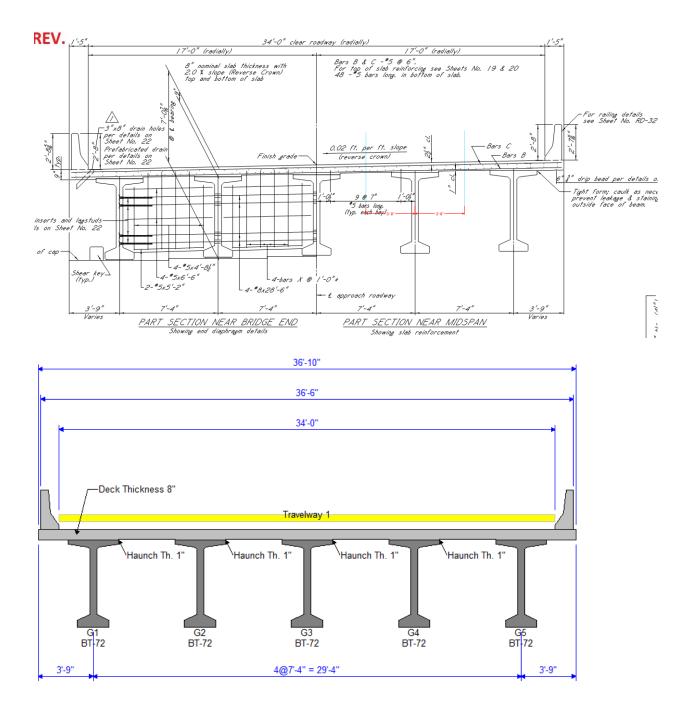
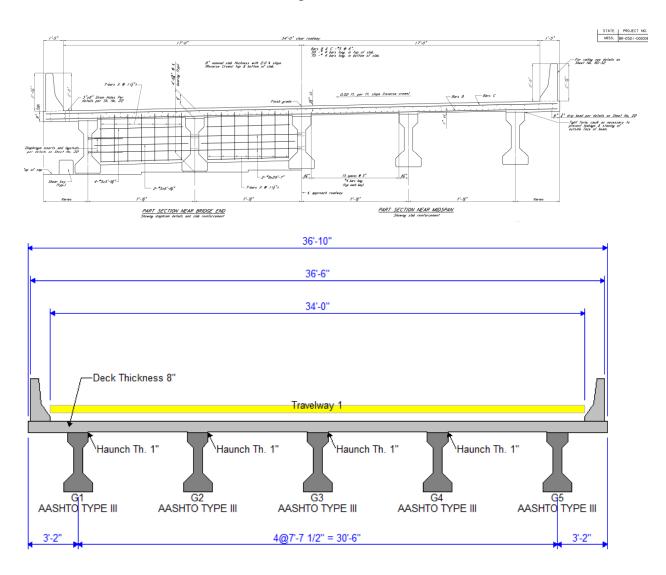
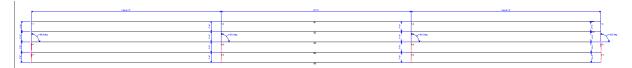
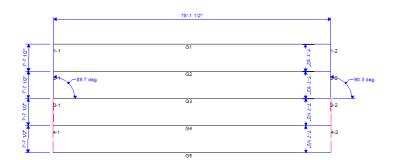
AASHTOWare BrDR 7.5.0 Prestress Tutorial 14 PS14 – Prestressed Concrete I Beam Example

This example details the data input of a prestressed concrete I beam bridge and performing an analysis. This is a bridge from the Mississippi DOT inventory which includes two units of SR 429, a three-span (138 ft each) continuous unit and a single 80 ft span unit.









Topics Covered

- Comments and Assumptions
- Data Entry of Prestressed concrete I beam with draped strands input as girder system.
- Prestressed multi-span modeling options.
 - Multi-span continuous
 - Multi-span continuous and simple span
- Export of prestressed concrete beams to the BrDR LRFD analysis engine
- Analysis and Results

Comments and Assumptions

- Assume 5000 psi for the 28-day compressive concrete strength of the Type III PS Beam for the 80-foot span.
- Due to rounding on the design plans, the BrDR span lengths are slightly off from the design drawings. Lengths are within 1/16".
- The plans show a discrepancy for strand type for the 138 ft beam details. The notes indicate ¹/₂" diameter 270 K-LR strands where the table and section show 0.6" diameter 270 K-LR strands so 0.6" diameter 270 K-LR strands will be used in the model.
- With larger radius, assume the overhangs as equal.
- Due to the limitations in BrDR, the skew angle at Support 2 & 3 of the three-span continuous unit will be 90 degrees.
- Traffic data and design speed for LRFR analysis
 - a. Assumed ADTT = 41 per NBI
- ¹/₄" Integral Wearing Surface
- HL93 will be the vehicle used for ratings.
- District, County and Owner information is not populated.
- For the exterior beams, an LRFD effective width = Overhang + S/2 is used, even though the overhang is greater than S/2 (C4.6.2.6.1).

Data Entry of Prestressed concrete I beam with draped strands input as girder system.

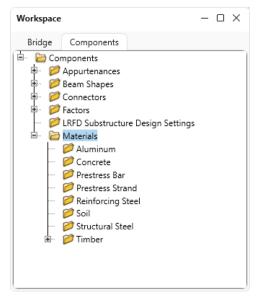
Br 🖁		AASHTOWare Bridge Design	and Rating		? —	
BRIDGE EXPLORER	port ch ~ Find Copy	RATE TOOLS VIEW				
Bridge		Manage				
← Favorites Folder ← P Recent Bridges ← P All Bridges ← P Deleted Bridges ← P Deleted Bridges	es	BID Bridge ID > 1 TrainingBridge1 2 TrainingBridge2 3 TrainingBridge3 4 PCITrainingBridge1 5 PCITrainingBridge2 6 PCITrainingBridge3	PCITraining	dge 1(LRFD) dge 2(LRFD) dge 3(LRFD) Bridge1(LFR) Bridge2(LRFD Bridge3(LFR)))	• • •
Bridge ID: SR 429 PS		ucture ID (8): 00000	Template		Bridge Workspace Superstruct Culverts Substructur	ures
	ription (cont'd) Alterna	tives Global reference point Tra				
Name: Description:	SR 429 PS14 PS GIRDERS ON PILE BEN LEAKE COUNTY MISSISSIPPI	ITS	Year built:	2017		
Location:	1.3 MI S SR 43		Length:	815.58	ft	
Facility carried (7):	SR 429		Route number:	429		
Feat. intersected (6): Default units:	VOCKANOOKANY RIVER US Customary		Mi. post:			
Bridge associ	ation	BrD BrM				
				ОК	Apply	Cancel

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

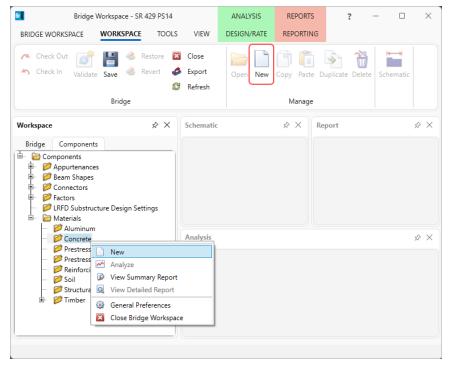
Click **OK** to apply the data and close the window.

Bridge Materials

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**).



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

Bridge Mate	rials - Concrete			-		×
Name:	Class FX Beam Concrete	e 138 FT				
Description:	Class FX cement concre	te				
Compressive s	trength at 28 days (f'c):	7.5	ksi			
Initial compres	sive strength (f'ci):	6	ksi			
Composition o	of concrete:	Normal ~				
Density (for de	ad loads):	0.15	kcf			
Density (for m	odulus of elasticity):	0.145	kcf			
Poisson's ratio	:	0.2				
Coefficient of t	thermal expansion (α):	0.000006	1/F			
Splitting tensil	e strength (fct):		ksi			
LRFD Maximur	n aggregate size:		in			
	Compute					
Std modulus o	f elasticity (Ec):	4989.954377	ksi			
LRFD modulus	of elasticity (Ec):	4905.547298	ksi			
Std initial mod	ulus of elasticity:	4463.150877	ksi			
LRFD initial mo	odulus of elasticity:	4557.295222	ksi			
Std modulus o	f rupture:	0.649519	ksi			
LRFD modulus	of rupture:	0.657267	ksi			
Shear factor:		1				
	Сору	to library Copy	from library OK A	pply	Canc	el

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

🕰 Bridge Mat	erials - Concrete			-		×
Name:	Class FX Beam Concrete	80 FT				
Description:	Class FX cement concre	te				
Compressive	strength at 28 days (f'c):	5	ksi			
Initial compre	essive strength (f'ci):	4.2	ksi			
Composition	of concrete:	Normal ~				
Density (for d	lead loads):	0.15	kcf			
Density (for n	nodulus of elasticity):	0.145	kcf			
Poisson's rati	0:	0.2				
Coefficient of	thermal expansion (α):	0.000006	1/F			
Splitting tens	ile strength (fct):		ksi			
LRFD Maximu	um aggregate size:		in			
	Compute					
Std modulus	of elasticity (Ec):	4074.280688	ksi			
LRFD modulu	is of elasticity (Ec):	4291.186125	ksi			
Std initial mo	dulus of elasticity:	3734.139931	ksi			
LRFD initial m	odulus of elasticity:	4051.254406	ksi			
Std modulus	of rupture:	0.53033	ksi			
LRFD modulu	is of rupture:	0.536656	ksi			
Shear factor:		1				
	Сору	to library Copy	from library OK App	ly	Cance	al

Add another concrete material in a similar manner. See image below.

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

Add concrete material for the deck from the library. Click the **Copy from library...** button and use the **Class A** (US) material. Once the material is copied, change the **Name** to **Class AA** and click on the **Compute** button as shown below.

Name Description	Library L	nits	fc	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 / N	etric	28		0.0000	2400	2320	25426.0823	27730.359798	0.2		3.333
Class A (US) Class A cement concrete	Standard US Cu	stomary	4.0000006		0.0000	0.15	0.145	3644.149254	3986.548657	0.2		0.479857
	Standard SI / N		17		0.0000	2400	2320	19811.8437	23520.226422	0.2		2.5976
	Standard US Cu Standard SI / N	stomary	2.4000003		0.0000	0.15 2400	0.145	2822.746208 25426.0823	3368.115517 27730.359798	0.2		0.371688
		stomary		-	0.0000	0.15	0.145	3644.149254	3986.54846	0.2		0.479857
										0	K Ap	ply Canc
Bridge Materials - Conci	rete										_	
Name: Class AA (U	S)											
Description: Class A cem	ent concre	te										
Compressive strength at 2	8 days (f'c)	4.0	000006			ksi						
Initial compressive strengt	h (f'ci):					ksi						
Composition of concrete:		No	rmal		\sim							
Density (for dead loads):		0.1	5			kcf						
Density (for modulus of el	asticity):	-	45			kcf						
Poisson's ratio:		0.2				1/F						
Coefficient of thermal exp Splitting tensile strength (i		0.0	00006			ksi						
LRFD Maximum aggregate						in						
	Comput											
Std modulus of elasticity (I	Ec):	36	44.1477	04		ksi						
LRFD modulus of elasticity	(Ec):	39	86.5486	57		ksi						
Std initial modulus of elast	ticity:					ksi						
LRFD initial modulus of ela	asticity:					ksi						
Std modulus of rupture:		-	174342			ksi						
LRFD modulus of rupture:		0.4	18			ksi						
Shear factor:		1										

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

To add a reinforcement material, select **Reinforcing Steel** in the **Components** tree and select **New** from the **Manage** group of the **WORKSPACE** ribbon (or right mouse click on **Reinforcing Steel** and select **New**)

	space - SR 429 PS14 RKSPACE TOOLS	VIEW	ANALYSIS DESIGN/RATE	REPORT		-	o x
Check Out Check In Validate Sav	e 💰 Restore 🛿	Export	Open New	Copy Past	Duplicate D	Delete Schen	natic
	-			-			
Workspace	\$ X	Schematic		s ×	Report		s> ×
Components Appurtenances Post Appurtenances Post Appurtenances Post Appurtenances Post Actors Post Aluminum Postress Bar Postress Postress		Analysis					× &
Soil	New Analyze View Summary View Detailed H General Prefere Close Bridge W	Report					

Click on the Copy from library... button in this window and select Grade 60 from the library and click OK.

Name	Description	Library	Units	Fy	Fu	Es	
Grade 300	300 MPa reinforcing steel	Standard	SI / Metric	300	500	199948	
Grade 350	350 MPa reinforcing steel (rail-steel)	Standard	SI / Metric	350	550	199948	
Grade 40	40 ksi reinforcing steel	Standard	US Customary	40.0000058	70.0000102	29000.004206	
Grade 400	400 MPa reinforcing steel	Standard	SI / Metric	400	600	199948	
Grade 50	50 ksi reinforcing steel (rail-steel)	Standard	US Customary	50.0000073	80.0000116	29000.004206	
Grade 500	500 MPa reinforcing steel	Standard	SI / Metric	500	700	199948	
Grade 60	60 ksi reinforcing steel	Standard	US Customary	60.000087	90.0000131	29000.004206	
Grade 75	75 ksi reinforcing steel	Standard	US Customary	75.0000109	100.0000145	29000.004206	
Structural or unknown grade prior 1954	Structural or unknown grade prior to 1954	Standard	US Customary	33.0000048	60.000087	29000.004206	

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

🕰 Bridge Mat	terials - Reinforc	ing Steel					-		×
Name:	Grade 60								
Description:	60 ksi reinforci	ing steel							
Material prop	perties								
Specified yie	ld strength (fy):	60.000087		ksi					
Modulus of e	elasticity (Es):	29000.0042	06	ksi					
Ultimate stre	ngth (Fu):	90.0000131		ksi					
Type Plain Epo Galv									
	Copy t	o library	Copy f	irom library	ОК	Appl		Cance	ł

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

Add the following prestress strands using the same **Copy from Library** technique. The window will be updated as shown below.

	Minimum	Initial			Required	num	ber	and	REQU			Centra	vid far	-	Dis	tance	6	ande	~	Del	lectic		linimus
	breaking strongth	Tension	Total	Strai	location ht strand			aped sh	rands	- '	totai	number G		Trands		an É an to	L 1	limi†s	'ł		pres		ancre) trengt
	-	As/strand	number strands	Numb	er Centroi	id No	mhe	Cont	roid (in.) s Beam) and A	47 E	5,000	At be	en end		l-down oint				1	8	C at	time ose (
	45,000	1 43.940	36	26	4.19		10	6.50	65.0		4.	<i>93</i>	21	.08	-	1-0"	0	to 5	<i>.</i>	511	s 12		6000
							_												-	_		_	
Library Data: Materials - Prest	tress Strand														-		×						
												Transfer	Transfer										
Name		Description		Library	Units	Fy	Fu	Modulus of elasticity	Load per unit length	Diameter	Area	length (Std)	length (LRFD)	Stran type		Epoxy coated							
0.6" (7W-250) LR Lo	ow relaxation 0.	600"/Seven Wire/fp	pu = 250	Standard	US Customary	225	250	28500	0.737	0.6	0.216		36	Low Relay	ation	False	÷						
0.6" (7W-250) SR St	tress relieved 0.0	600°/Seven Wire/fp	ou = 250	Standard	US Customary	212.5	250	28500	0.737	0.6	0.216	30	36	Stress Rel	lieved	False	1						
0.6" (7W-270) LR Lo	ow relaxation 0.	600"/Seven Wire/fp	pu = 270	Standard	US Customary	243	270	28500	0.74	0.6	0.217	30	36	Low Relay	ation	False							
0.6" (7W-270) SR St	tress relieved 0.0	600"/Seven Wire/fp	ou = 270	Standard	US Customary	229.5	270	28500	0.74	0.6	0.217	30	36	Stress Rel	lieved	False							
1/2" (7W-250) LR Lo	ow relaxation 1/	2"/Seven Wire/fpu	= 250	Standard	US Customary	225	250	28500	0.49	0.5			30	Low Relay	ation	False							
1/2" (7W-250) SR St	tress relieved 1/	2"/Seven Wire/fpu	= 250	Standard	US Customary	212.5	250	28500	0.49	0.5	0.144	25	30	Stress Rel	lieved	False	*						
													ОК	Ap	ply	Can	cel						
A Bridge Materials - I	DC Strend								×														
Bridge Waterials - I	PS Strand								^														
Name: 0.6" (7	7W-270) LR																						
Descriptions (Leven																							
	elavation ()	600"/Seven \	Nire/fru	- 270																			
Description: Low re	elaxation 0.	.600"/Seven \	Nire/fpu	= 270																			
Strand diameter:	elaxation 0.	.600"/Seven \ 0.6	Wire/fpu	= 270																			
	elaxation 0.			= 270																			
Strand diameter: Strand area:		0.6	in in^2	= 270																			
Strand diameter: Strand area: Strand type:		0.6 0.217 Low Relaxatio	jin jin^2 on ∨	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer		0.6 0.217 Low Relaxatio 270] in] in^2 on ∨] ksi	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy):	ngth (Fu):	0.6 0.217 Low Relaxatio 270 243	in in^2 on ∨ ksi ksi	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer	ngth (Fu):	0.6 0.217 Low Relaxatio 270] in] in^2 on ∨] ksi	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy):	ngth (Fu):	0.6 0.217 Low Relaxatio 270 243 28500	in in^2 on ∨ ksi ksi	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy):	ngth (Fu): / (E): Compute	0.6 0.217 Low Relaxatio 270 243 28500	in in^2 on ∨ ksi ksi	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy): Modulus of elasticity Transfer length (Std):	ngth (Fu): / (E): Compute :	0.6 0.217 Low Relaxatio 270 243 28500 30] in] in^2 on ∨] ksi] ksi] ksi	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy): Modulus of elasticity Transfer length (Std): Transfer length (LRFE	ngth (Fu): (E): Compute : D):	0.6 0.217 Low Relaxatio 270 243 28500 30 36	in in^2 on ~ ksi ksi ksi in	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy): Modulus of elasticity Transfer length (Std):	ngth (Fu): (E): Compute : D):	0.6 0.217 Low Relaxatio 270 243 28500 30 30 36 0.74	in in^2 on v ksi ksi ksi in in lb/ft	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy): Modulus of elasticity Transfer length (Std): Transfer length (LRFE	ngth (Fu): (E): Compute : D):	0.6 0.217 Low Relaxatio 270 243 28500 30 36	in in^2 on v ksi ksi ksi in in lb/ft	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy): Modulus of elasticity Transfer length (Std): Transfer length (LRFE	ngth (Fu): (E): Compute : D):	0.6 0.217 Low Relaxatio 270 243 28500 30 30 36 0.74	in in^2 on v ksi ksi ksi in in lb/ft	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy): Modulus of elasticity Transfer length (Std): Transfer length (LRFE	ngth (Fu): (E): Compute : D):	0.6 0.217 Low Relaxatio 270 243 28500 30 30 36 0.74	in in^2 on v ksi ksi ksi in in lb/ft	= 270																			
Strand diameter: Strand area: Strand type: Ultimate tensile strer Yield strength (fy): Modulus of elasticity Transfer length (Std): Transfer length (LRFE	ngth (Fu): / (E): Compute : D): :	0.6 0.217 Low Relaxatio 270 243 28500 30 30 36 0.74	in in^2 on ∨ ksi ksi in in lb/ft ated	= 270		Арр			incel														

