify the **Length** as shown below.



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

Deck Profile

Double click on the **Deck Profile** node in the **Bridge Workspace** tree to open the **Deck Profile** window. Modify the **Length** as shown below.

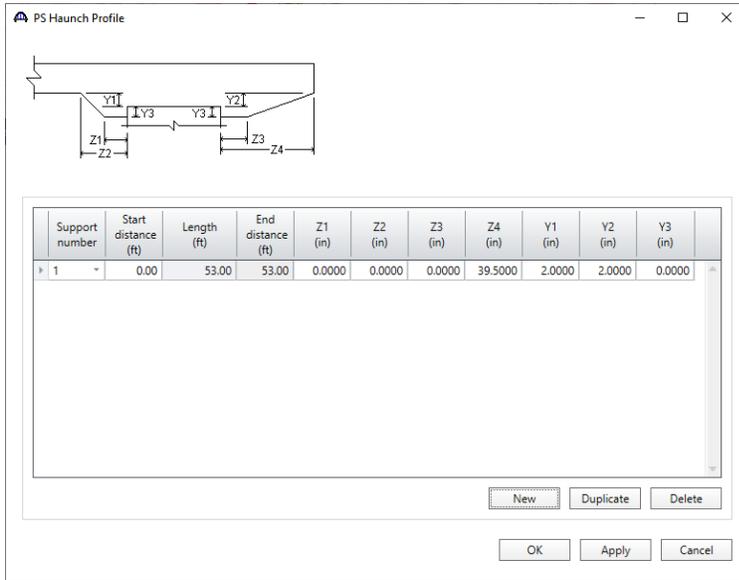


Click **OK** to apply the data and close the window.

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Haunch Profile

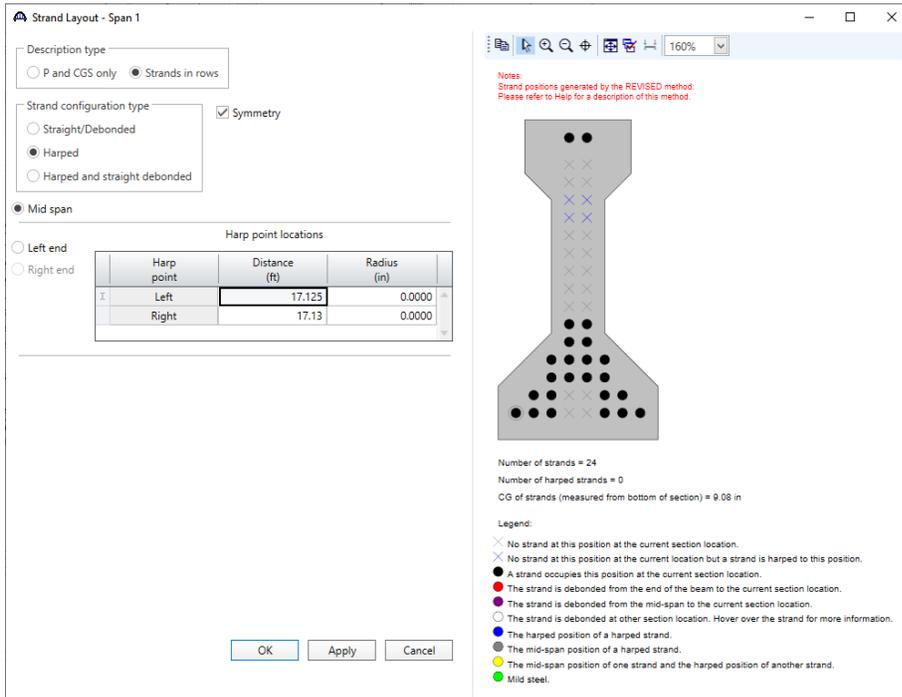
Double click on the **Haunch Profile** node in the **Bridge Workspace** tree to open the **PS Haunch Profile** window. Modify the **Length** as shown below.



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

Modify the harp point distance in Strand Layout

Expand the **Strand Layout** node in the **Bridge Workspace** tree and double click on **Span 1** to open the **Strand Layout – Span 1** window. Modify the **Harp point locations** as shown below.



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

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Re-enter the Shear Reinforcement Ranges

Double click on the **Shear Reinforcement Ranges** window in the **Bridge Workspace** tree to open the **PS Shear Reinforcement Ranges** window. Re-enter the shear reinforcement ranges as shown below.

PS Shear Reinforcement Ranges

Vertical | Horizontal

Span: 1

Name	Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)
> #5 Stirrup	<input checked="" type="checkbox"/>	0	1	1.5	0.125	0.125
#5 Stirrup	<input checked="" type="checkbox"/>	0.125	13	3	3.25	3.375
#5 Stirrup	<input checked="" type="checkbox"/>	3.375	5	6	2.5	5.875
#5 Stirrup	<input checked="" type="checkbox"/>	5.875	5	12	5	10.875
#5 Stirrup	<input checked="" type="checkbox"/>	10.875	10	18	15	25.875
#5 Stirrup	<input checked="" type="checkbox"/>	25.875	2	15	2.5	28.375
#5 Stirrup	<input checked="" type="checkbox"/>	28.375	10	18	15	43.375
#5 Stirrup	<input checked="" type="checkbox"/>	43.375	5	12	5	48.375
#5 Stirrup	<input checked="" type="checkbox"/>	48.375	5	6	2.5	50.875
#5 Stirrup	<input checked="" type="checkbox"/>	50.875	13	3	3.25	54.125

Stirrup wizard... | Stirrup design tool... | View calcs | New | Duplicate | Delete | OK | Apply | Cancel