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

LR indicates I	ow-relaxatio	on strands			F	REST	RESS I	REOUIRE	MENTS		r deflection an Details					
Strand	Minimum	Initial		/	Required n	umber a	nd		Centi	roid for	Distance	Camber	De	flec	tion	Minimum
type	breaking	tension			location o	f strand	ls		total number	er of strands	from £	limits	d	liagra	a m	concrete
	strength		Total	Straight	strands	Dra	ped stra	ands	'	(in.)	span to					strength
			number	Number	Centroid	Number	Centro	oid (in.)	1+ 1	At beam end	hold-down		A	B	0	at time of
	lbs/strand	lbs/strand	strands	strands	(in.)	strands	£ span	Beam end	At £ span	AT Deam end	point					release (psi)
}"ø270 K-LR	41,300	30,980	26	20	4.10	6	4.50	40.00	4.19	12.38	8'-0"	0 to 23"	18"	15"	96	4200

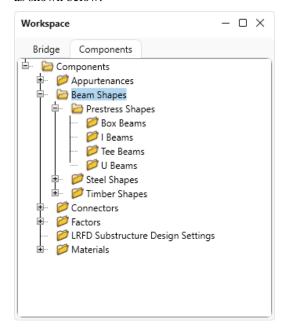
Name	Description	Library	Units	Fy	Fu	Modulus of elasticity	Load per unit length	Diameter	Area	Transfer length (Std)	Transfer length (LRFD)	Strand type	Epoxy coated	
1/2 (/ W-2JU) LN	Low relaxation 1/2 / Seven Wire/ipu = 250	Stanuaru	US CUSLOMARY	223	200	20000	0.49	0.0	0.144	23	50	LOW Nelaxation	raise	
1/2" (7W-250) SR	Stress relieved 1/2"/Seven Wire/fpu = 250	Standard	US Customary	212.5	250	28500	0.49	0.5	0.144	25	30	Stress Relieved	False	
1/2" (7W-270) LR	Low relaxation 1/2"/Seven Wire/fpu = 270	Standard	US Customary	243	270	28500	0.52	0.5	0.153	25	30	Low Relaxation	False	
1/2" (7W-270) SR	Stress relieved 1/2"/Seven Wire/fpu = 270	Standard	US Customary	229.5	270	28500	0.52	0.5	0.153	25	30	Stress Relieved	False	
1/4" (3W-250) LR	Low relaxation 1/4"/Three Wire/fpu = 250	Standard	US Customary	225	250	28500	0.13	0.25	0.036	12.5	15	Low Relaxation	False	
1/4" (7W-250) LR	Low relaxation 1/4"/Seven Wire/fpu = 250	Standard	US Customary	225	250	28500	0.122	0.25	0.036	12.5	15	Low Relaxation	False	

🕰 Bridge Ma	terials - PS Strand				_		×
Name:	1/2" (7W-270) L	R					
Description:	Low relaxation 1	I/2"/Seven \	Wire/fpu = 270				
Strand diame	eter:	0.5	in				
Strand area:		0.153	in^2				
Strand type:		Low Relaxa	ation 🗸				
Ultimate ten	sile strength (Fu):	270	ksi				
Yield strengt	h (fy):	243	ksi				
Modulus of e	elasticity (E):	28500	ksi				
	Compute	2					
Transfer leng	th (Std):	25	in				
Transfer leng	th (LRFD):	30	in				
Unit load per	r length:	0.52	lb/ft				
		Ероху	coated				
Сору	to library	Copy from l	ibrary	ОК	Apply	Cance	el

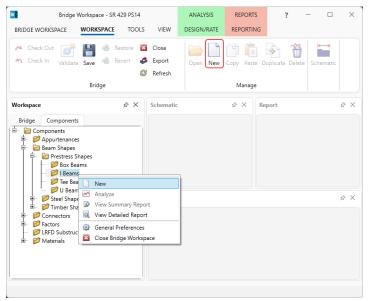
Click **OK** to apply the data and close the window.

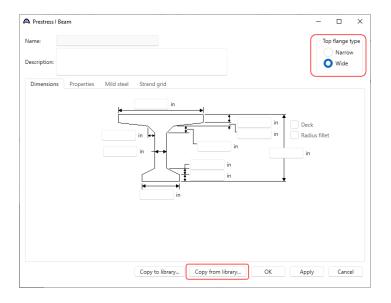
Beam Shapes

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



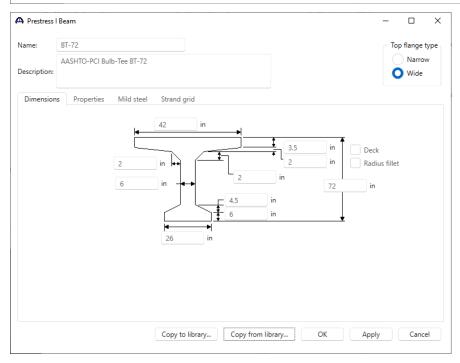
Click on the **I Beams** node in the **Components** tree and select **New** from the **Manage** group of the **WORKSPACE** ribbon (or right mouse click on **I Beams** and select **New** or double click on **I Beams** in the **Components** tree). The window shown below will open.





Select the **Top flange type** as **Wide** and click the **Copy from library...** button. Select **BT-72** (**AASHTO-PCI Bulb-Tee BT-72**) and click **OK**. The beam properties are copied to the **Prestress I Beam** window as shown below.

Nar	me	Description	Library	Units	Depth	Top flange thickness	Top flange width	Bottom flange thickness	Bottom flange width	Top hauch height	Bottom haunch height	Top haunch 2 height	Top haunch 2 width	Deck included	Top flange ext. width	Radius fillet	Top flange radius fillet	Bottom flange radius fillet	Top web radius fillet	Bottom web radius fillet
AAS	SHTO TYPE V	AASHTO TYPE V	Standard	US Customary	63	5	42	8	28	3	10	4	4							
AAS	SHTO TYPE VI	AASHTO TYPE VI	Standard	US Customary	72	5	42	8	28	3	10	4	4							
BT-	54	AASHTO-PCI Bulb-Tee BT-54	Standard	US Customary	54	3.5	42	6	26	2	4.5	2	2							
BT-	63	AASHTO-PCI Bulb-Tee BT-63	Standard	US Customary	63	3.5	42	6	26	2	4.5	2	2							
BT-	72	AASHTO-PCI Bulb-Tee BT-72	Standard	US Customary	72	3.5	42	6	26	2	4.5	2	2							
1-28	Bx66	I-28x66	Standard	US Customary	66	5	42	8	28	3	10	4	4							
1-28	8x78	I-28x78	Standard	US Customary	78	5	42	8	28	3	10	4	4							
1-28	8x84	1-28x84	Standard	US Customary	84	5	42	8	28	3	10	4	4							



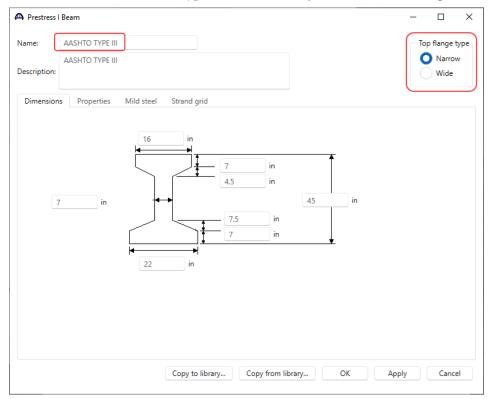
Click **OK** to apply the data and close the window.

ame:	BT-72						 Top flange type
escription:	AASHTO-PCI Bul	b-Tee BT-72	2				Narrow Wide
Dimension	ns Properties	Mild stee	Strand	d grid			
Į			Row no.	No. of strands	Vertical distance from bottom (in)	Horizontal spacing (in)	
			1	12	2.5	2	A
			2	12	4	2	
<u>í</u>		ance	3	8	6.5	2	
Rov	w1J ♣		4	4	8.5	2	
			5	2	10.5	2	
			6	2	61	2	
			7	2	63	2	
			8	2	65	2	
			9	2	67	2	
		>	10	2	69	2	
						New Du	plicate Delete

Navigate to the Strand grid tab. Delete the existing rows and add the following strand layout.

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

Add another I beam **AASHTO Type III** in a similar way. The window will be updated as shown below.



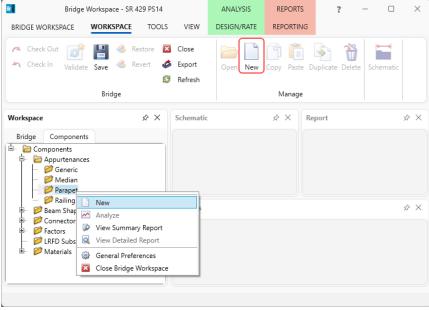
Prestress	Beam						-		×
Name:	AASHTO TYPE III						— To	p flange	type
Description:	AASHTO TYPE III						8	Narro Wide	W
Dimension	s Properties Mild s	teel	Strand	grid					
ŧ			Row no.	No. of strands	Vertical distance from bottom (in)	Horizontal spacing (in)			
			1	10	2.5	2		4	
_			2	10	4.5	2			
	± Distance		3	10	6.5	2			
Row 1	······		4	2	38	2			
			5	2	40	2			
		>	6	2	42	2			
						New Duplic	ate	Delete	
			Copy to	o library C	opy from library	ОК	Apply	Canc	el

Navigate to the Strand grid tab, delete the existing strands, and add the following.

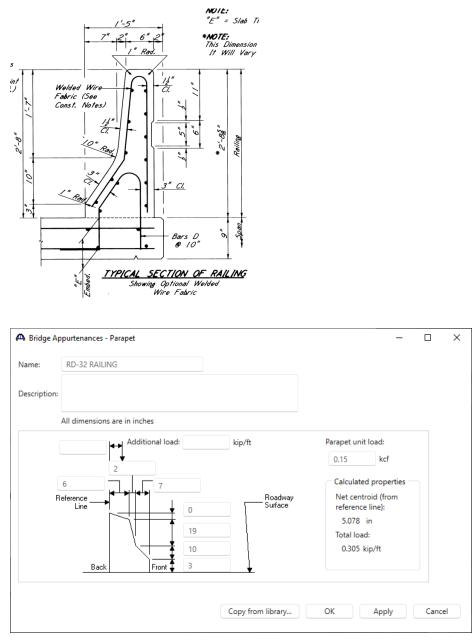
Click **OK** to apply the data and close the window.

Bridge - Appurtenances

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



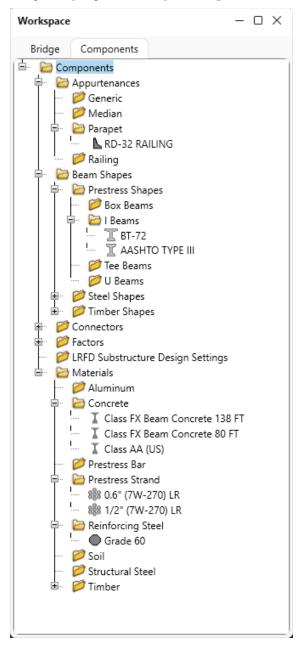
Enter the parapet details as shown below.



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

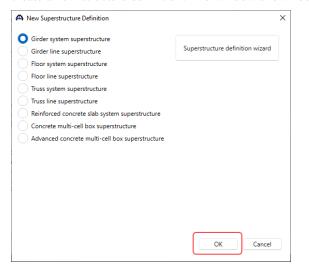
The default impact factors, standard LRFD and LFR factors will be used.

The partially expanded **Bridge Workspace** tree in the **Components** tab is shown below.



Superstructure definition – AS BUILT THREE 138 FT SPANS

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. Enter the data as shown below.

	ecs Engine			
lame: AS BUIL	T THREE 138 FT SP	PANS		Modeling
THREE C	ONTINUOUS SPA	INS		O Multi-girder system MCB
				With frame structure simplified definition
escription:				Deck type:
				Concrete Deck 🗸 🗸
efault units: US Custo	mary 🗸	Enter span lengths along the reference		For PS/PT only
umber of spans: 3	0	line:		Average humidity:
umber of girders: 5	$\hat{\cdot}$	Span Length (ft)		70 %
		> 1 136.708333		Member alt. types
		2 137.166666		Steel
		3 136.708333		P/S
				R/C
				Timber P/T
Horizontal curvature along		ance from PC to first support line:	ft	
		t tangent length:	ft	
— Superstructure alignme	Radi		ft	
Curved		ction:	Left V	
			ft	
Curved	Direc	tangent length:		
Curved	End	tangent length: ance from last support line to PT:	ft	
Curved Tangent, curved, t	End Dista	tangent length: ance from last support line to PT: gn speed:	ft	
Curved Tangent, curved, t	End Dista	ance from last support line to PT:		

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

Load Case Description

Expand the AS BUILT THREE 138 FT SPANS superstructure definition. Double-click on the Load Case Description node in the Bridge Workspace tree to open the Load Case Description window. Click the Add default load case descriptions button to create the following load cases.

	Load case name	Description	Stage		Тур	be	Time* (days)	
	DC1	DC acting on non-composite section	Non-composite (Stage 1)	\sim	D,DC	~		
	DC2	DC acting on long-term composite section	Composite (long term) (Stage 2)	\sim	D,DC	~		
	DW	DW acting on long-term composite section	Composite (long term) (Stage 2)	\sim	D,DW	~		
>	SIP Forms	Weight due to stay-in-place forms	Non-composite (Stage 1)	\sim	D,DC	~		
	stressed members only	Add default load			New	Duplic		Delete

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

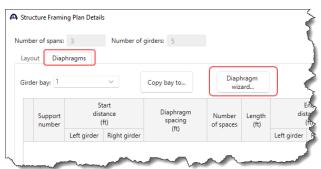
Structure Framing Plan Detail – Layout

Double-click on **Framing Plan Detail** in the **Bridge Workspace** tree to describe the framing plan in the **Structure Framing Plan Details** window. In this example, all the data will be entered to 4 significant digits, for example enter the 7'-4" spacing as **7.3333.** Click **Apply** after entering the data as shown below.

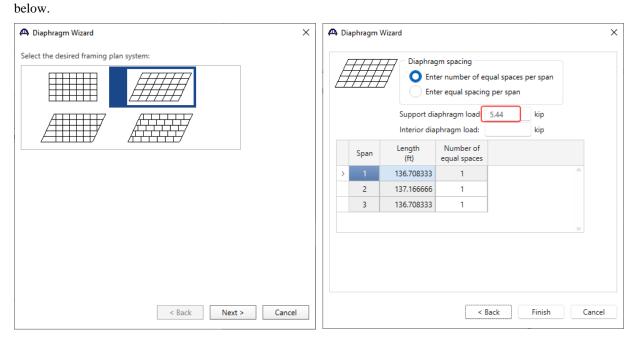
🗛 s	truc	ture Framin	ig Plan Details								-		×
Nu	mbe	r of spans:	3	Number of gird	ers:	5							
L	ayou	ut Diapł	hragms										
					Gi	rder spac	ing orientatio	n —					
		Support	Skew (degrees)		8		ndicular to gir support	der					
	>	1	0.5175										
		2	0				Girder						
		3	0			Girder bay	(f Start of	End of					
		4	-0.5175				girder	girder					
						1	7.333333	7.333333	^				
						2	7.333333	7.333333					
						3	7.333333	7.333333					
					>	4	7.333333	7.333333					
				w.					v				
										OK	Apply	Canc	el

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



Click the **Finish** button to add the diaphragms.

The **Diaphragm Wizard** will create diaphragms for all the girder bays in the structure. The diaphragms created for **each girder bay** is shown below.

Diaphragm Support Start Diaphragm Number Left girder Right girder Diaphragm 1 0 0 0 1 0 0 0.44 Number 2 0 -0.066237 0 1 0 0 0.44 -Not Assigned 3 0 -0.066237 0 1 0 0 5.44 -Not Assigned 3 0 -0.066237 0 1 0 0 5.44 -Not Assigned 3 0 -0.066237 0 1 0 0 0.44 -Not Assigned 3 136.708333 136.642096 0 1 0 136.708333 136.642096	Sup nur 1 2 3 3	pport mber ~ ~ ~	dist (Left girder 0 0	tart tance (ft) Right girder 0	Diaphragm spacing									
Support number Significance (H) Disploragm of space Number of space Length of space distance (H) Load (H) Disploragm (H) 1 0 0 0 0 1 0 0 5.44 -Not Assigned 2 0 0.066237 0 1 0 0 5.44 -Not Assigned 3 0 0.066237 0 1 0 0 5.44 -Not Assigned 3 136.708333 136.642096 0 1 0 136.708333 136.7457 5.44 -Not Assigned 3 136.708333 136.7457 0 1 0 136.708333 136.7427 5.44 -Not Assigned 3 136.708333 136.7457 5.44 -Not Assigned 3 Number of girders: 5 - - - - <td colspans<<="" th=""><th>1 2 2 3 3 3</th><th>* ×</th><th>dist (Left girder 0 0</th><th>tance (ft) Right girder 0</th><th>spacing</th><th>Number</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td>	<th>1 2 2 3 3 3</th> <th>* ×</th> <th>dist (Left girder 0 0</th> <th>tance (ft) Right girder 0</th> <th>spacing</th> <th>Number</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	1 2 2 3 3 3	* ×	dist (Left girder 0 0	tance (ft) Right girder 0	spacing	Number							
Number Us (ft) 0'space (ft) 0'space (ft) 0'space (ft) Uspace	1 2 2 3 3 3	~ ~ ~	Left girder 0 0	Right girder 0				dista	ance		Diaphragm			
2 0 -0.066237 0 1 0 0 -Not Assigned × 2 × 0 -0.066237 0 1 0 0 -Not Assigned × 3 × 0 -0.066237 0 1 0 0 -Not Assigned × 3 × 0 -0.066237 0 1 0 0 -Not Assigned × 3 × 136.708333 136.642096 0 1 0 136.708333 136.642096 -Not Assigned × 3 × 136.708333 136.642096 0 1 0 136.708333 136.77457 5.44 -Not Assigned × 3 × 136.708333 136.77457 5.44 -Not Assigned × ructure Framing Plan Details - - - - - - ruber of spans: 3 Number of girders: 5 - - - - support Diaphragm Number of spansi Number of spansi Length distance (the pinder fight girder fight girder fight girder fight girder	2 2 3 3	~ ~ ~	0			of spaces	(#)			(kip)				
2 v 0 0 1 0 0 5.44 Not Assigned v 3 v 136.708333 136.642096 0 1 0 136.708333 136.642096 Not Assigned v 3 v 136.708333 136.67457 0 1 0 136.708333 136.67457 5.44 Not Assigned v 3 v 136.708333 136.77457 0 1 0 136.708333 136.77457 5.44 Not Assigned v 3 v 136.708333 136.77457 0 1 0 136.708333 136.77457 5.44 Not Assigned v 3 v 136.708333 136.77457 0 1 0 136.708333 136.77457 5.44 Not Assigned v Number of girders: 5 yout Diaphragm Visuard Visuard Support Start O O 1 0 0 0 0 0 0 0 0 0 0 0	2 3 3	~		-0.066237	0	1	0	0	0	5.44	Not Assigned			
3 v 0 -0.066237 0 1 0 0 -0.066237 5.44 Not Assigned v 3 v 136.708333 136.642096 0 1 0 136.708333 136.642096 Not Assigned v 3 v 136.708333 136.77457 0 1 0 136.708333 136.77457 5.44 Not Assigned v 3 v 136.708333 136.77457 5.44 Not Assigned v v 1 v 136.708333 136.77457 5.44 Not Assigned v v New Duplicate Deletitic OK Apply Ca OK Apply Ca Number of girders: 5 Number of girders: 5 yout Diaphragm wizard Length distance (h) Diaphragm (h) yout Diaphragm (h) Number of spaces (h) Length (h) Left girder Load (kp) Diaphragm (h) 1 v 0 0 1 0 0 <	3 3	~	0		0	1	0	0	-0.066237		Not Assigned	,		
3 × 136.708333 136.642096 0 1 0 136.708333 136.642096 Not Assigned × 3 × 136.708333 136.77457 0 1 0 136.708333 136.642096 Not Assigned × 3 × 136.708333 136.77457 0 1 0 136.708333 136.77457 5.44 Not Assigned × New Duplicate Deletion 0 136.708333 136.77457 5.44 Not Assigned × New Duplicate Deletion 0 0 0 0 0 0 0 0 Number of griders: 5 5 5	3			0	0	1	0	0	0	5.44	Not Assigned	/		
3 136.77457 0 1 0 136.77457 5.44 Not Assigned × New Duplicate Delete OK Apply Ca OK Apply Ca New Diaphragm rder bay: 2 Copy bay to Diaphragm (ft) Diaphragm Mumber of spaces (ft) Left girder 1 V 0 0 1 0 0 5.44 Not Assigned × 1 × 136.77457 5.44 Not Assigned × - - -	_		0	-0.066237	0	1	0	0	-0.066237	5.44	Not Assigned	·		
New Duplicate Delet OK Apply Ca Number of spans: 3 Number of girders: 5 nyout Diaphragms — — rder bay: 2 Copy bay to Diaphragm wizard Length distance (ft) Length distance (ft) Length distance (ft) Diaphragm 1 V 0 0 1 0 0 5.44 Not Assigned ~ 1 V 136.708333 136.708333 Not Assigned ~ Not Assigned ~ 2 0 0 1 0 0 5.44 Not Assigned ~	2	~	136.708333	136.642096	0	1	0	136.708333	136.642096		Not Assigned	/		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	3	~	136.708333	136.77457	0	1	0	136.708333	136.77457	5.44	Not Assigned	/		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ructure	Framir	ng Plan Detail:	s						0	K Apply			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	ber of s	spans: Diap	3	Number of							Apply			
Left girder Right girder (III) Left girder Right girder Right girder 1 \low 0 0 1 0 0.0 5.44 Not Assigned \science 1 \low 136.708333 136.708333 0 1 0 136.708333 136.708333 Not Assigned \science 2 \low 0 0 1 0 0 0 5.44 Not Assigned \science	nber of s nyout rder bay	spans: Diap y: 2	3 hragms St	Number of	Copy bay to		wizard	En		C	K Apply			
1 × 136.708333 136.708333 0 1 0 136.708333 136.708333 Not Assigned 2 × 0 0 0 1 0 0 0 5.44 Not Assigned	nber of s nyout rder bay Sup	spans: Diap y: 2	3 phragms St dist	Number of V	Copy bay to Diaphragm spacing	Number	wizard	I En dista	ince	Load	-			
2 × 0 0 0 1 0 5.44Not Assigned ×	nber of s nyout rder bay Sup	spans: Diap y: 2	3 shragms St dist (Number of	Copy bay to Diaphragm spacing	Number	wizard	I En dista (fi	ince t)	Load	-			
	nber of s yout rder bay Sup nur	spans: Diap y: 2 pport mber	3 phragms St dist (Left girder	Number of the second se	Copy bay to Diaphragm spacing (ft)	Number of spaces	Length (ft)	En dista (fi Left girder	ince t) Right girder	Load (kip)	Diaphragm			
	yout yout rder bay Sup nur 1	spans: Diap y: 2 opport mber	3 shragms St dist (Left girder 0	Number of start tart (ft) Right girder	Copy bay to Diaphragm spacing (ft) 0	Number of spaces 1	Length (ft)	En dista (fi Left girder 0	nce t) Right girder 0	Load (kip)	Diaphragm Not Assigned ~			
2 × 137.100429 137.034192 0 1 0 137.100429 137.034192 5.44Not Assigned ×	yout yout rder bay Sup nur 1 1	spans: Diap y: 2 opport mber	3 shragms dist (Left girder 0 136.708333	Number of a	Copy bay to Diaphragm spacing (ft) 0 0	Number of spaces 1	Length (ft) 0 0	En dista (fr Left girder 0 136.708333	Right girder 0 136.708333	Load (kip) 5,44	Diaphragm Not Assigned ~~ Not Assigned ~~			
3 × 136.642096 136.575859 0 1 0 136.642096 136.575859Not Assigned ×	nber of s nyout rder bay Sup nur 1 1	spans: Diap y: 2 opport mber	3 shragms dist (Left girder 0 136.708333	Number of a	Copy bay to Diaphragm spacing (ft) 0 0	Number of spaces 1	Length (ft) 0 0	En dista (fr Left girder 0 136.708333	Right girder 0 136.708333	Load (kip) 5,44	Diaphragm Not Assigned Not Assigned 			
3 × 136.77457 136.840807 0 1 0 136.77457 136.840807 5.44Not Assigned ×	nber of s nyout rder bay nur 1 1 2 2	spans: Diap y: 2 opport mber ~ ~ ~	3 shragms dist (1) Left girder 0 136.708333 0 137.100429	Number of A	Copy bay to Diaphragm spacing (ft) 0 0 0 0 0 0	Number of spaces 1 1 1 1 1	Length (ft) 0 0 0 0	En dista (ff Left girder 0 136.708333 0 137.100429	Right girder 0 136.708333 0 137.034192	Load (kip) 5.44 5.44	Diaphragm Not Assigned Not Assigned 			
	nber of s nyout rder bay nur 1 1 2 2 2	spans: Diap y: 2 opport mber ~ ~ ~	3 shragms dist (Left girder 0 136.708333 0	Number of a	Copy bay to Diaphragm spacing (ft) 0 0 0 0 0 0	Number of spaces 1 1 1	Length (ft) 0 0	En dista (fi Left girder 0 136.708333 0	Right girder 0 136.708333 0	Load (kip) 5.44 5.44	Diaphragm Not Assigned Not Assigned 			

A Structure Framing Plan Details \times _ Number of spans: 3 Number of girders: 5 Layout Diaphragms Diaphragm Girder bay: 3 \sim Copy bay to... wizard... Start End Diaphragm distance Length (ft) distance Support Number Load spacing (ft) Diaphragm (ft) (ft) number (kip) of spaces Left girder Right girder Left girder Right girder 0 0 0 0 --Not Assigned-- \sim 0 0 5.44 1 1 \sim 136.708333 1 136.708333 136.708333 0 1 0 136.708333 --Not Assigned-- \sim 2 0 0 0 1 0 0 0 5.44 --Not Assigned-- \vee 137.034192 1 0 2 136.967955 0 137.034192 136.967955 5.44 --Not Assigned--3 \sim 136.575859 136.509622 0 1 0 136.575859 136.509622 --Not Assigned--3 \sim 136.840807 136.907044 0 1 0 136.840807 136.907044 5.44 --Not Assigned-- \sim New Duplicate Delete ОК Apply Cancel

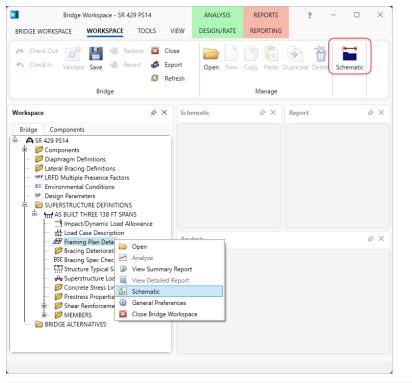
PS14 -	Prestressed	Concrete	I Beam	Example
TOIT	1 Testresseu	Concrete	I Deam	LAmple

rder b	bay: 4		~	Copy bay to		Diaphra wizar						
		dist	tart :ance ft)	Diaphragm spacing	Number of spaces	Length (ft)	Er dista (f	ance	Load (kip)	Diaphragm		
	1 × 2 ×	Left girder	Right girder	(ft)			Left girder	Right girder				
1	\sim	0	0	0	1	0	0	0	5.44	Not Assigned	\sim	
1	\sim	136.708333	136.708333	0	1	0	136.708333	136.708333		Not Assigned	\sim	
2	\sim	0	0	0	1	0	0	0	5.44	Not Assigned	\sim	
2	\sim	136.967955	136.901718	0	1	0	136.967955	136.901718	5.44	Not Assigned	\sim	
3	\sim	136.509622	136.443385	0	1	0	136.509622	136.443385		Not Assigned	\sim	
3	\sim	136.907044	136.973281	0	1	0	136.907044	136.973281	5.44	Not Assigned	\sim	
									New	Duplicate		Delete

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).



Schematic				– 🗆 ×
Framing Plan				$\sim \times$
Framing Plan Image Image				÷
IN CAP MEL In Car Mellon, As a sub-transmittion target transmittion and an end construction transmittion.				
044.19	+	w	02312	
Unit any	Varia,		Yester	Yere
	2 0 0			
	2 2 21			
	2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4			

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.

A Structure Typical Section	- 🗆 X
Distance from left edge of deck to superstructure definition ref. line Deck thickness	
Left overhang	
Deck Deck (cont'd) Parapet Median Railing Generic Sidewalk Lane position	on Striped lanes Wearing surface
Superstructure definition reference line is $within$ \checkmark the bridge deck.	
Start End Distance from left edge of deck to superstructure definition reference line: 18.416666 ft 18.416666 ft	
Distance from right edge of deck to superstructure definition reference line: 18.416666 ft 18.416666 ft	
Left overhang: 3.75 ft 3.75 ft	
Computed right overhang: 3.75 ft 3.75 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.

Distance from left edge of deck to j Di superstructure definition ref. line su Deck titlickness titlic	5	n ref. line nition	overhang : Lane position	Striped lanes	Wearing surface		
Deck thickness	Superstructure Defin Reference Line	nition Right (-	Striped lanes	Wearing surface		
Deck (cont'd) Parapet Median concrete: Class AA (US)	5	eneric Sidewalk	-	Striped lanes	Wearing surface		
concrete: Class AA (US)	5		Lane position	Striped lanes	Wearing surface		
deck thickness: 8		~					
	in						
case: Engine Assign	ned 🗸						
crack control parameter: 130	kip/in						
ined modular ratio factor: 2							
exposure factor: 1							

Structure Typical Section – Parapets

Add two parapets as shown below.

Struc	ture Typical Section								-		
ick	Front										
)eck	Deck (cont'd) Parapet	Median I	Railing Ger	neric Sidewalk	Lane posit	ion Stripe	d lanes We	earing surface			
	Name	Load case	Measure to	Edge of deck dist. measured from	Distance at start (ft)	Distance at end (ft)	Front face orientation				
>	RD-32 RAILING 🗸 🗸	DC2 🗸	Back \checkmark	Left Edge 🛛 🗸	0.166666	0.166666	Right \sim			4	
	RD-32 RAILING V	DC2 V	Back 🗸	Right Edge 🗸	0.166666	0.166666	Left \checkmark				
							Ne	w Duplica	te	Delete	
								ОК А	pply	Cano	e

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.

۵	Compute Lar	ne Positions				Х
	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	-17	17	-17	17	-
					Apply Canc	el

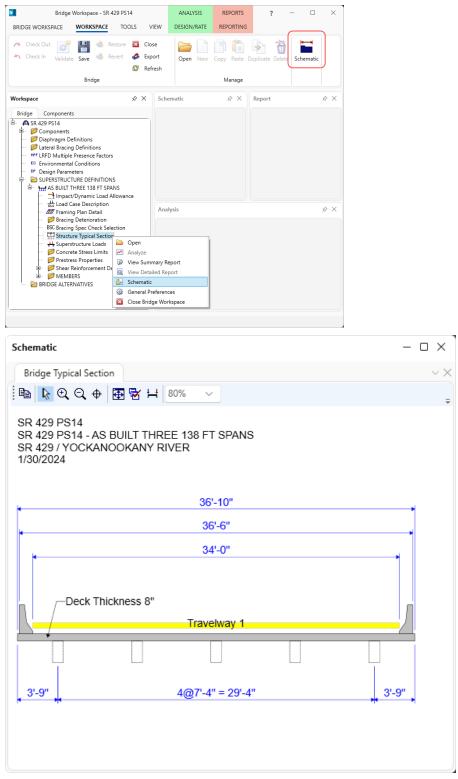
The Lane Position tab is populated as shown below.