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

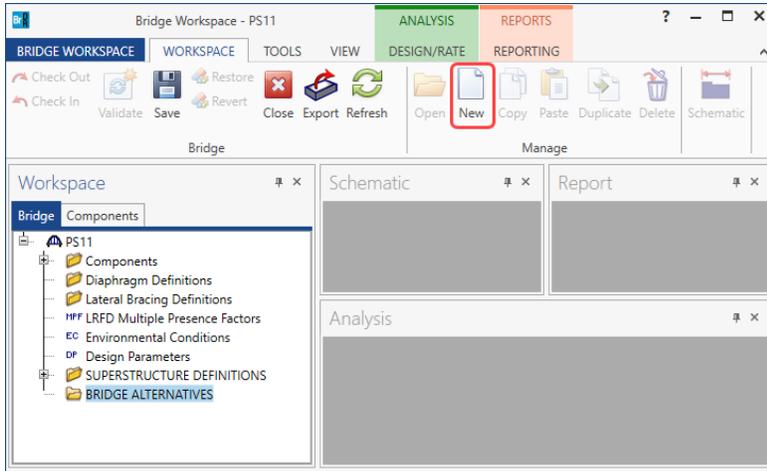
Make sure to modify these for the interior girder (G2) of the **Span 2 Definition** superstructure.

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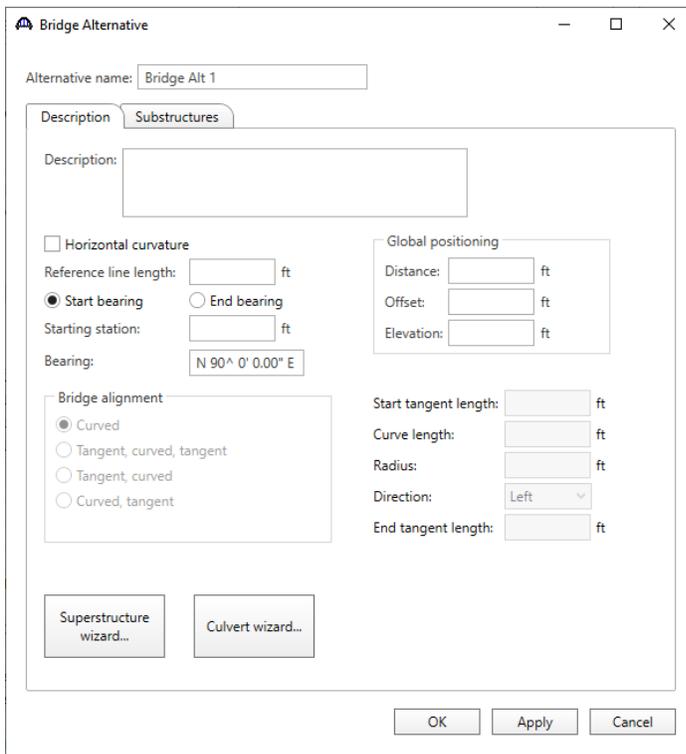
Create one Bridge Alternative and three superstructures.

The first superstructure is for Span No. 1, the second superstructure is for Span No. 2 and the third superstructure is for Span No. 3

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).



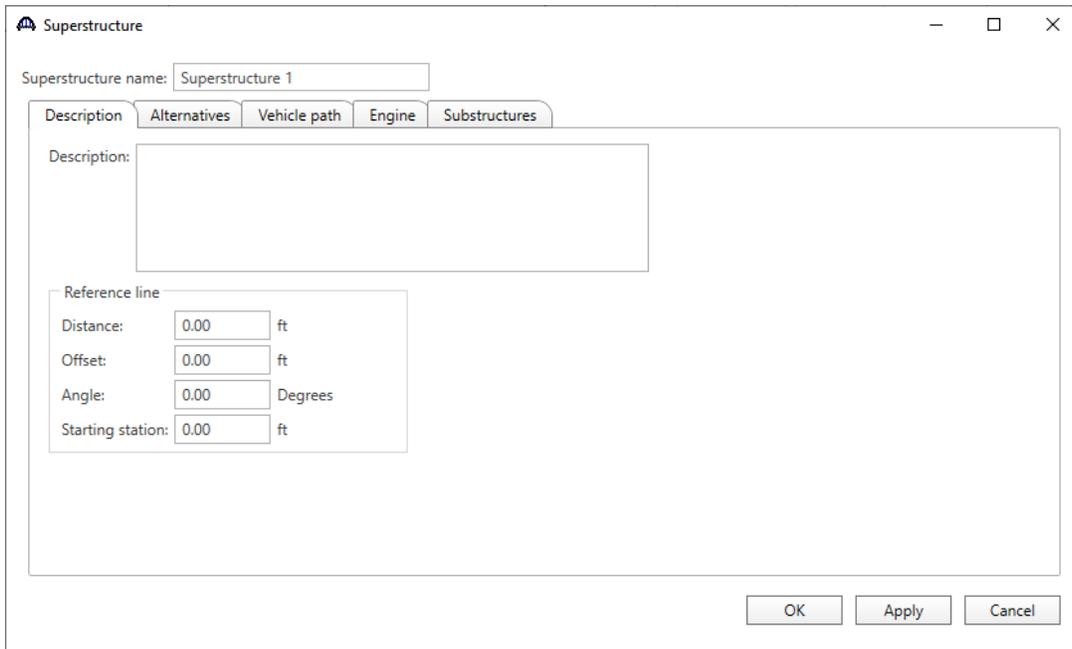
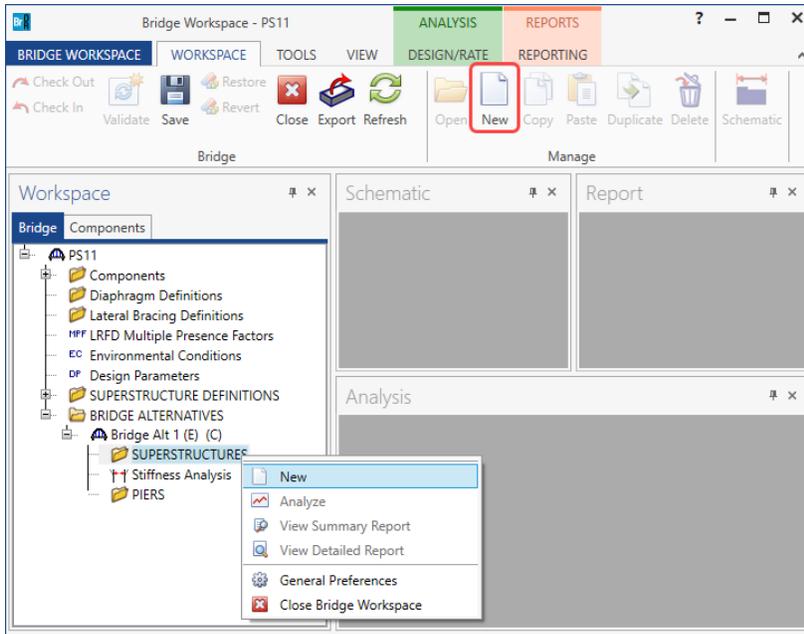
Enter the following data.