🗛 Stru	cture Typical S	ection				_		×
Deck	Travelw		e Definition Reference Line avelway 2	valk Lane position Strip	ed 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	-17	17	-17	17		-	
	LRFD fatigue Lanes ava	ilable to trucks:	Compute		New Dupli	icate	Delete	
					ОК	Apply	Cancel	

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

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).



Superstructure Loads

Double click on the **Superstructure Loads** node in the **Bridge Workspace** tree to open the **Superstructure Loads** window. Navigate to the **DL distribution** tab in this window. Select options in this window as shown below. The BrDR LRFD engine does not support the transverse continuous beam analysis option.

Superstructure Loads					_		>
Uniform temperature	Gradient temperature	Wind	DL distribution				
Stage 1 dead load o	distribution						
 By tributary area 							
 By transverse sin 							
	ntinuous-beam analysis						
 By percentage 							
Der	centage						
Girder	(%)						
▶ 1	<u></u>						
2							
3							
4							
5							
Stage 2 dead load of Uniformly to all By tributary area By transverse sin By transverse co By percentage	girders						
Girder Per	centage (%)						
▶ 1	(70)						
2							
3							
4							
5	-						
O User-defined de	ad load						
			OK	Δr	oply	Cance	-1
			UK		793	Carlo	

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

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 data shown above the **Compute** button, select **Moderate** for the **Corrosion condition** and select the **Class FX Beam Concrete 138 FT** concrete 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.

A Stress Limit Sets -	Concrete						_		×
Name:	138 FT STR	ESS LIMIT							
Description:									
Corrosion condition:	Moderate		\sim						
Final allowable te	ension stress	limit coef. (US	6) override:						
Concrete material:	Class FX Bea	im Concrete 1	138 FT 🗸						
ſ	Compute								
L L		LFD		LRFD					
Initial allowable comp	pression:	3.6	ksi	3.9	ksi				
Initial allowable tension	on:	0.2	ksi	0.2	ksi				
Final allowable comp	ression:	4.5	ksi	4.5	ksi				
Final allowable tensio	n:	0.5203364	ksi	0.5203364	ksi				
Final allowable DL co	mpression:	3	ksi	3.375	ksi				
Final allowable slab c	ompression:		ksi		ksi				
Final allowable comp (LL+1/2(Pe+DL))	ression:	3	ksi	3	ksi				
				C	к	Apply		Cance	2

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

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.

me: 0.6" (7W-27	0) LR							
General P/S data	Loss	; data - lump sum	Loss data	- PCI				
P/S strand materia	al:	0.6" (7W-270) LR		~	Jacking stress ratio:	0.75		
Loss method:		AASHTO Approxim	ate	\sim	P/S transfer stress ratio:			
					Transfer time:	24	Hours	
					Age at deck placement:	60	Days	
					Final age:	27375	Days	
Percentage DL: Include elastic		%						

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

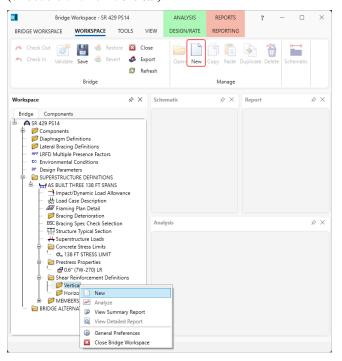
The following loss methods are available in the BrDR LRFD engine.

- AASHTO Approximate
- AASHTO Refined
- Lump Sum
- PCI
- Pre-2005 AASHTO Refined (AASHTO Refined, Third edition, 2004 without interims)

Another feature for prestress loss calculations in the BrDR LRFD engine is the ability to include elastic gains and losses due to dead load application.

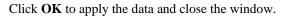
Shear Reinforcement

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**).



Define the stirrups as shown below.

🗛 Shear	Reinforcement Definition - Vert	ical			-		×
Name:	#5 K Bars]					
		Material:	Grade 60			~	
		Bar size:	5 ×				
		Number of legs:	2				
	Vertical Shear Reinforceme	Inclination (alpha): nt	90	Degrees			
			C	ОК Арј	ply	Cance	!



Define the #5 S Bars stirrup definition as shown below. Note that the #5 S Bars are the same definition as the #5 K Bars.

A Shear Reinforcement Definition - V	ertical			_		×
Name: #5 S Bars						
	Material:	Grade 60			\sim	
	Bar size:	5 ~				
	Number of legs:	2				
Vertical	Inclination (alpha):	90	Degrees			
Shear Reinforce	ment	C	DK AF	oply	Cance	:1

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

Describing a member:

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.

🗛 Member										-		×
Member name:	G1				Link with	None	~					
Description:												
	Existin	g C	urrent	Member alter	mative name	Description						
												w
Number of span	15: _3		Span no.	Span length (ft)								
		>	1	136.575859	-							
			2	137.166666								
			3	136.575859								
					w.							
								ОК	Арр	ly	Canc	el

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**.

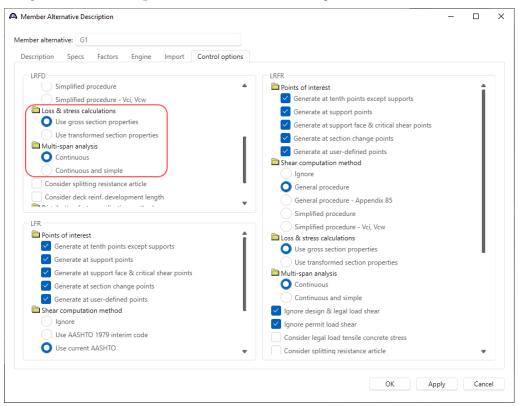
laterial type:	Girder type:
Post tensioned concrete	PS Precast Box
Prestressed (pretensioned) concrete	PS Precast I
Reinforced concrete	PS Precast Tee
Steel	PS Precast U

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

The **Member Alternative Description** window will open as shown below. Enter the name for this member alternative as shown below. The **Schedule based Girder property input method** is the only input method available for a prestressed concrete beam.

Member Alternative Des	cription							_	
ember alternative: G1]								
Description Specs	Factors	Engine	Import	Control options					
Description:				Material type:	Prestressed (Preter	sioned)			
				Girder type:	PS Precast I				
				Modeling type:	Multi Girder System	n			
				Default units:	US Customary	\sim			
Cross-section b	ased	J		Default rating me	thod:				
				-					
Load case:	Engine Ass	igned	~	LFR	~				
Load case: Additional self load:		igned kip/ft	~						
			~						
Additional self load:		kip/ft							
Additional self load: Additional self load:	eter (Z)	kip/ft	Exposu	LFR	~				
Additional self load: Additional self load: Crack control param	eter (Z)	kip/ft %	Exposu Top of	LFR	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			

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



Navigate to the Control options tab and check the LRFD options as shown below.

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

The BrDR LRFD engine allows to select either gross or transformed section properties to be used in the loss and stress calculations. Note that the gross section properties are always used in structural analysis.

Prestressed multi-span modeling options

The BrDR LRFD engine also allows to model prestress beams made continuous for live load in two ways.

• Multi-span continuous

The Continuous analysis method considers multi-span structures to be simply supported for beam self-weight and uncured deck and continuously supported for composite dead and live loads. This method takes advantage of the continuity connection to reduce the maximum positive moment at mid-spans.

• Multi-span continuous and simple span

The Continuous and Simple method analyzes the structure as simply supported for beam self-weight and uncured deck and both continuously and simply supported for composite dead and live loads. The maximum effects from the two analyses are then used in the specification checking. This method accounts for the condition where full continuity is not provided at interior supports and does not reduce the maximum positive moment at mid-spans.

Beam Details

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

	C		Girder	Prestress		Beam p	projection	
	Span number	Beam shape	material	properties	n	Left end (in)	Right end (in)	
>	1	BT-72 🗸	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		9	6	
	2	BT-72 V	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		6	6	
	3	BT-72 V	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		6	9	

Beam	Details						_		×
Span	detail C	Continuous sup	port detail	Stress limit ranges	Slab interface	Continuity diaphragm	Web end block		
CL of on Le	f Bearing I		CL of Bearing ←on Right						
	Support number	Support distance on left, SL (in)	Support distance on right, SR (in)						
>	2	11	11					-	
						ОК	Apply	Cance	4

Span detail Continuous support detail Stress limit ranges Slab interface Continuity diaphragm Web end block Interface type: Interface width to beam widths: Interface width: Interface width: Cohesion factor: 0.28 ksi Friction factor: 1 K1: 0.3								_		Х
number Name distance Length distance 1 138 FT STRESS LIMIT 0 136.9092 136.9092 2 138 FT STRESS LIMIT 0 136.9092 136.9092 3 138 FT STRESS LIMIT 0 136.9092 136.9092 3 138 FT STRESS LIMIT 0 136.9092 136.9092 3 138 FT STRESS LIMIT 0 136.9092 136.9092 New Duplicate Delete OK Apply Cancel OK Apply Cancel OK Apply Cancel OK Apply Cancel Intertionally Roughened O O O Default interface width to beam widths: Intertionally Roughened O O O Default interface width: 0 0 0 0 0 0 Cohesion factor: 0 0 0 0 0 0 0 K1: 0 0 0 0 0 0 0 0	Span de	etail	Continuous support det	ail Stress li	mit ranges	Slab interface	Continuity diaphragm	Web end block		
1 1 138 FT STRESS LIMIT 0 136.9092 136.9092 2 138 FT STRESS LIMIT 0 136.9092 136.9092 136.9092 3 138 FT STRESS LIMIT 0 136.9092 136.9092 136.9092 3 138 FT STRESS LIMIT 0 136.9092 136.9092 136.9092 3 138 FT STRESS LIMIT 0 136.9092 136.9092 136.9092 3 138 FT STRESS LIMIT 0 136.9092 136.9092 136.9092 0 136.9092 136.9092 136.9092 136.9092 136.9092 0 136.9092 136.9092 136.9092 136.9092 136.9092 0 136.9092 136.9092 136.9092 136.9092 136.9092 0 136.9092 136.9092 136.9092 136.9092 136.9092 136.9092 0 136.9092 196.9092 196.9092 196.9092 196.9092 196.9092 196.9092 196.9092 196.9092 196.9092 196.9092			Name	distance	Length	distance				
2 138 FT STRESS LIMIT 0 136.333333 136.333333 3 138 FT STRESS LIMIT 0 136.9092 136.9092 New Duplicate Delete OK Apply Cancel OK Apply Cancel Span detail Continuous support detail Stress limit ranges Slab interface Continuous support detail Stress limit ranges Slab interface Continuity diaphragm Veb end block Interface width in Continuity diaphragm Web end block Interface width: in in Continuity diaphragm Web end block Interface width: in in Continuity diaphragm Web end block Interface width: in in Continuity diaphragm Web end block Interface width: in in Continuity diaphragm Web end block Interface width: in in in in Cohesion factor: 0.28 ksi in Friction factor: 1 0.3 in			138 FT STRESS LIMIT							
> 3 × 138 FT STRESS LIMIT × 0 136.9092 136.9092 > 3 × 138 FT STRESS LIMIT × 0 136.9092 136.9092 New Duplicate Delete OK Apply Cancel OK Apply Cancel Span detail Continuous support detail Stress limit ranges Slab interface Continuity diaphragm Web end block Interface width Interface OZ Default Interface width: In Cohesion factor: 0.28 ksi riction factor: 1 0.3										
OK Apply Cancel Beam Details – C Span detail Continuous support detail Stress limit ranges Slab interface Continuity diaphragm Web end block Interface type: Intentionally Roughened Default interface width to beam widths: Default interface width to beam widths: An of the stress o	> 3	\sim								
OK Apply Cancel Beam Details – C Span detail Continuous support detail Stress limit ranges Slab interface Continuity diaphragm Web end block Interface type: Intentionally Roughened Default interface width to beam widths: Default interface width: Cohesion factor: 0.28 ksi Friction factor: 1 K1: 0.3										
Beam Details - Continuous support detail Stress limit ranges Slab interface Continuity diaphragm Web end block Interface type: Intentionally Roughened <							New	Duplicate	Delete	
Span detail Continuous support detail Stress limit ranges Slab interface Continuity diaphragm Web end block Interface type: Interface width to beam widths: Interface width: Interface width: Cohesion factor: 0.28 ksi Friction factor: 1 K1:							ОК	Apply	Cance	I
Default interface width to beam widths:										
Interface width: in Cohesion factor: 0.28 ksi Friction factor: 1 K1: 0.3			Continuous support det	ail Stress li	mit ranges	Slab interface	Continuity diaphragm	_ Web end block		>
Cohesion factor: 0.28 ksi Friction factor: 1 K1: 0.3	Span de	etail					Continuity diaphragm	 Web end block		>
Friction factor: 1 K1: 0.3	Span de Interfac	etail :e type:		Intentionally			Continuity diaphragm	— Web end block		>
0.3	Span de Interfac Default Interfac	etail e type: interfac e width	ce width to beam widths:	Intentionally	Roughened		Continuity diaphragm			>
	Span de Interfac Default Interfac Cohesic	etail e type: interfac e width on facto	ce width to beam widths: :: pr:	Intentionally	Roughened		Continuity diaphragm	— Web end block		;
1.8 ksi	Span de Interfac Default Interfac Cohesic Friction	etail e type: interfac e width on facto	ce width to beam widths: :: pr:	Intentionally 0.28 1	Roughened		Continuity diaphragm	— Web end block		;
	Span de Interfac Default Interfac Cohesic Friction K1:	etail e type: interfac e width on facto	ce width to beam widths: :: pr:	Intentionally	Roughened in ksi		Continuity diaphragm			;
	Span de Interfac Default Interfac Cohesic Friction	etail e type: interfac e width on facto	ce width to beam widths: :: pr:	Intentionally	Roughened in ksi		Continuity diaphragm	_ Web end block		
	Span de Interfac Default Interfac Cohesic Friction K1:	etail e type: interfac e width on facto	ce width to beam widths: :: pr:	Intentionally	Roughened in ksi		Continuity diaphragm	- Web end block		
	Span de Interfac Default Interfac Cohesic Friction K1:	etail e type: interfac e width on facto	ce width to beam widths: :: pr:	Intentionally	Roughened in ksi		Continuity diaphragm	- Web end block		

/an	detai		Continuous sup		Stress limi	cranges	Slab interface	<u> </u>	ity diaphrag	Wet	end block	
	Sp	an		Left supp	port			Right sup	port			
	nun	nber	Material	Distance (in)	Bar count	Bar size	Material	Distance (in)	Bar count	Bar size		
	1	\sim	~ ~			~	Grade 60 🗸	3.5	2	10 🗸		
	1	\sim	~			~	Grade 60 🗸	7	2	10 🗸		
	1	\sim	~ ~			~	Grade 60 🗸	11	1	10 ~	1	
	1	\sim	~ ~			~	Grade 60 🗸	20	1	10 ~	1	
	1	\sim	~ ~			~	Grade 60 🗸	29	1	10 ~	1	
	1	\sim				~	Grade 60 🗸	38	1	10 ~	1	
	2	\sim	Grade 60 🗸 🗸	3.5	2	10 🗸	Grade 60 🗸	3.5	2	10 ~	1	
	2	\sim	Grade 60 🗸 🗸	7	2	10 🗸	Grade 60 🗸	7	2	10 ~	1	
	2	\sim	Grade 60 🗸 🗸	11	1	10 🗸	Grade 60 🗸	11	1	10 ~	1	
	2	\sim	Grade 60 🗸 🗸	20	1	10 ~	Grade 60 🗸	20	1	10 ~	1	
	2	\sim	Grade 60 🗸 🗸	29	1	10 ~	Grade 60 🗸	29	1	10 ~	1	
	2	\sim	Grade 60 🗸 🗸	38	1	10 ~	Grade 60 🗸	38	1	10 ~	1	
	3	\sim	Grade 60 🗸 🗸	3.5	2	10 🗸	Grade 60 🗸 🗸			~		
	3	\sim	Grade 60 🗸 🗸	7	2	10 🗸	Grade 60 🔍			~	1	
	3	\sim	Grade 60 🗸 🗸	11	1	10 🗸	Grade 60 🔍			~	1	
	3	\sim	Grade 60 🗸 🗸	20	1	10 🗸	Grade 60 🔍			~		
	3	\sim	Grade 60 🗸 🗸	29	1	10 ~	Grade 60 🗸 🗸			~		
0	3	\sim	Grade 60 $$	38	1	10 🗸	Grade 60 🗸 🗸			~		
	lano		sitive moment a	supports in	ratings				New	Duplic	ate	Delete

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

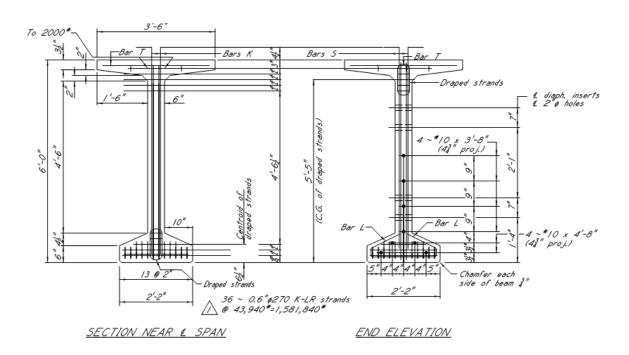
Shrinkage Time

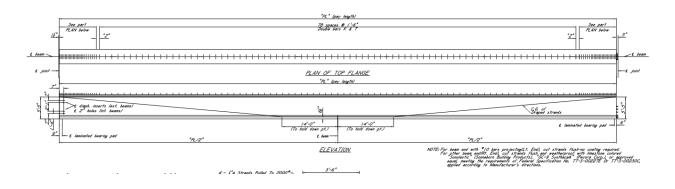
Double-click on the **Shrinkage Time** node in the **Bridge Workspace** tree to open the **Shrinkage/Time** window. Enter the data as shown below.

hrinkage Time Beam Curing method: Steam-cured Y Deck
Curing method: Steam-cured
Deck
Curing method: Moist-cured Y Drying time: Days

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

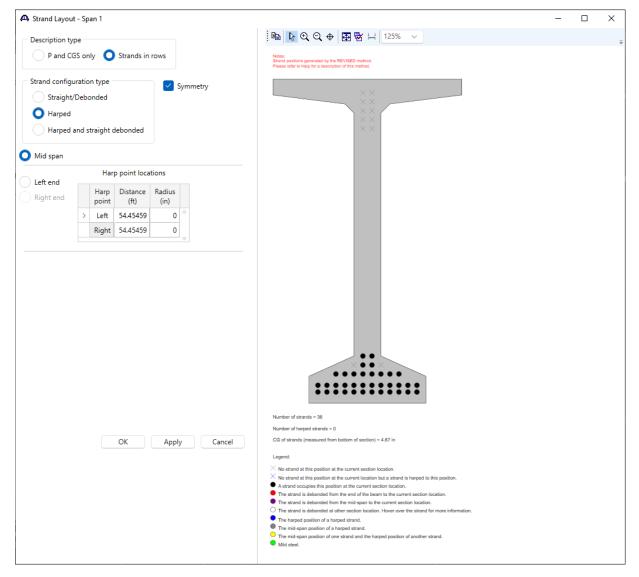
Strand Layout



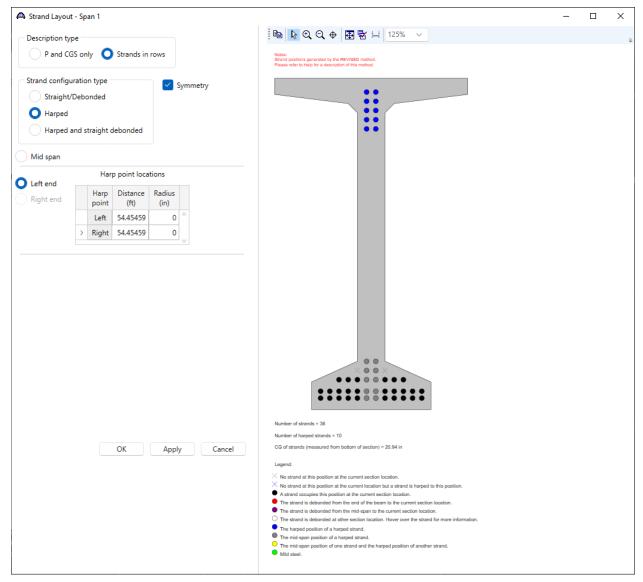


Expand the tree under **Strand Layout** and open the **Span 1** window. Use the **Zoom** buttons on the right side of this window to shrink/expand the schematic of the beam shape so that the entire beam is visible.

Select the **Description type** as **Strands in rows** and the **Strand configuration type** as **Harped**. The **Mid span** radio button will now become active. Enter details as shown below.



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



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

Repeat the process to describe the same strand layout for **Span 2** and **Span 3**. Span 2 Harp point is located at **54.16666** ft and Span 3 Harp point is located at **54.45460** ft.

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.

ck	concre	ete Reinf	orcement												
	Ν	Vaterial	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n			
,	Class F	X Bean 🗸	1 ~	0	410.318384	410.318384	7.75		88.999998	88.999998	88.999998		8		

Navigate to the **Reinforcement** tab and describe the deck reinforcement as shown below.

C																	
concrete	Reinforceme	nt															
Material	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Std bar count	LRFD bar count	Bar s	size	Distance (in)	Row		Bar spacing (in)					
Grade 60	~ 1 ~	0	106.159	106.159	8	8	5	\sim	2.9375	Top of Slab	\sim	11					
Grade 60	~ 1 ~	0	410.318384	410.318384	9	9	5	~	1.9375	Bottom of Slab	\sim	7					
Grade 60	~ 1 ~	106.159	70	176.159	8	8	8	\sim	3.125	Top of Slab	\sim	11					
Grade 60	× 1 ×	121.159	35	156.159	8	8	8	\sim	3.125	Top of Slab	\sim	11					
Grade 60	~ 2 ~	39.583141	58	97.583141	8	8	6	~	3	Top of Slab	\sim	11					
Grade 60	× 2 ×	97.583141	70	167.583141	8	8	8	~	3.125	Top of Slab	~	11					
Grade 60	× 2 ×	117.583141	35	152.583141	8	8	6	~	3.125	Top of Slab	\sim	11					
Grade 60	✓ 3 ✓	30.416475	106.159	136.575475	8	8	5	~	2.9375	Top of Slab	\sim	11					
													Naw	Dupli	rate	Delete	
														New	New Dupli	New Duplicate	New Duplicate Delete

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

Haunch Profile

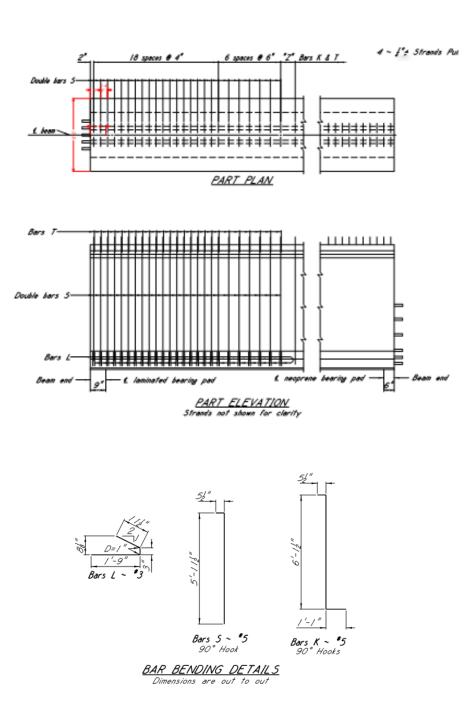
The haunch profile is defined by double-clicking on the **Haunch Profile** node in the **Bridge Workspace** tree. Enter data as shown below and Click **OK** to apply the data and close the window.

		1] IY3										
5	Z1 - Z2 Support	Start distance	Length (ft)	Z3 Z4 End distance	Z1 (in)	Z2 (in)	Z3 (in)	Z4 (in)	Y1 (in)	Y2 (in)	Y3 (in)	
> 1		(ft) 0	410.318384	(ft) 410.318384	(,	(,	((,	1	(,	(,	
								1	1	1		_

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

Shear Reinforcement Ranges

Use the **Stirrup wizard** from the **Shear Reinforcement Ranges** window to create the following shear stirrups. Double-click on the **Shear Reinforcement Ranges** node in the **Bridge Workspace** tree to open the **PS Shear Reinforcement Ranges** window.



Beam elevation showing stirrups

pan: 1 🗸				
0.75	ft		135.659192; ft 0.5 ft	
0.75	i.		135,0351321 14 0.5 14	
stance from left end rrup:	to first 0.1666	66 ft	Distance from left end to last stirrup: 136.2425	532(
stance from right end rrup:	d to last 0.6666	5958 ft	All extended into deck	
Reinf. name	Number of spaces	Spacing (in)		
#5 S Bars \sim	1	0		
#5 S Bars \sim	16	4		
#5 S Bars \sim	6	6		
#5 K Bars 🛛 🗸	1	10.4552		
#5 K Bars 🗸 🗸	78	18		
#5 S Bars 🗸 🗸	1	10.4552		
Symmetry Finish by symm			New Duplicate De	lete
Finish by symm	etry mber spaces	\sim	New Duplicate De	lete
Finish by symm		\sim		lete ~~
Finish by symm	mber spaces	Spacing (in)	New Duplicate De	
Finish by symm	Number of spaces	(in)	New Duplicate De	
Finish by symm	Number of spaces	(in) 6	New Duplicate De	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Finish by symm	Number of spaces	(in)	New Duplicate De	
Finish by symm Even nur Id nur Reinf. name #5 S Bars ~ #5 K Bars ~ #5 K Bars ~	Number of spaces 6	(in) 6 10.4552	New Duplicate De	
Finish by symm Even nur Id nur Reinf. name #5 S Bars ~ #5 K Bars ~ #5 K Bars ~	Number of spaces 6 1 78	(in) 6 10.4552 18	New Duplicate De	~~~ ~~~
Finish by symm Even nur d nur Reinf. name #5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 K Bars ~	Number of spaces 6 1 78	(in) 6 10.4552 18 10.4552	New Duplicate De	~~
Finish by symm Even nur Id nur Reinf. name #5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~	Number of spaces 6 1 78 1 6	(in) 6 10.4552 18 10.4552 6		~~
Finish by symm Finish by symm Even nur Id nur Reint. name #5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~	Number of spaces 6 1 78 1 6	(in) 6 10.4552 18 10.4552 6		lete lete
Finish by symm Finish by symm Very Arrow of Ar	Number of spaces 6 1 78 1 6 18	(in) 6 10.4552 18 10.4552 6		~~
Finish by symm Finish by symm Finish by symm Reinf. name #5 S Bars ~ #5 K Bars ~ #5 S Bars ~ Symmetry ~ Sinish by symm	Number of spaces 6 1 78 1 6 18	(in) 6 10.4552 18 10.4552 6		~~
Finish by symm Finish by symm Finish by symm Reinf. name #5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ Symmetry Finish by symm Even num	Number of spaces 6 1 1 78 1 1 6 18 etry	(in) 6 10.4552 18 10.4552 6		~~
Finish by symm Finish by symm Finish by symm Reinf. name #5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ Symmetry Finish by symm Even num	Number of spaces 6 1 1 78 1 1 6 1 8 1 8 1 8 1 8 1 8 1 8 1 8 1 8	(in) 6 10.4552 18 10.4552 6		~~

Click on the **Stirrup Wizard** button and enter the following data for each span as shown below.

	rd)
Span: 2 🗸			
	↓ ▲ ▶		
0.5	ft		135.3333321 ft 0.5 ft
istance from left end t	to first 0.166	666 ft	
tirrup: istance from right end		ft	Distance from left end to last stirrup: 136.3333320 f
tirrup:	0	π	All extended into deck
Reinf. name	Number of spaces	Spacing (in)	
#5 S Bars 🛛 🗸	1	0	
#5 S Bars 🛛 🗸	18	4	
#5 S Bars 🗸 🗸	6	6	
#5 K Bars 🛛 🗸	1	7	
#5 K Bars 🗸 🗸	78	18	
#5 S Bars 🗸	1	7	
nafre	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		New Duplicate Delete
marine #5 S Bars	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	6	New Duplicate Delete
			New Duplicate Delete
#5 S Bars V		7	New Duplicate Delete
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 K Bars ~	1	7	New Duplicate Delete
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 K Bars ~	1 78	7 18 7	New Duplicate Delete
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ *5 S Bars ~	1 78 1	7 18 7	New Duplicate Dele
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ *5 S Bars ~	1 78 1	7 18 7 6 6	New Duplicate Delete
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ Symmetry	1 78 1 6 18	7 18 7 6 6	
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ Symmetry	1 78 1 6 18 2try	7 18 7 6 6	
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ Symmetry Finish by symmetry Finish by symmetry Even num	1 78 1 6 18 2 try nber spaces	7 18 7 6 6	
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ Symmetry Finish by symmetry Finish by symmetry Even num	1 78 1 6 18 2try	7 18 7 6 6	
#5 S Bars ~ #5 K Bars ~ #5 K Bars ~ #5 S Bars ~ #5 S Bars ~ #5 S Bars ~ Symmetry Finish by symmetry Finish by symmetry Even num	1 78 1 6 18 2 try nber spaces	7 18 7 6 6	



Click **Apply all** and the wizard closes returning to the **PS Shear Reinforcement Ranges** window populated as shown below.

ertical Horizontal							
oan: 1 🗸 🗸	Сору	span to					
Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)
#5 S Bars	\sim		0.166666	1	0	0	0.166666
#5 S Bars	~	 Image: A set of the set of the	0.166666	1	0	0	0.166666
#5 S Bars	~	\checkmark	0.166666	18	4	6	6.166666
#5 S Bars	~	 Image: A set of the set of the	6.166666	6	6	3	9.166666
#5 K Bars	~	\sim	9.166666	1	10.4552	0.87126667	10.03793267
#5 K Bars	~	 Image: A set of the set of the	10.03793267	78	18	117	127.03793267
#5 S Bars	~	 Image: A set of the set of the	127.03793267	1	10.4552	0.87126667	127.90919934
#5 S Bars	~	\sim	127.90919934	6	6	3	130.90919934
#5 S Bars	~		130.90919934	18	4	6	136.90919934
Stirrup wizard	Stirrup	design too	I View calcs	;	Ne	ew Dupl	icate Delete

Span:	2 v C	opy span to						
	Name	Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	× 🔽	0.166666	1	0	0	0.166666	-
:	#5 S Bars	~ 	0.166666	1	0	0	0.166666	
:	#5 S Bars	~ 🔽	0.166666	18	4	6	6.166666	
:	#5 S Bars	~ 🔽	6.166666	6	6	3	9.166666	
:	#5 K Bars	~ 🔽	9.166666	1	7	0.58333333	9.74999933	
:	#5 K Bars	~ 🔽	9.74999933	78	18	117	126.74999933	
:	#5 S Bars	~ 🔽	126.74999933	1	7	0.58333333	127.33333266	
:	#5 S Bars	~ 🔽	127.33333267	6	6	3	130.33333267	
;	#5 S Bars	~ 🔽	130.33333267	18	4	6	136.33333267	

Snan	: 3 ~	Conv	span to						
	Name	copy	Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	~		0.166666	1	0	0	0.166666	-
	#5 S Bars	~	\checkmark	0.166666	1	0	0	0.166666	
	#5 S Bars	~	 Image: A set of the set of the	0.166666	18	4	6	6.166666	
	#5 S Bars	~	 Image: A set of the set of the	6.166666	6	6	3	9.166666	
	#5 K Bars	~	 Image: A set of the set of the	9.166666	1	10.4552	0.87126667	10.03793267	
	#5 K Bars	~	 Image: A set of the set of the	10.03793267	78	18	117	127.03793267	
	#5 S Bars	\sim	 Image: A set of the set of the	127.03793267	1	10.4552	0.87126667	127.90919934	
	#5 S Bars	\sim	 Image: A set of the set of the	127.90919933	6	6	3	130.90919933	
	#5 S Bars	~	 Image: A set of the set of the	130.90919933	18	4	6	136.90919933	

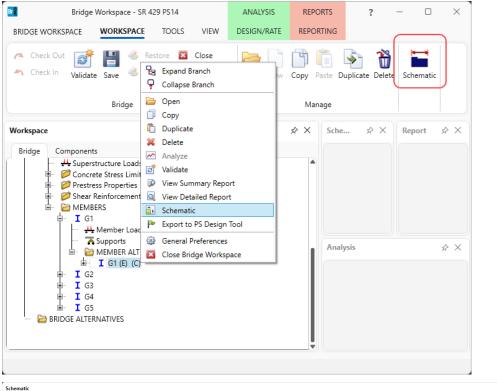
Click **OK** to apply the data and close the window.

Live Load Distribution

The live load distribution factors will be computed by the BrDR LRFD engine during analysis.

Schematic – G1 Member Alternative

While the member alternative G1 (E) (C) 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 G1 (E) (C) in the Bridge Workspace and select Schematic from the menu).



Schematic	- 🗆 ×
PS Profile	~ ×
□ La Q Q ⊕ 田 密 H 50%	÷
98 43 P914 98 43 P914 - A BULTTHREE 10 FT SPANS - 01 1000004	
Bern Lergths + 130-10 20/02"	,
Horz. Shear Reint. Spooling Vent. Shear Reint. Spooling 13,55% @ 0.57% @ 10.127 72 55% @ 1.47~117-07	8 5PA@118 5PA@4~6118 5PA@ 6 5PA@ 6771-6
Deboried Stands	
• B1172	
Beam Projectors	or 🗍 🖡 or
Bearing Offsets	11" ++++ 11"
Span Lengths 1326-5786	+
Notes: * Al lover langth dimensions are horiz. * X exercise disphragm locations.	
4	Þ

	Harp Lo	cations	
Girder	Span 1	Span 2	Span 3
1	54.45460	54.16667	54.45460
2	54.48771	54.16667	54.48771
3	54.52083	54.16667	54.52083
4	54.55395	54.16667	54.55395
5	54.58707	54.16667	54.58707

Girder 1 is complete. Girders G2-G5 are similar but the lengths are different.