A screenshot of the "Bridge Alternative" dialog box. The "Alternative name" field contains "Bridge Alt 1". There are two tabs: "Description" and "Substructures". The "Description" tab is active, showing a "Description:" text area. Below this are sections for "Horizontal curvature" (with "Start bearing" selected), "Global positioning" (with "Distance:", "Offset:", and "Elevation:" fields), and "Bridge alignment" (with "Curved" selected). To the right of "Bridge alignment" are "Start tangent length:", "Curve length:", "Radius:", "Direction:" (set to "Left"), and "End tangent length:" fields. At the bottom left are "Superstructure wizard..." and "Culvert wizard..." buttons. At the bottom right are "OK", "Apply", and "Cancel" buttons.

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

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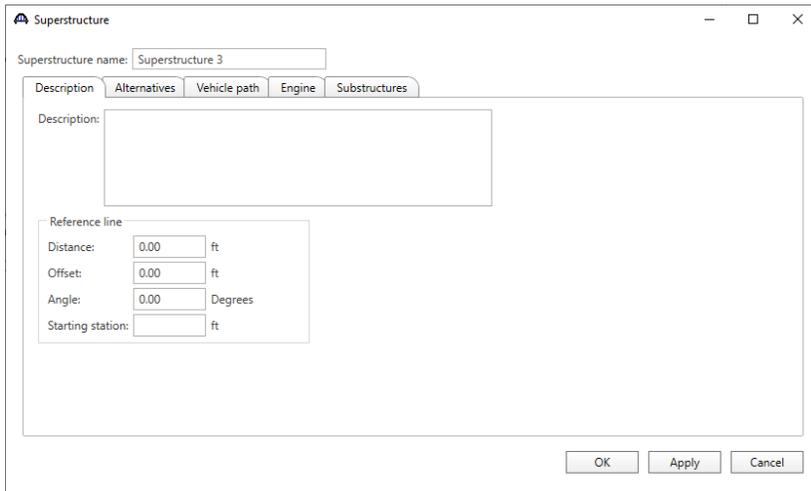
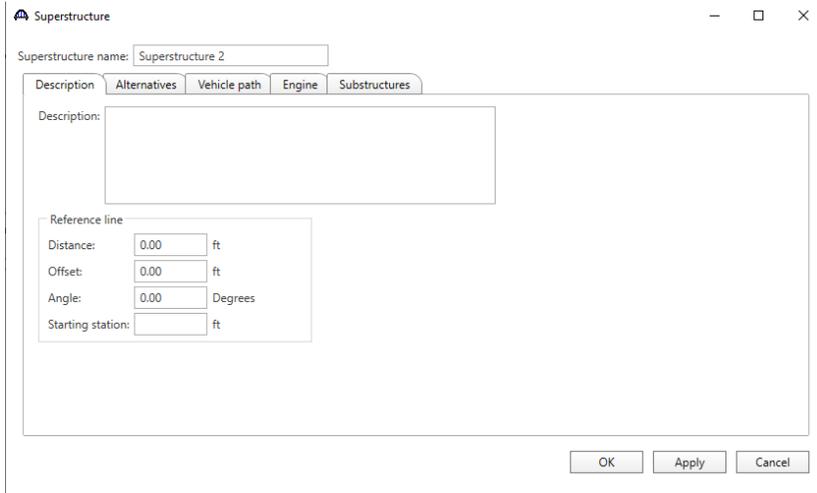
Expand the **Bridge Alt 1** node in the **Bridge Workspace** tree by clicking the **+** button. Double-click on the **SUPERSTRUCTURES** node (or select **SUPERSTRUCTURES** and click **New** from the **Manage** group of the **WORKSPACE** ribbon) and enter the following new superstructure.

A screenshot of the "Superstructure" dialog box. The title bar reads "Superstructure". The "Superstructure name:" field contains "Superstructure 1". Below the name field are four tabs: "Description", "Alternatives", "Vehicle path", "Engine", and "Substructures". The "Description" tab is active. It contains a large text area for "Description:". Below this is a "Reference line" section with four input fields: "Distance:" (0.00 ft), "Offset:" (0.00 ft), "Angle:" (0.00 Degrees), and "Starting station:" (0.00 ft). At the bottom right of the dialog are three buttons: "OK", "Apply", and "Cancel".