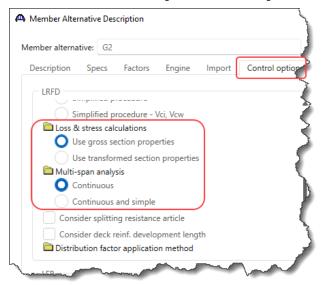
Enter the girder G2-G5 and see images to update the differences in windows shown below.

Girder G2

Member Alternative Description

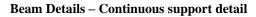
mber alternative: G2					
Description Specs	Factors	Engine	Import	Control options	
escription:				Material type:	Prestressed (Pretensioned)
				Girder type:	PS Precast I
				Modeling type:	Multi Girder System
				Default units:	US Customary 🗸 🗸
Cross-section b					
Cross-section b	ased			Default rating me	thod:
Cross-section b Self load Load case:	ased	-	~	Default rating me	thod:
Cross-section b	ased	kip/ft	~		thod:
Cross-section b Self load Load case:	Engine Ass	-	~		thod:
Cross-section b Self load Load case: Additional self load:	Engine Ass	kip/ft			thod:
Cross-section b Self load Load case: Additional self load:	Engine Ass	kip/ft		LFR re factor	thad: V

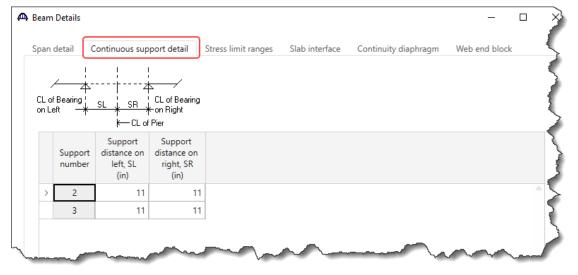
Member Alternative Description – Control Options



Beam Details – Span detail

Spar	n detail	Continuous	upport detail Stress limit ranges S	Slab interface Continu	iity diapł	nragm W	eb end block	
	Casa		Girder	Prestress		Beam p	rojection	
	Span number	Beam shap	e material	properties	n	Left end (in)	Right end (in)	
>	1	BT-72 ~	Class FX Beam Concrete 138 FT \sim	0.6" (7W-270) LR 🗸		9	6	
	2	BT-72 ~	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		6	6	
	3	BT-72 🗸	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		6	9	





Beam Details – Stress limit ranges

pa	n det	ail	Continuous support detail	Stress lim	it ranges	Slab interface	Continuity diaphragm	Web end block
		pan mber	Name	Start distance (ft)	Length (ft)	End distance (ft)		
>	1	\sim	138 FT STRESS LIMIT	0	136.9754	136.9754		
	2	\sim	138 FT STRESS LIMIT 🛛 🗸	0	136.333333	136.333333		
	3	\sim	138 FT STRESS LIMIT	0	136.9754	136.9754		

Beam Details – Slab interface

Span detail Continuous suppor	t detail 🛛 Str	ess limit ranges	Slab interface	Continuity diaphragm	Web end block	
nterface type:	Intentio	nally Roughened	~			
Default interface width to beam wid	lths: 🗸					
nterface width:		in				
Cohesion factor:	0.28	ksi				
riction factor:	1					
(1)	0.3					
(2:	1.8	ksi				

Beam Details – Continuity diaphragm

Spar	n deta	il	Continuous supp	oort detail	Stress limi	t ran	ges	Slab interface	Continu	iity diaphrag	m	Web	end block	
	c.	ban		Left supp	port				Right sup	port				
		nber	Material	Distance (in)	Bar count	Bar	size	Material	Distance (in)	Bar count	Bar	size		
	1	\sim	~				\sim	Grade 60 🗸 🗸	3.5	2	10	~		
	1	\sim	~				\sim	Grade 60 🗸	7	2	10	~		
	1	\sim	~				\sim	Grade 60 🗸	11	1	10	~		
	1	\sim	~ ~				\sim	Grade 60 🗸 🗸	20	1	10	~		
	1	\sim	~				\sim	Grade 60 🗸	29	1	10	~		
>	1	\sim	~				\sim	Grade 60 🗸	38	1	10	~		
	2	\sim	Grade 60 🗸	3.5	2	10	\sim	Grade 60 🗸	3.5	2	10	~		
	2	\sim	Grade 60 🗸	7	2	10	\sim	Grade 60 🗸	7	2	10	~		
	2	\sim	Grade 60 🗸	11	1	10	\sim	Grade 60 🗸	11	1	10	\sim		
	2	\sim	Grade 60 🗸	20	1	10	\sim	Grade 60 🗸	20	1	10	\sim		
	2	\sim	Grade 60 🗸	29	1	10	\sim	Grade 60 🗸	29	1	10	\sim		
	2	\sim	Grade 60 🗸	38	1	10	\sim	Grade 60 🗸	38	1	10	\sim		
	3	\sim	Grade 60 🗸	3.5	2	10	\sim	Grade 60 🛛 🗸				\sim		
	3	\sim	Grade 60 🗸	7	2	10	\sim	Grade 60 🗸 🗸				\sim		
	3	\sim	Grade 60 🗸	11	1	10	\sim	Grade 60 🛛 🗸				\sim		
	3	\sim	Grade 60 🗸	20	1	10	\sim	Grade 60 🛛 🗸				\sim		
	3	\sim	Grade 60 🗸	29	1	10	\sim	Grade 60 🛛 🗸				\sim		
	3	\sim	Grade 60 🗸	38	1	10	\sim	Grade 60 🛛 🗸				\sim		
										New		uplice	ta) r	elete
	Igno	re po	sitive moment at	supports in	ratings					New	D	uplica		relete

Strand Layout

Strand layout is similar to G1, but the length is different. See below for G2 harp locations and enter them in the window by following the steps used for G1.

	Harp Loo	cations	
Girder	Span 1	Span 2	Span 3
2	54.48771	54.16667	54.48771

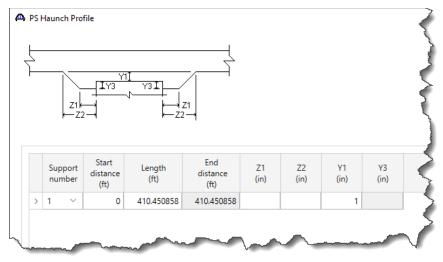
Deck Profile – Deck concrete

	PS Precast I k concrete Reinforce	ment									
	Material	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n
>	Class AA (US) 🗸 🗸	1 ~	0	410.450858	410.450858	7.75	87.999996	87.999996	87.999996	87.999996	8

Deck Profile – Reinforcement

	PS Precast	_	einfor	cemer	nt										
	Materia	al		port nber	Start distance (ft)	Length (ft)	End distance (ft)	Std bar count	LRFD bar count	Bar	r size	Distance (in)	Row		Bar spacing (in)
	Grade 60	\sim	1	\sim	0	410.450858	410.450858	10	10	5	\sim	1.9375	Bottom of Slab	\sim	7
	Grade 60	\sim	1	\sim	0	106.225429	106.225429	8	8	5	\sim	2.9375	Top of Slab	\sim	11
	Grade 60	\sim	1	\sim	106.225429	70	176.225429	8	8	8	\sim	3.125	Top of Slab	\sim	11
	Grade 60	\sim	1	\sim	121.225429	35	156.225429	8	8	8	\sim	3.125	Top of Slab	\sim	11
	Grade 60	\sim	2	\sim	39.583333	58	97.583333	8	8	6	\sim	3	Top of Slab	\sim	11
	Grade 60	\sim	2	\sim	97.583333	70	167.583333	8	8	8	\sim	3.125	Top of Slab	\sim	11
	Grade 60	\sim	3	\sim	15.416667	35	50.416667	8	8	8	\sim	3.125	Top of Slab	\sim	11
>	Grade 60	\sim	3	\sim	30.416667	106.225429	136.642096	8	8	5	~	2.9375	Top of Slab	\sim	11

PS Haunch Profile



PS Shear Reinforcement Ranges

an: 1	~ Сору	/ span to					
	Name	Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)
#5 S Ba	irs ~	 Image: A set of the set of the	0.166666	1	0	0	0.166666
#5 S Ba	irs ~		0.166666	18	4	6	6.166666
#5 S Ba	irs 🗸 🗸		6.166666	6	6	3	9.166666
#5 K B	ars \vee		9.166666	1	10.852	0.904333	10.070999
#5 K B	ars 🗸 🗸	\checkmark	10.070999	78	18	117	127.070999
#5 S Ba	irs 🗸 🗸		127.070999	1	10.852	0.904333	127.975332
#5 S Ba	irs 🗸 🗸	\checkmark	127.975332	6	6	3	130.975332
> #5 S Ba	irs \vee		130.975332	18	4	6	136.975332
				-	-		

Spa	n: 2 v	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
	#5 S Bars	\sim	 Image: A set of the set of the	0.166666	1	0	0	0.166666	
	#5 S Bars	\sim	 Image: A set of the set of the	0.166666	18	4	6	6.166666	
	#5 S Bars	\sim		6.166666	6	6	3	9.166666	
	#5 K Bars	\sim	\checkmark	9.166666	1	7	0.583333	9.749999	
	#5 K Bars	\sim	\checkmark	9.749999	78	18	117	126.749999	
	#5 S Bars	\sim	\checkmark	126.749999	1	7	0.583333	127.333332	
	#5 S Bars	\sim	\checkmark	127.333332	6	6	3	130.333332	
>	#5 S Bars	\sim	\checkmark	130.333332	18	4	6	136.333332	
							1		

бра	n: 3 ~	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
	#5 S Bars	\sim	 Image: A set of the set of the	0.166666	1	0	0	0.166666	1
	#5 S Bars	\sim		0.166666	18	4	6	6.166666	
	#5 S Bars	\sim	 Image: A set of the set of the	6.166666	6	6	3	9.166666	
	#5 K Bars	\sim	 Image: A set of the set of the	9.166666	1	10.852	0.904333	10.070999	
	#5 K Bars	\sim	\checkmark	10.070999	78	18	117	127.070999	
	#5 S Bars	\sim		127.070999	1	10.852	0.904333	127.975332	
	#5 S Bars	\sim		127.975332	6	6	3	130.975332	
>	#5 S Bars	\sim	\checkmark	130.975332	18	4	6	136.975332	
	Stirrup wizard		design tool					uplicate Dele	

Girder G3

Member Alternative Description

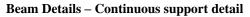
ember alternative: G	\$				4
Description Specs	Factors	Engine	Import	Control options	
Description:				Material type:	Prestressed (Pretensioned)
				Girder type:	PS Precast I
				Modeling type:	Multi Girder System
				Default units:	US Customary 🗸 🗸
Girder property inp Schedule base Cross-section	ed			Default rating me	thod:
Schedule base Cross-section	based	signed	~	Default rating me	thod:
Cross-section	ed based Engine As		~		thod:
Schedule base Cross-section Self load Load case:	Engine As	signed kip/ft %	~		thod:
Schedule base Cross-section Self load Load case: Additional self load	Engine As	kip/ft			thod:
Self load Load case: Additional self load	Engine As	kip/ft	Exposu	LFR	thod:

Member Alternative Description – Control Options

A Member Alternative Description
Member alternative: G3
Description Specs Factors Engine Import Control options
LRFD Simplified procedure - Vci, Vcw Loss & stress calculations Use gross section properties Use transformed section properties Multi-span analysis Continuous
Continuous and simple Consider splitting resistance article
Consider deck reinf. development length

Beam Details - Span detail

par	n detail	Continuou	s su	pport detail Stress limit ranges S	lab interface Continui	ty dia	phragm W	eb end block	
	C			Girder	Prestress		Beam p	projection	
	Span number	Beam sha	ape	material	properties	n	Left end (in)	Right end (in)	
>	1	BT-72	\sim	Class FX Beam Concrete 138 FT \sim	0.6" (7W-270) LR 🗸		9	6	
	2	BT-72	\sim	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		6	6	
	3	BT-72	\sim	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		6	9	





Beam Details – Stress limit ranges

Spar	n det	tail	Continuous support detai	il Stress lir	nit ranges	Slab interface	Continuity diaphragm	Web end blo
		pan mber	Name	Start distance (ft)	Length (ft)	End distance (ft)		
	1	\sim	138 FT STRESS LIMIT	~ 0	137.0417	137.0417		
	2	\sim	138 FT STRESS LIMIT	~ 0	136.333333	136.333333		
I	3	\sim	138 FT STRESS LIMIT	/ 0	137.0417	137.0417		

Beam Details – Slab interface

Span detail Continuous suppor	t detail Stre	ss limit ranges	Slab interface	Continuity diaphragm	Web end b
Interface type:	Intentiona	ally Roughened	~	-	
Default interface width to beam wi	dths: 🗸				
Interface width:		in			
Cohesion factor:	0.28	ksi			
Friction factor:	1				
K1:	0.3				
K2:	1.8	ksi			

Beam Details – Continuity diaphragm

								<u> </u>			
	Sp	an		Left sup	port			Right sup	port		
	nur	nber	Material	Distance (in)	Bar count	Bar size	Material	Distance (in)	Bar count	Bar size	
>	1	\sim	~			~	Grade 60 🗸	3.5	2	10 ~	
	1	\sim	~			~	Grade 60 🗸	7	2	10 ~	
	1	\sim	~			~	Grade 60 🗸	11	1	10 ~	
	1	\sim	~			~	Grade 60 🗸	20	1	10 ~	
	1	\sim	~			~	Grade 60 🗸	29	1	10 ~	
	1	\sim	~			~	Grade 60 🗸	38	1	10 ~	
	2	\sim	Grade 60 🗸	3.5	2	10 ~	Grade 60 🗸	3.5	2	10 ~	
	2	\sim	Grade 60 🗸	7	2	10 ~	Grade 60 🗸	7	2	10 ~	
	2	\sim	Grade 60 🗸	11	1	10 ~	Grade 60 ∨	11	1	10 ~	
	2	\sim	Grade 60 V	20	1	10 ~	Grade 60 🗸	20	1	10 ~	
	2	\sim	Grade 60 🗸	29	1	10 ~	Grade 60 🗸	29	1	10 ~	
	2	\sim	Grade 60 ∨	38	1	10 ~	Grade 60 🗸	38	1	10 ~	
	3	\sim	Grade 60 V	3.5	2	10 ~	Grade 60 🗸			~	
	3	\sim	Grade 60 V	7	2	10 ~	~			~	
	3	\sim	Grade 60 V	11	1	10 ~	~			~	
	3	\sim	Grade 60 V	20	1	10 ~	~			~	
	3	~	Grade 60 V	29	1	10 ~	~			~	
	3	\sim	Grade 60 V	38	1	10 ~	~			~	
	lano	re po	sitive moment at	supports in	ratinos				New	Duplica	ite Delete

Strand Layout

Strand layout is similar to G1, but the length is different. See below for G3 harp locations and enter them in the window by following the steps used for G1.