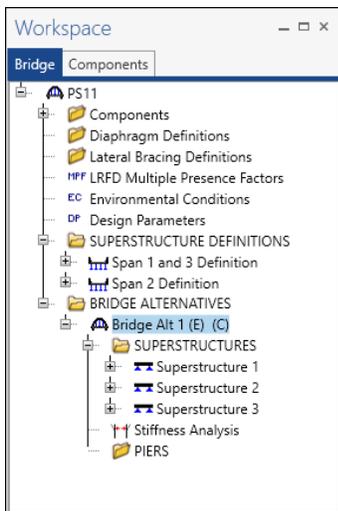
Click **OK** to apply the data and close the window.

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Similarly create two other superstructures for Span No. 2 and Span No. 3 as shown below.



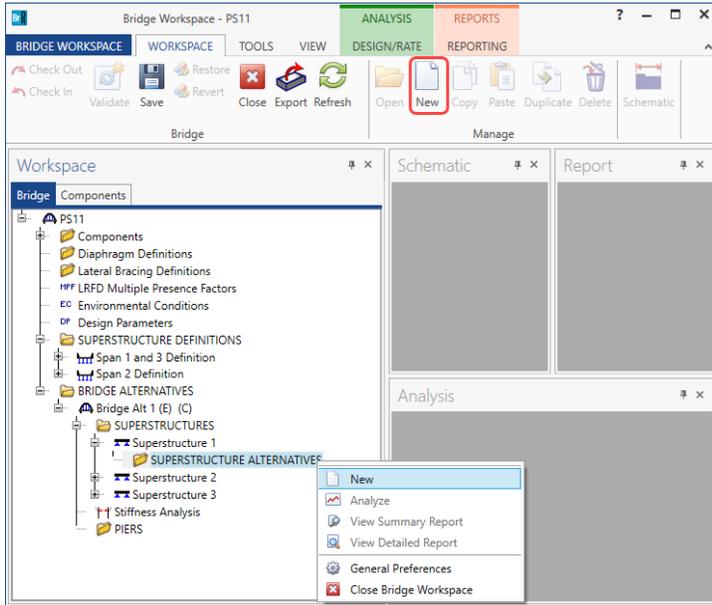
The partially expanded Bridge Workspace tree is shown below.



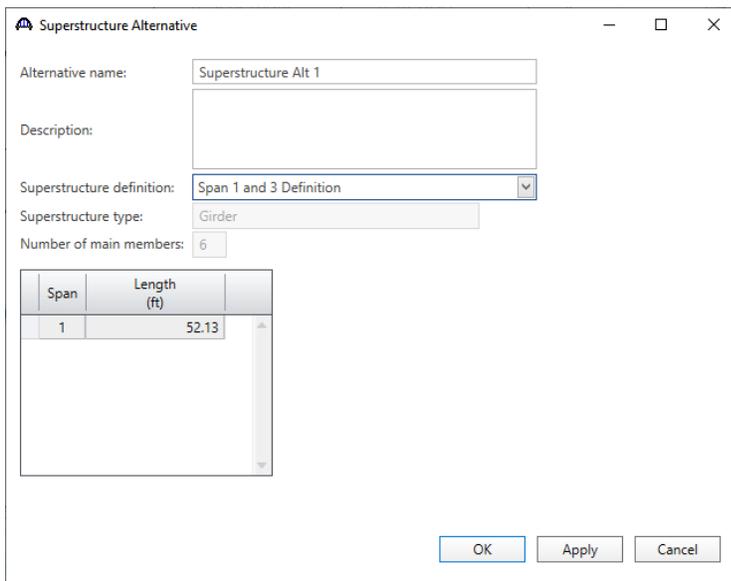
PS11 – Bridge Over Shoal Creek

Assign Span 1 and 3 Definition to the first and third Superstructures and assign Span 2 Definition to the second superstructure

Expand the **Superstructure 1** node in the **Bridge Workspace** tree by clicking the **+** button. Double-click on **SUPERSTRUCTURE ALTERNATIVES** (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 Span 1 and 3 Definition** as the current superstructure definition for this Superstructure Alternative.