	Harp Loo	cations	
Girder	Span 1	Span 2	Span 3
3	54.52083	54.16667	54.52083

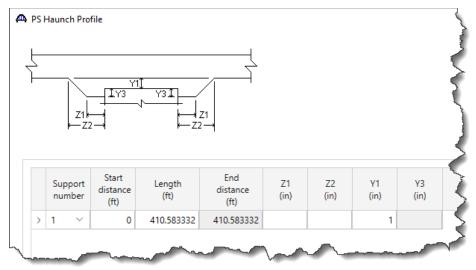
Deck Profile – Deck concrete

	Material	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n	
>	Class AA (US) V	1 ~	0	410.583332	410.583332	7.75	87.999996	87.999996	87.999996	87.999996		8

Deck Profile – Reinforcement

pe:	PS Precast I	_												
Decl	k concrete	Rei	nfor	cemer	it									
	Material			oport mber	Start distance (ft)	Length (ft)	End distance (ft)	Std bar count	LRFD bar count	Bar size	Distance (in)	Row		Bar spacing (in)
>	Grade 60	~	1	~	0	410.583332	410.583332	10	10	5 ~	1.9375	Bottom of Slab	\sim	7
	Grade 60	~	1	~	0	106.291666	106.291666	8	8	5 ~	2.9375	Top of Slab	\sim	11
	Grade 60	~	1	\sim	106.291666	70	176.291666	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	~	1	\sim	121.291666	35	156.291666	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	~	2	~	39.583333	58	97.583333	8	8	6 ~	3	Top of Slab	\sim	11
	Grade 60	~	2	~	97.583333	70	167.583333	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	~	3	~	15.416667	35	50.416667	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	~	3	\sim	30.416667	106.291666	136.708333	8	8	5 V	2.9375	Top of Slab	\sim	11

PS Haunch Profile



PS Shear Reinforcement Ranges

Spar	n: 1 v	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	\sim	 Image: A start of the start of	0.166666	1	0	0	0.166666	-
	#5 S Bars	~	~	0.166666	18	4	6	6.166666	
	#5 S Bars	\sim	 Image: A set of the set of the	6.166666	6	6	3	9.166666	
	#5 K Bars	\sim	 Image: A set of the set of the	9.166666	1	11.25	0.9375	10.104166	
	#5 K Bars	~	 Image: A set of the set of the	10.104166	78	18	117	127.104166	
	#5 S Bars	\sim		127.104166	1	11.25	0.9375	128.041666	
	#5 S Bars	\sim		128.041666	6	6	3	131.041666	
	#5 S Bars	\sim	\sim	131.041666	18	4	6	137.041666	
	Stirrup wizard	Stirrup	design tool	View calcs		Ne	w Dupl	icate Delete	

Spar	n: 2 v	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	~	\checkmark	0.166666	1	0	0	0.166666	-
	#5 S Bars	~	 Image: A set of the set of the	0.166666	18	4	6	6.166666	
	#5 S Bars	~		6.166666	6	6	3	9.166666	
	#5 K Bars	~	 Image: A start of the start of	9.166666	1	7	0.583333	9.749999	
	#5 K Bars	\sim	\checkmark	9.749999	78	18	117	126.749999	
	#5 S Bars	\sim	\checkmark	126.749999	1	7	0.583333	127.333332	
	#5 S Bars	\sim	\checkmark	127.333332	6	6	3	130.333332	
	#5 S Bars	~	\checkmark	130.333332	18	4	6	136.333332	
	#5 S Bars	~		130.333332	18	4	6	136.333332	

Spar	n: 3 ~	Сору	span to					
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)
>	#5 S Bars	\sim		0.166666	1	0	0	0.166666
	#5 S Bars	~	 Image: A set of the set of the	0.166666	18	4	6	6.166666
	#5 S Bars	\sim		6.166666	6	6	3	9.166666
	#5 K Bars	\sim		9.166666	1	11.25	0.9375	10.104166
	#5 K Bars	\sim		10.104166	78	18	117	127.104166
	#5 S Bars	\sim		127.104166	1	11.25	0.9375	128.041666
	#5 S Bars	\sim		128.041666	6	6	3	131.041666
	#5 S Bars	\sim		131.041666	18	4	6	137.041666
	Stirrup wizard	Stirrup	design tool	View calcs		N	ew Dup	icate Delete

Girder G4

Member Alternative Description

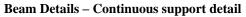
ember alternati	ive: G4					:
Description	Specs	Factors	Engine	Import	Control options	
Description:					Material type:	Prestressed (Pretensione
					Girder type:	PS Precast I
					Modeling type:	Multi Girder System
					Default units:	US Customary
Cross-	erty input ule based section ba					
O Sched Cross-	ule based section b	ased	rigned		Default rating me	
Sched Cross- Self load Load case:	ule based -section bi			~		
O Sched Cross-	self load:	ased	signed kip/ft %	~	Default rating me	
Self load Load case: Additional	self load:	Engine As	kip/ft		Default rating me	
Self load Load case: Additional	ule based section bi self load: self load: ol parame	Engine As	kip/ft		Default rating me LFR re factor	

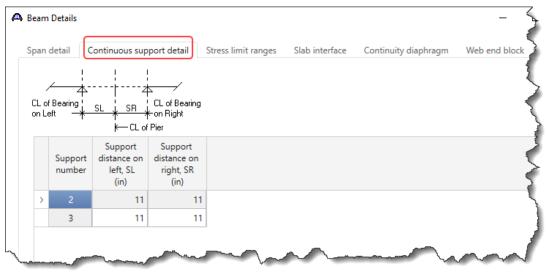
Member Alternative Description – Control Options

nber alternative: G4		
escription Specs Factors En	gine Import	Control options
LRFD		
 Simplified procedure - Vci, V Loss & stress calculations 	cw	
Use gross section properties		
Use transformed section pro	perties	
Multi-span analysis		
O Continuous		
Continuous and simple		
Consider splitting resistance arti	cle	
Consider deck reinf. developme	nt lenath	•
Distribution factor application me	2	-

Beam Details – Span detail

								-	
	Span	Beam s	hape	Girder		Prestress	n	· · ·	rojection
	number		p.c	material		properties		Left end (in)	Right end (in)
	1	BT-72	\sim	Class FX Beam Concrete 138 FT	\sim	0.6" (7W-270) LR 🗸		9	6
	2	BT-72	\sim	Class FX Beam Concrete 138 FT	\sim	0.6" (7W-270) LR 🗸		6	6
0	3	BT-72	\sim	Class FX Beam Concrete 138 FT	\sim	0.6" (7W-270) LR 🗸		6	9







Spar	n deta	il	Continuous support de	tail	Stress lim	it ranges	Slab interface	Continuity diaphragm	Web end bloc
		an 1ber	Name		Start distance (ft)	Length (ft)	End distance (ft)		
>	1	\sim	138 FT STRESS LIMIT	\sim	0	137.1079	137.1079		
	2	\sim	138 FT STRESS LIMIT	\sim	0	136.333333	136.333333		
	3	\sim	138 FT STRESS LIMIT	\sim	0	137.1079	137.1079		

Beam Details – Slab interface

Span detail Continuous support de	tail Stre	ess limit ranges	Slab interface	Continuity diaphragm	Web end blo
Interface type:	Intention	ally Roughened	~		3
Default interface width to beam widths	 Image: A set of the set of the				
Interface width:		in			•
Cohesion factor:	0.28	ksi			<
Friction factor:	1				1
K1:	0.3				
K2:	1.8	ksi			

Beam Details – Continuity diaphragm

par	n deta	ail	Continuous sup	port detail	Stress limi	it ran	ges	Slab interfa	ce	Continu	ity diaphrag	n	Web	end block	
				Left sup	port					Right sup	port				
		pan mber	Material	Distance (in)	Bar count	Bar	r size	Material		Distance (in)	Bar count	Bar	size		
	1	\sim	~				\sim	Grade 60	-	3.5	2	10	~		
	1	\sim	~				\sim	Grade 60	/	7	2	10	\sim		
	1	\sim	~ ~				\sim	Grade 60	/	11	1	10	\sim		
	1	\sim	~ ~				\sim	Grade 60	/	20	1	10	\sim		
	1	\sim	~ ~				\sim	Grade 60	/	29	1	10	\sim		
	1	\sim	~ ~				\sim	Grade 60	/	38	1	10	\sim		
	2	\sim	Grade 60 🗸	3.5	2	10	\sim	Grade 60	/	3.5	2	10	\sim		
	2	\sim	Grade 60 🗸	7	2	10	\sim	Grade 60	/	7	2	10	\sim		
	2	\sim	Grade 60 🗸	11	1	10	\sim	Grade 60	/	11	1	10	\sim		
	2	\sim	Grade 60 🗸	20	1	10	\sim	Grade 60	/	20	1	10	\sim		
	2	\sim	Grade 60 🗸	29	1	10	\sim	Grade 60	/	29	1	10	\sim		
>	2	\sim	Grade 60 🗸 🗸	38	1	10	\sim	Grade 60	/	38	1	10	\sim		
	3	\sim	Grade 60 🗸 🗸	3.5	2	10	\sim	Grade 60	/				\sim		
	3	\sim	Grade 60 🗸	7	2	10	\sim		/				\sim		
	3	\sim	Grade 60 🗸	11	1	10	\sim		/				\sim		
	3	\sim	Grade 60 🗸	20	1	10	\sim		/				\sim		
	3	\sim	Grade 60 🗸	29	1	10	\sim		/				\sim		
	3	\sim	Grade 60 🗸	38	1	10	\sim		/				\sim		
	Igno	ore po	sitive moment a	t supports in	ratings						New	D	uplicat	e [Delete

Strand Layout

Strand layout is similar to G1, but the length is different. See below for G3 harp locations and enter them in the window by following the steps used for G1.

	Harp Loo	cations	
Girder	Span 1	Span 2	Span 3
4	54.55395	54.16667	54.55395

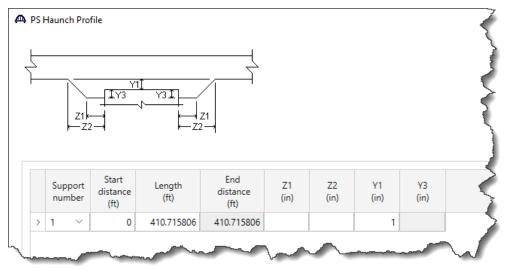
Deck Profile – Deck concrete

e: PS Precast I											
eck concrete Reinforcement											
Material		Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n
> Class AA (US)	\sim	1 ~	0	410.715806	410.715806	7.75	87.999996	87.999996	87.999996	87.999996	8

Deck Profile – Reinforcement

pe:	PS Precast I												
Dec	k concrete	Reinfo	rcemer	nt									
	Material		pport imber	Start distance (ft)	Length (ft)	End distance (ft)	Std bar count	LRFD bar count	Bar size	Distance (in)	Row		Bar spacing (in)
>	Grade 60 🗸	1	\sim	0	410.715806	410.715806	10	10	5 ~	1.9375	Bottom of Slab	\sim	7
	Grade 60 V	1	\sim	0	106.357904	106.357904	8	8	5 ~	2.9375	Top of Slab	\sim	11
	Grade 60 V	1	\sim	106.357904	70	176.357904	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60 V	1	\sim	121.357904	35	156.357904	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60 V	2	\sim	39.583334	58	97.583334	8	8	6 ~	3	Top of Slab	\sim	11
	Grade 60 V	2	\sim	97.583334	70	167.583334	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60 v	3	\sim	15.416666	35	50.416666	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60 🗸	3	\sim	30.416668	106.357904	136.774572	8	8	5 ~	2.9375	Top of Slab	\sim	11

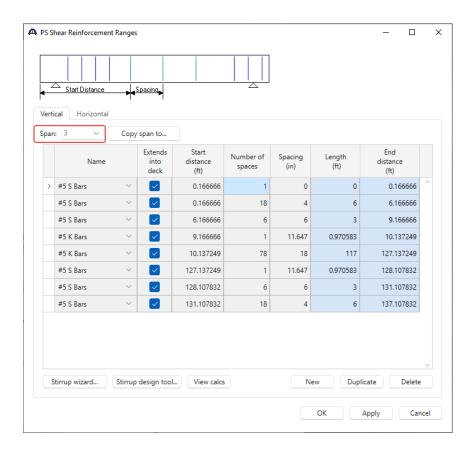
PS Haunch Profile



PS Shear Reinforcement Ranges

Spar	n: 1 v	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	~		0.166666	1	0	0	0.166666	-
	#5 S Bars	~	 Image: A set of the set of the	0.166666	18	4	6	6.166666	
	#5 S Bars	~	 Image: A set of the set of the	6.166666	6	6	3	9.166666	
	#5 K Bars	~	 Image: A set of the set of the	9.166666	1	11.647	0.970583	10.137249	
	#5 K Bars	~	 Image: A set of the set of the	10.137249	78	18	117	127.137249	
	#5 S Bars	~	 Image: A set of the set of the	127.137249	1	11.647	0.970583	128.107832	
	#5 S Bars	~	 Image: A set of the set of the	128.107833	6	6	3	131.107833	
	#5 S Bars	~	 Image: A set of the set of the	131.107833	18	4	6	137.107833	
	Stirrup wizard S	Stirrup	design tool	View calcs		Ne	ew Dup	licate Delete	

Spar	n: 2 ~	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	~		0.166666	1	0	0	0.166666	-
	#5 S Bars	\sim		0.166666	18	4	6	6.166666	
	#5 S Bars	\sim	 Image: A set of the set of the	6.166666	6	6	3	9.166666	
	#5 K Bars	\sim	\checkmark	9.166666	1	7	0.583333	9.749999	
	#5 K Bars	\sim	\checkmark	9.749999	78	18	117	126.749999	
	#5 K Bars	\sim		126.749999	1	7	0.583333	127.333332	
	#5 S Bars	\sim		127.333332	6	6	3	130.333332	
	#5 S Bars	\sim	\checkmark	130.333332	18	4	6	136.333332	
	Stirrup wizard	Stirrup	design tool	View calcs		Ne	w Dun	licate Delete	



Girder G5

Member Alternative Description

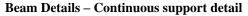
Description	Specs	Factors	Engine	Import	Control opti	ons		
Description:					Material ty	pe:	Prestressed (Pretensio	onec
					Girder type	:	PS Precast I	
					Modeling t	ype:	Multi Girder System	
					Default uni	its:	US Customary	\sim
O Sche	operty inpu dule based s-section b				Default rating	g metł	hod:	
Cros	dule based				Default rating	g metł	hod:	
Cros	dule based s-section b		signed	~	Default rating	g metł	hod:	
Self load Load case	dule based s-section b :: I self load:	Engine As	kip/ft	~		g metł	hod:	
Self load Load case	dule based s-section b	Engine As	-	~		g metł	hod: V	
Self load Load case Additiona	dule based s-section b :: I self load:	Engine As:	kip/ft			g metł	hod:	

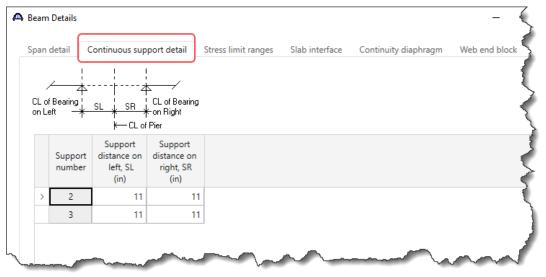
Member Alternative Description – Control Options

mber alternative: G5	
escription Specs Factors Engine Import	Control options
LRFD	
Simplified procedure - Vci. Vcw	
Loss & stress calculations	
 Use gross section properties 	
Use transformed section properties	
🛅 Multi-span analysis	
O Continuous	
Continuous and simple	I
Consider splitting resistance article	I
Consider deck reinf. development length	-
Distribution factor application method	

Beam Details – Span detail

oan	detail	Continue	ous su	pport detail Stress limit ranges S	lab interface Continui	ty diaph	iragm W	eb end bloc	
	C			Girder	Prestress		Beam p	orojection	
	Span number	Beam shape		material	properties	n	Left end (in)	Right end (in)	
	1	BT-72	\sim	Class FX Beam Concrete 138 FT \sim	0.6" (7W-270) LR 🗸		9	6	
	2	BT-72	~	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸		6	6	
>	3	BT-72	\sim	Class FX Beam Concrete 138 FT 🛛 🗸	0.6" (7W-270) LR 🗸 🗸		6	9	





Beam Details – Stress limit ranges

Spar	n de	tail	Continuous support detail	Stress lim	it ranges	Slab interface	Continuity diaphragm	Web end block
		Span Name number		Start distance (ft)	Length (ft)	End distance (ft)		
>	1	\sim	138 FT STRESS LIMIT	0	137.1741	137.1741		
	2	\sim	138 FT STRESS LIMIT 🛛 🗸	0	136.333333	136.333333		
	3	\sim	138 FT STRESS LIMIT	0	137.1741	137.1741		

Beam Details – Slab interface

Span detail Continuous	support detail	Stress limit range	s Slab interfac	e Continuity diaphragm	Web end bl
Interface type:	Intent	ionally Roughen	ed 🗸		
Default interface width to be	eam widths: 🔽				
Interface width:		in			1
Cohesion factor:	0.28	ksi			
Friction factor:	1				4
K1:	0.3				
K2:	1.8	ksi			

Beam Details – Continuity diaphragm

				port detail	Stress limit ranges Slab interfac				Continu						
	Sp	an		Left sup	ipport				Right sup	Right support					
	num		Material	Distance (in)	Bar count	Bar siz	ze	Material	Distance (in)	Bar count	Bar	size			
	1	\sim	~			``	~	Grade 60 🗸 🗸	3.5	2	10	~			
	1	\sim	~				~	Grade 60 🗸 🗸	7	2	10	\sim			
	1	\sim	~ ~				~	Grade 60 🗸 🗸	11	1	10	\sim			
	1	\sim	~			``	~	Grade 60 🗸 🗸	20	1	10	\sim			
	1	\sim	~			``	~	Grade 60 🗸	29	1	10	\sim			
	1	\sim	~			```	~	Grade 60 🗸	38	1	10	\sim			
	2	\sim	Grade 60 🗸	3.5	2	10 🚿	~	Grade 60 🗸 🗸	3.5	2	10	\sim			
	2	\sim	Grade 60 🗸 🗸	7	2	10	~	Grade 60 🗸 🗸	7	2	10	\sim			
	2	\sim	Grade 60 🗸 🗸	11	1	10	~	Grade 60 🗸 🗸	11	1	10	\sim			
	2	\sim	Grade 60 🗸 🗸	20	1	10	~	Grade 60 🗸 🗸	20	1	10	\sim			
	2	\sim	Grade 60 🗸 🗸	29	1	10 \	~	Grade 60 🗸 🗸	29	1	10	\sim			
	2	\sim	Grade 60 🗸	38	1	10	~	Grade 60 🗸 🗸	38	1	10	\sim			
>	3	\sim	Grade 60 🗸	3.5	2	10 \	~	Grade 60 🔍				\sim			
	3	\sim	Grade 60 🗸	7	2	10	~					\sim			
	3	\sim	Grade 60 🗸	11	1	10	~					\sim			
	3	\sim	Grade 60 🗸	20	1	10	~	~				\sim			
	3	\sim	Grade 60 🗸	29	1	10 \	~	~				~			
	3	\sim	Grade 60 🗸	38	1	10	~	~				\sim			
	lanor	e po	sitive moment a	t supports in	ratings					New	D	uplica	te	Del	ete

Strand Layout

Strand layout is similar to G1, but the length is different. See below for G5 harp locations and enter them in the window by following the steps used for G1.