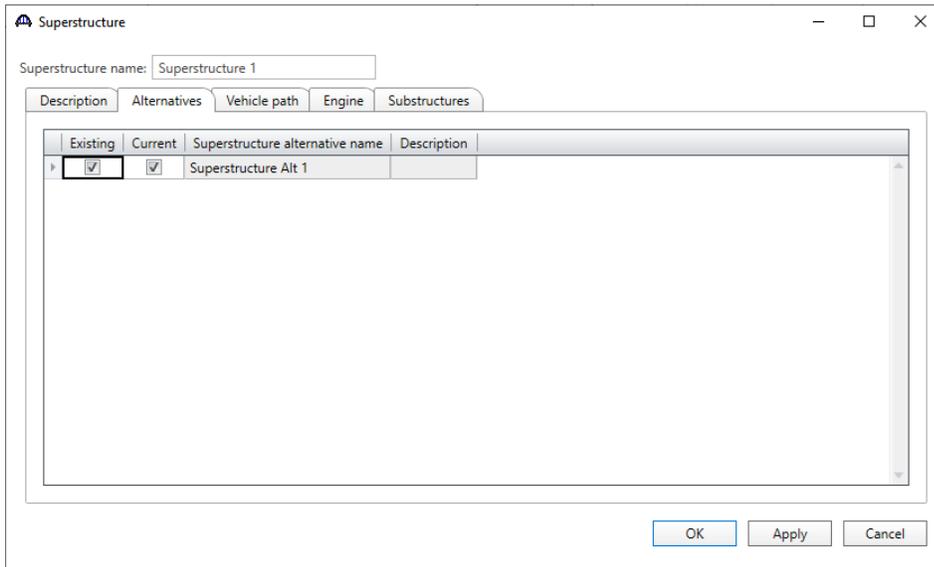


Span	Length (ft)
1	52.13

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

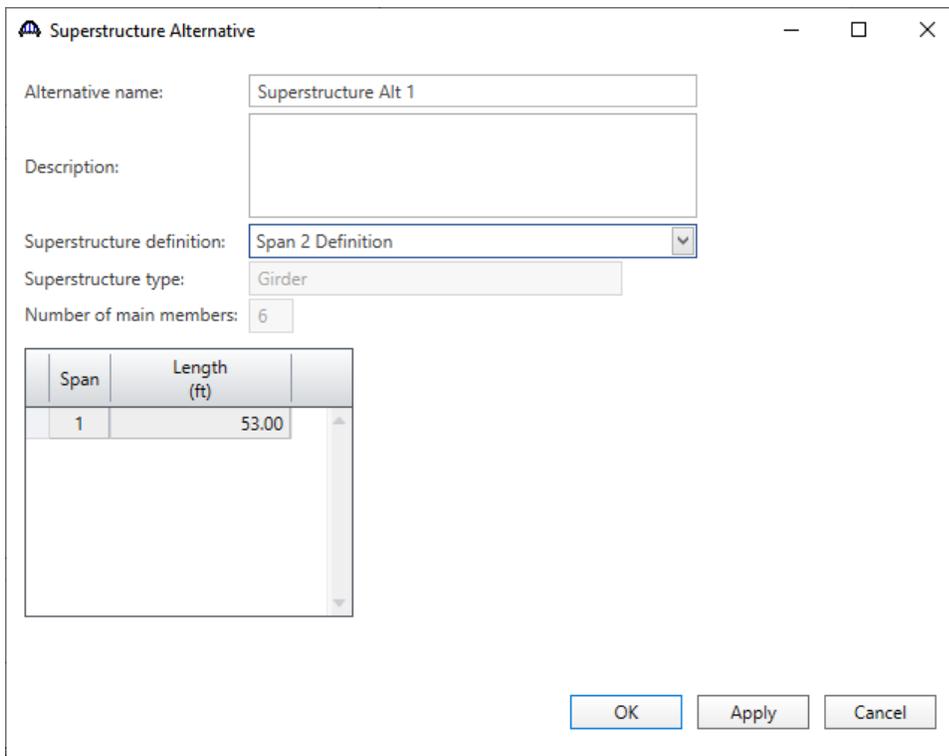
PS11 – Bridge Over Shoal Creek

Re-open the **Superstructure 1** window and navigate to the **Alternatives** tab. The **Structure Alternative 1** will be shown as the **Existing** and **Current** alternative for **Superstructure 1**.



Similarly add two other **SUPERSTRUCTURES** and assign **Span 2 Definition** to **Superstructure 2** and **Span 1 and 3 Definition** to **Superstructure 3** as shown below.

Superstructure 2



Superstructure 3

Alternative name: Superstructure Alt 1

Description:

Superstructure definition: Span 1 and 3 Definition

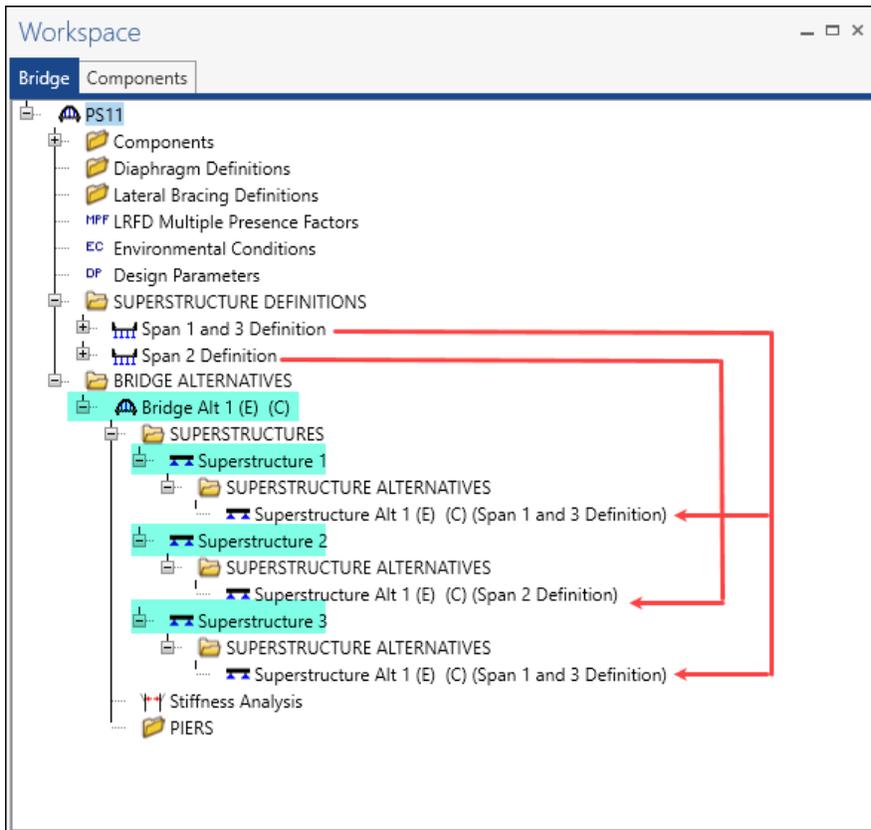
Superstructure type: Girder

Number of main members: 6

Span	Length (ft)
1	52.13

OK Apply Cancel

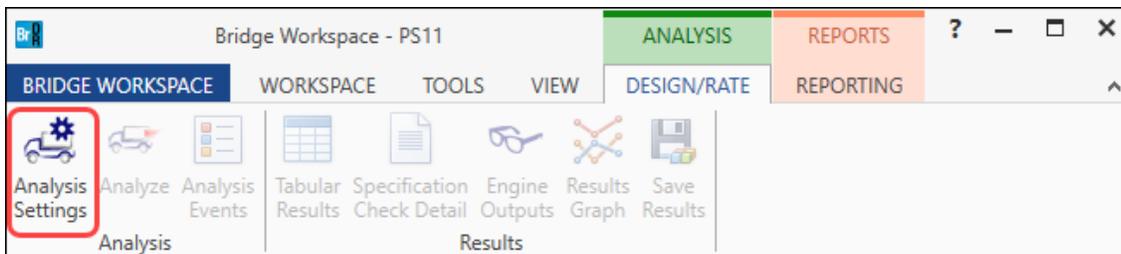
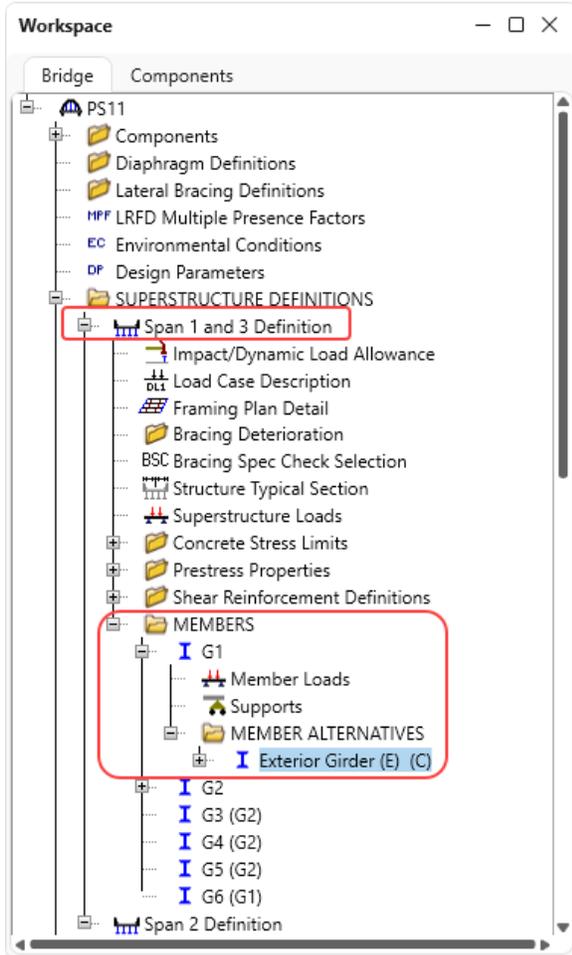
The partially expanded **Bridge Workspace** tree is shown below.



PS11 – Bridge Over Shoal Creek

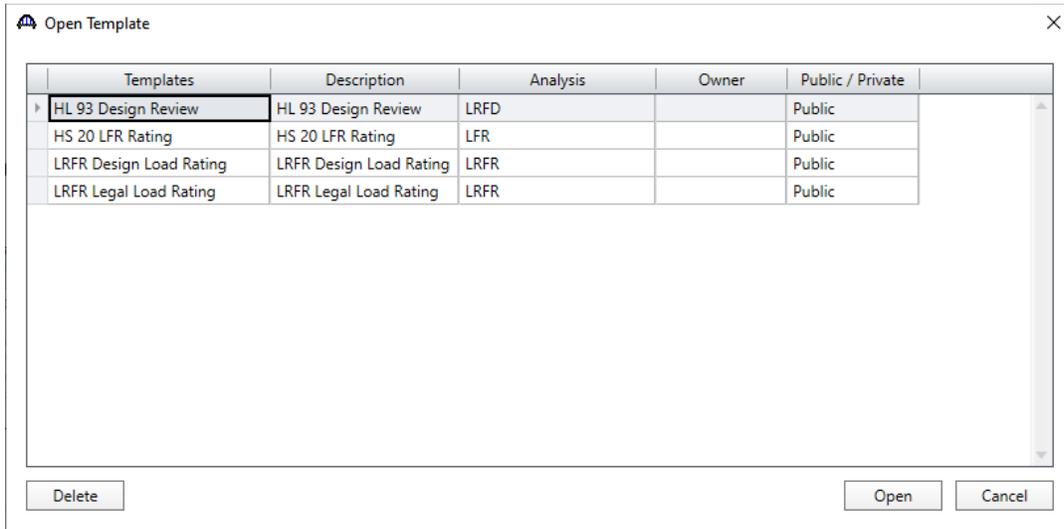
LRFD Design Review

To perform an LRFD design review of this exterior girder, select **Exterior Girder** under member **G1** of the **Span 1 and 3 Definition** superstructure in the **Bridge Workspace tree** and select the **Analysis Settings** button on the **Analysis** group of the **DESIGN/RATE** ribbon. The window shown below opens.

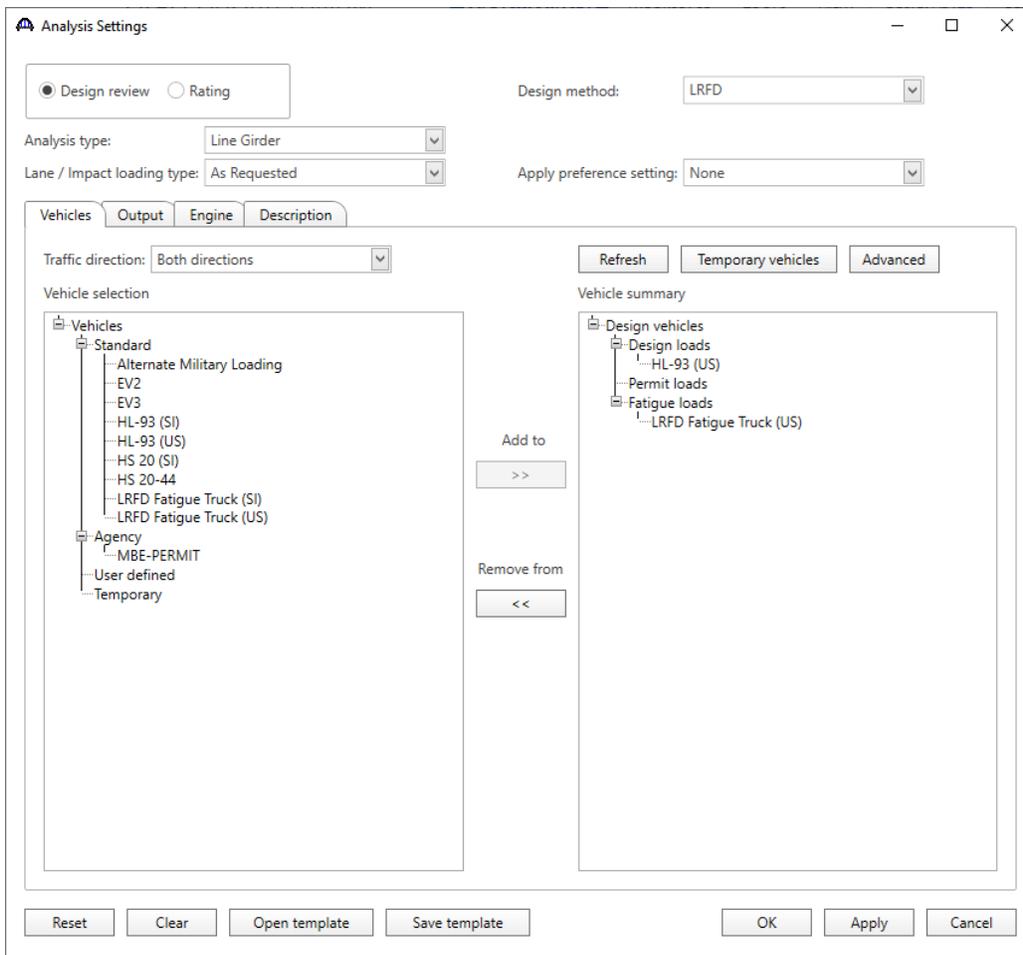


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Click the **Open Template** button and select the **HL 93 Design Review** to be used in the rating and click **OK**.



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

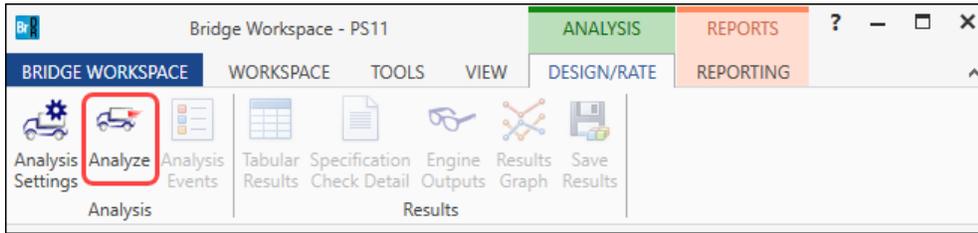


Click **OK** to apply the data and close the window.

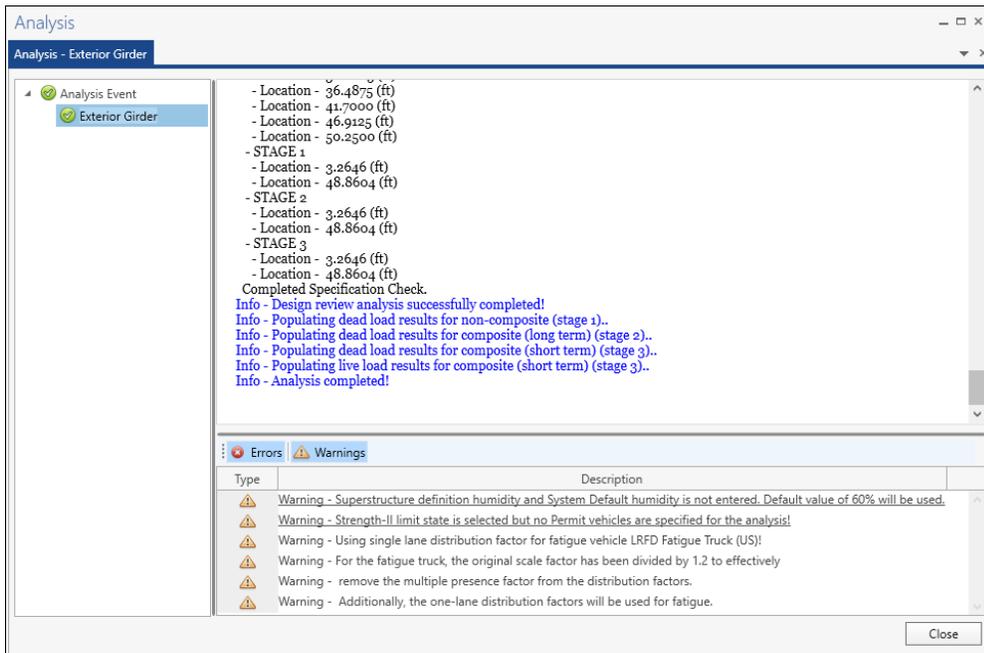
PS11 – Bridge Over Shoal Creek

Specification Checks

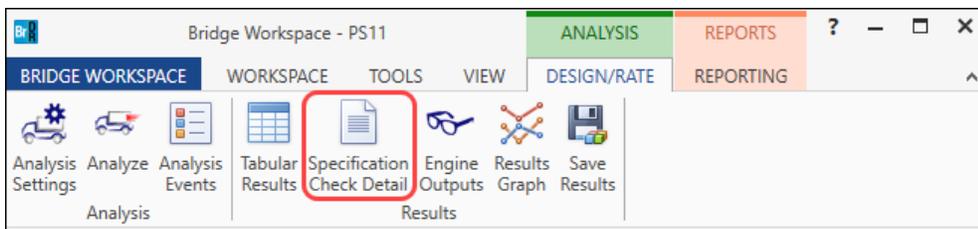
Next click the **Analyze** button on the **Analysis** group of the **DESIGN/RATE** ribbon to perform the design review.



After the analysis is complete, review the information and the warning messages on the **Analysis** window.



Click on the **Specification Check Detail** button from the **Results** group of the **DESIGN/RATE** ribbon to open the **Specification Checks** window.



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The details for one of the specification checks is shown below.

Specification Checks for Exterior Girder - 25 of 762

Articles: All articles
Format: Bullet list

Specification filter: Superstructure Component

- Prestress Calculations
- Stage 1
- Stage 2
- Stage 3
 - Exterior Girder
 - Span 1 - 0.00 ft.
 - Span 1 - 1.88 ft.
 - Span 1 - 3.26 ft.
 - Span 1 - 5.21 ft.
 - Span 1 - 10.43 ft.
 - Span 1 - 15.64 ft.
 - Span 1 - 16.06 ft.
 - Span 1 - 20.85 ft.
 - Span 1 - 26.06 ft.
 - Span 1 - 31.28 ft.
 - Span 1 - 36.06 ft.
 - Span 1 - 36.49 ft.
 - Span 1 - 41.70 ft.
 - Span 1 - 46.91 ft.
 - Span 1 - 48.86 ft.
 - Span 1 - 50.25 ft.
 - Span 1 - 52.13 ft.

Specification reference	Limit State	Flex. Sense	Pass/Fail
✓ 2.5.2.6.2 Criteria for Deflection		N/A	Passed
✓ 5.4.2.1 Compressive Strength		N/A	Passed
5.4.2.5 Poisson's Ratio		N/A	General Comp.
5.4.2.6 Modulus of Rupture		N/A	General Comp.
5.4.2.8 Concrete Density Modification Factor		N/A	General Comp.
✓ 5.5.3.1 Fatigue Limit State - General		N/A	Passed
NA 5.5.3.2 Reinforcing Bars and Welded Wire Reinforcement		N/A	Not Required
5.5.4.2 PS Strength Limit State - Resistance Factors		N/A	General Comp.
5.6.2.2 Rectangular Stress Distribution		N/A	General Comp.
✓ 5.6.3.2 PS Flexural Resistance (Prestressed Concrete)		N/A	Passed
✓ 5.6.3.3 Minimum Reinforcement		N/A	Passed
✓ 5.7.2.5 Minimum Transverse Reinforcement		N/A	Passed
✓ 5.7.2.6 Maximum Spacing of Transverse Reinforcement		N/A	Passed
✓ 5.7.3.3 Nominal Shear Resistance		N/A	Passed
5.7.3.4 Procedures for Determining Shear Resistance		N/A	General Comp.
✓ 5.7.3.5 Longitudinal Reinforcement		N/A	Passed
✓ 5.7.4 Interface Shear Transfer		N/A	Passed
✓ 5.7.4.2 Minimum Area of Interface Shear Reinforcement		N/A	Passed
✓ 5.9.2.3.2a Compressive Stresses		N/A	Passed
✓ 5.9.2.3.2b Tensile Stresses		N/A	Passed
5.9.4.3.2 Bonded Strand		N/A	General Comp.
Computation of Vp		N/A	General Comp.
Cracked_Moment_of_Inertia Section Property Calculations		N/A	General Comp.
PS_Basic_Properties Calculation		N/A	General Comp.
PS_Gross_Composite_Section_Properties PS Gross Composi		N/A	General Comp.

Spec Check Detail for 5.6.3.2 PS Flexural Resistance (Prestressed Concrete)

5.6 Design for Flexural and Axial Effects – B Regions
5.6.3 Flexural Members
5.6.3.2 Flexural Resistance
(AASHTO LRFD Bridge Design Specifications, Ninth Edition)

PS I Narrow - At Location = 26.0625 (ft) - Left Stage 3

Cross Section Properties

Name: AASHTO TYPE II
Girder f'c = 6.00 (ksi) Girder f'ci = 5.00 (ksi)
Slab f'c = 6.00 (ksi)

Effective Slab Width = 90.00 (in)
Effective Slab Thickness = 7.00 (in)
Haunch Width = 31.75 (in)
Haunch Thickness = 2.00 (in)
Beam Height = 36.00 (in)

Total Aps = 3.67 (in^2)
Total CGS = 9.08 (in)

Eff Aps = 3.67 (in^2)
Eff CGS = 9.08 (in)

Note: If the capacity has been overridden, the Resistance is computed as override phi*override capacity. Otherwise the Resistance is computed as per the Specification.

OK