	Harp Loo	cations	
Girder	Span 1	Span 2	Span 3
5	54.58707	54.16667	54.58707

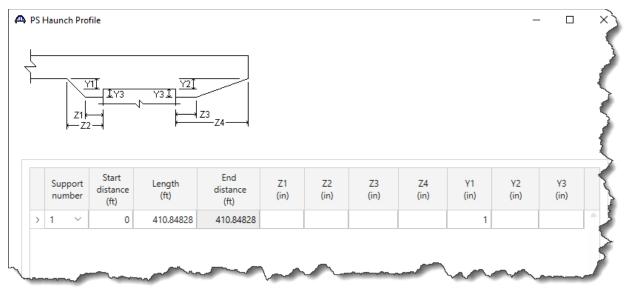
Deck Profile – Deck concrete

-	PS Precast I k concrete Reinforcement										
ec	Remorcement						Start effective	End effective	Start effective	End effective	
	Material	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	flange width (Std) (in)	flange width (Std) (in)	flange width (LRFD) (in)	flange width (LRFD) (in)	n
>	Class AA (US) \sim	1 ~	0	410.84828	410.84828	7.75	88.999998	88.999998	88.999998	88.999998	8

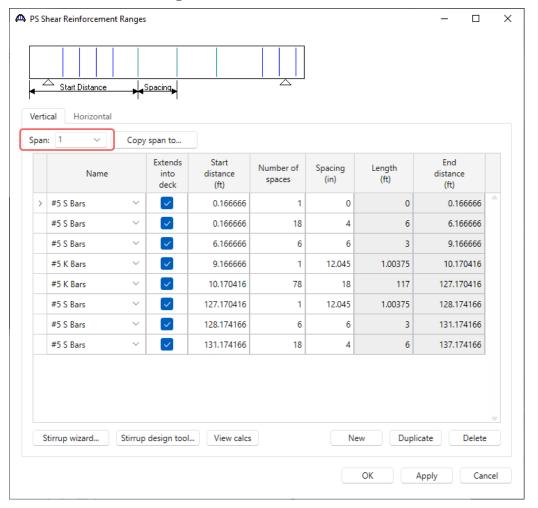
Deck Profile – Reinforcement

pe:	PS Precast													
Dec	k concrete	Re	infor	cemer	ıt									
	Materia	I		port nber	Start distance (ft)	Length (ft)	End distance (ft)	Std bar count	LRFD bar count	Bar size	Distance (in)	Row		Bar spacing (in)
>	Grade 60	\sim	1	\sim	0	410.848281	410.848281	9	9	5 ~	1.9375	Bottom of Slab	\sim	7
	Grade 60	\sim	1	\sim	0	106.424141	106.424141	8	8	5 ~	2.9375	Top of Slab	\sim	11
	Grade 60	\sim	1	\sim	106.424141	70	176.424141	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	\sim	1	\sim	121.424141	35	156.424141	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	\sim	2	\sim	39.583334	58	97.583334	8	8	6 ~	3	Top of Slab	\sim	11
	Grade 60	\sim	2	\sim	97.583334	70	167.583334	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	\sim	3	\sim	15.416666	35	50.416666	8	8	8 ~	3.125	Top of Slab	\sim	11
	Grade 60	\sim	3	\sim	30.416668	106.424141	136.840809	8	8	5 ~	2.9375	Top of Slab	\sim	11

PS Haunch Profile



PS Shear Reinforcement Ranges



Spar	n: 2 ~	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	\sim		0.166666	1	0	0	0.166666	1
	#5 S Bars	~	 Image: A set of the set of the	0.166666	18	4	6	6.166666	
	#5 S Bars	\sim	 Image: A set of the set of the	6.166666	6	6	3	9.166666	
	#5 K Bars	\sim	 Image: A set of the set of the	9.166666	1	7	0.583333	9.749999	
	#5 K Bars	\sim	 Image: A set of the set of the	9.749999	78	18	117	126.749999	
	#5 K Bars	\sim		126.749999	1	7	0.583333	127.333332	
	#5 S Bars	~		127.333332	6	6	3	130.333332	
	#5 S Bars	\sim		130.333332	18	4	6	136.333332	
	Stirrup wizard	Stirrup	design tool	View calcs		N	ew Dup	licate Delete	

Spar	n: 3 🗸	Сору	span to						
	Name		Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
>	#5 S Bars	~	 Image: A set of the set of the	0.166666	18	4	6	6.166666	1
	#5 S Bars	\sim	 Image: A set of the set of the	0.166666	1	0	0	0.166666	
	#5 S Bars	\sim	\checkmark	6.166666	6	6	3	9.166666	
	#5 K Bars	\sim	\checkmark	9.166666	1	12.045	1.00375	10.170416	
	#5 K Bars	\sim	\checkmark	10.170416	78	18	117	127.170416	
	#5 S Bars	\sim	\checkmark	127.170416	1	12.045	1.00375	128.174166	
	#5 S Bars	\sim	\checkmark	128.174166	6	6	3	131.174166	
	#5 S Bars	\sim	\sim	131.174166	18	4	6	137.174166	
	#5 S Bars		design tool				6 ew Dupli		

Superstructure definition – AS BUILT 80 FT SPAN skew

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 for the 80 ft span. The window shown below will appear.

A New Superstructure Definition		×
O Girder system superstructure		
Girder line superstructure	Superstructure definition wizard	
Floor system superstructure		
Floor line superstructure		
Truss system superstructure		
Truss line superstructure		
Reinforced concrete slab system superstructure		
Concrete multi-cell box superstructure		
Advanced concrete multi-cell box superstructure		
	OK Cancel	

Select **Girder system superstructure**, click **OK** and the **Girder System Superstructure Definition** window will open. Enter the data as shown below.

	s Specs Engine						
ame:	AS-BUILT 80 FT SPAN ske	ew				Modeling	
2	SIMPLE SPAN					Multi-girder system MCB With frame structure simplified definit	ion
escription:						Deck type:	
						Concrete Deck 🛛 🗸	
efault units: U umber of spans:	S Customary V		er span l ng the re ::			For PS/PT only Average humidity:	
umber of girders:	5 🗘		Span	Length (ft)		70 %	
		>	1	78.125	^	Member alt. types	
						P/S R/C	
						Timber	
	e along reference line				Ŧ		
Horizontal curvatur			rom PC t	o first suppo	rt line:		
Horizontal curvatur		tance f					
	vature Dist		ent lengt	h:			
Horizontal cur	vature Disi alignment Star		ent lengt	h:			
Horizontal cur Superstructure Curved Tangent, c	vature Disi alignment Star Rac urved, tangent Diri	art tang	-	h:			
Horizontal curr Superstructure Curved Tangent, c Tangent, c	vature Disi alignment Star urved, tangent Dire urved End	art tango dius: rection:	-				
Horizontal curr Superstructure Curved Tangent, c	vature Disi alignment Star urved, tangent Dirr urved End ngent	art tange dius: rection: d tange	nt lengti				
Horizontal curr Superstructure Curved Tangent, c Tangent, c	vature Disi alignment Star urved, tangent Dir urved End ngent Disi	art tange dius: rection: d tange	nt lengti rom last	1:			
Superstructure Curved Tangent, c	vature Disi alignment Stav urved, tangent Din urved End ngent Disi	art tange dius: rection: d tange stance fi	nt lengti rom last eed:	1:			

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

Load Case Description

Expand the **AS-BUILT 80 FT SPAN skew** superstructure definition. Double-click on the **Load Case Description** node in the **Bridge Workspace** tree to open the **Load Case Description window**. Click the **Add default load case descriptions** button to create the following load cases.

	Load case name	Description	Stage		Туре	Time* (days)	
	DC1	DC acting on non-composite section	Non-composite (Stage 1)	V D,DC	~		
	DC2	DC acting on long-term composite section	Composite (long term) (Stage 2)	V D,DC	~		
	DW	DW acting on long-term composite section	Composite (long term) (Stage 2)	V D,DW	~		
>	SIP Forms	Weight due to stay-in-place forms	Non-composite (Stage 1)	V D,DC	\sim		
	stressed members only	Add default load		Ne		licate De	elete

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. Click **Apply** after entering the data as shown below.

A Structure Framing Plan Details						-		×
Number of spans: 1 Number of gird	ers: 5							
Layout Diaphragms								
	Girder spaci	ng orientatio	1 — 1					
Skew	O Perper	ndicular to gire	der					
Support (degrees)	Along	support						
> 1 0.3								
2 -0.3	Girder	Girder s (fi	pacing :)					
	bay	Start of girder	End of girder					
	> 1	7.625	7.625	A				
	2	7.625	7.625					
	3	7.625	7.625					
	4	7.625	7.625					
				w.				
					OK	Apply	Canc	el

Structure Framing Plan Detail – Diaphragms

Switch to the **Diaphragms** tab to enter diaphragm spacing for each girder bay as shown below.

Girder bay: 1 Support number 2 1 ~ 1 ~ 77.9653	0 0	nt Di	iaphragm spacing (ft) 0 0	Number of spaces 1 1	Length (ft)	I E dis	End tance (ft) Right girder	Load (kip)	Diaphragm		
Left gird	distance (ft) der Right girder	Right girder	spacing (ft) 0	of spaces	(ft) 0	dis Left girder	tance (ft)		Diaphragm		
Left gird > 1 ∨	rder Right girder	Right girder 0	0	1	0	Left girder		(кір)			
> 1 ~	0 0	0									
1 ~ 77.9653	3301 78.04515	78.04515	0	1	0		0 0	3.19	Not Assigned	~	
			1			77.965301	1 78.04515	3.19	Not Assigned	\sim	
								New	Duplicate K Apply		Delete Canc
Structure Framing Plan De		Number of gird	ders: 5								
mber of spans: 1 Layout Diaphragms			lers: 5		Diaphra wizaro						
mber of spans: 1 Layout Diaphragms Girder bay: 2 Support	Number of Start distance	Cc rt nce Di		Number	wizard	I E dis	End tance (ft)	Load	Diaphragm	-	
mber of spans: 1 Layout Diaphragms Girder bay: 2 Support number	Number of Start distance (ft)	Cc tt nce D	opy bay to iaphragm		wizard	I E dis	tance (ft)	Load (kip)	Diaphragm	-	
mber of spans: 1 Diaphragms Girder bay: 2 Support	Start distance (ft) der Right girder	Cc tt nce D	opy bay to iaphragm spacing	Number	wizard	I E dis	tance (ft) Right girder		Diaphragm Not Assigned	-	

A Structure Framing Plan Details _ \times Number of girders: 5 Number of spans: 1 Layout Diaphragms Diaphragm \sim Girder bay: 3 Copy bay to... wizard... Start End Diaphragm distance distance Support Number Length Load Diaphragm spacing (ft) (ft) (ft) number of spaces (ft) (kip) Left girder Right girder Left girder Right girder > 1 \sim 0 0 0 1 0 0 0 3.19 --Not Assigned-- \sim \sim 0 1 78.125 78.20485 0 1 78.125 78.20485 3.19 --Not Assigned-- \sim New Duplicate Delete ОК Apply Cancel

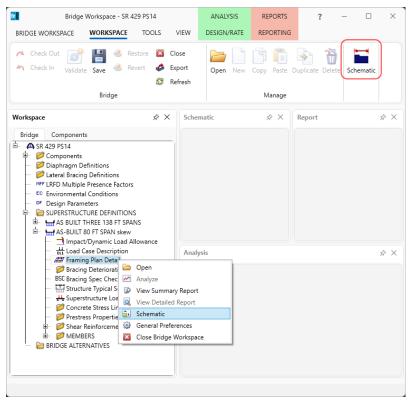
۵	Stru	ctur	e Frami	ng Plan Detail	s								-		×
N	umb	er of	f spans:	1	Number of	girders: 5									
	Layo	out	Diap	ohragms											
	Gird	er b	ay: 4		~	Copy bay to		Diaphra wizar							
			upport umber	dist	tart ance ft)	Diaphragm spacing	Number of spaces	Length (ft)	Er dista (f	ance	Load (kip)	Diaphragm			
			annoer	Left girder	Right girder	(ft)	or spaces	(14)	Left girder	Right girder	(kip)				
	>	1	\sim	0	0	0	1	0	0	0	3.19	Not Assigned	\sim		
		1	\sim	78.20485	78.284699	0	1	0	78.20485	78.284699	3.19	Not Assigned	\sim		
											New	Duplicate		Delete	
											C	K Apply		Cance	!

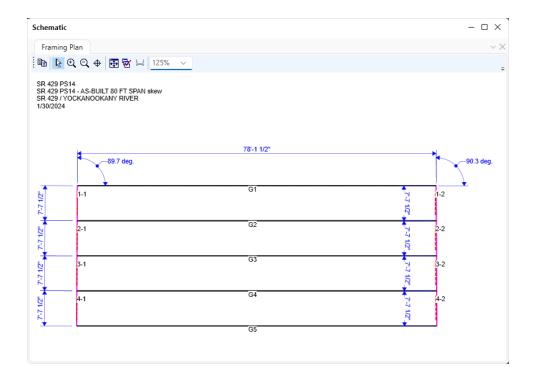
Click **OK** to apply the data and close the window.

PS14 – Prestressed Concrete I Beam Example

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).





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.

A Structure Typical Section							-		×
Distance from left edge of deck to superstructure definition ref. line beck thickness	Distance from superstructure Superstruct Reference	definiti ure De	ion ref. line						
Left overhang			- Rig	ght overhang					
Deck Deck (cont'd) Parapet Mer	dian Railing	, (Generic Sidew	valk Lane position	Striped lanes	Wearing surface			
Superstructure definition reference line is			✓ the bridge dependence of the bridge depe	eck.					
Distance from left edge of deck to superstructure definition reference line:	Start 18.416666	ft	End 18.416666 f	t					
Distance from right edge of deck to superstructure definition reference line:	18.416666	ft	18.416666 f	t					
Left overhang:	3.166666	ft	3.166666 f	t					
Computed right overhang:	3.166666	ft	3.166666 f	t					
						ОК	Apply	Cance	el

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.

A Structure Typical Section	-		×
Distance from left edge of deck to superstructure definition ref. linesuperstructure definition ref. line			
Deck thickness			
Left overhang			
Deck Deck (cont'd) Parapet Median Railing Generic Sidewalk Lane position Striped lanes Wearing surface			
Deck concrete: Class AA (US) \checkmark			
Total deck thickness: 8 in			
Load case: Engine Assigned \lor			
Deck crack control parameter: 130 kip/in			
Sustained modular ratio factor: 2			
Deck exposure factor: 1			
ОК Арр	y	Cance	el

Structure Typical Section – Parapets

Add two parapets as shown below.

ø	St	ructure Typical Section				-		×
	Bacl		Median Railing Ger	eneric Sidewalk Lane pos	ition Striped lanes Wearing surface			
		Name	Load case Measure to	Edge of deck Distance at dist. measured start from (ft)	Distance at end (ft) Front face orientation			
		> RD-32 RAILING ~	DC2 V Back V	Left Edge ~ 0.166666			A	
	-	RD-32 RAILING ~	DC2 V Back V	Right Edge V 0.166666	0.166666 Left ~			
					New Du	plicate	Delete]
					ОК	Apply	Cance	el 🛛

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.

A	Compute Lar	ne 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	-17	17	-17	17	-
					Apply Canc	el

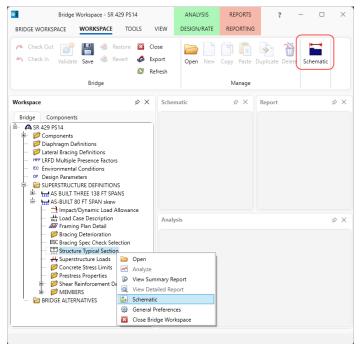
eck	Deck (co	nt'd) Parapet Median	Railing Generic Sidew	valk Lane position Strip	ed lanes Wearing surface		
	Travelway number	Distance from left edge of travelway to superstructure definition reference line at start (A) (ft)	Distance from right edge of travelway to superstructure definition reference 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	-17	17	-17	17		
- L (RFD fatigue Lanes ava	ailable to trucks: Truck fraction:	Compute		New Dup	licate	Delete

The Lane Position tab is populated as shown below.

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

Schematic – Structure Typical Section

While the **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).



Schematic	- 🗆 ×
Bridge Typical Section	$\sim \times$
□ 📴 💦 🔍 🗘 🔶 🖽 🗟 🛏 80% 🛛 ✓	÷
SR 429 PS14 SR 429 PS14 - AS-BUILT 80 FT SPAN skew SR 429 / YOCKANOOKANY RIVER 1/30/2024	
3 6'-10"	-+
36'-6"	-+
34'-0"	
Deck Thickness 8"	1
4@7'-7 1/2" = 30'-6" 3'-2	

Superstructure Loads

Double click on the **Superstructure Loads** node in the **Bridge Workspace** tree to open the **Superstructure Loads** window. Navigate to the **DL distribution** tab in this window. Select options in this window as shown below. The BrDR LRFD engine does not support the transverse continuous beam analysis option.

	cture Loads				-	>
Uniform t	emperature	Gradient temperatur	e Wind	DL distribution		
Stage	1 dead load	distribution				
-	tributary are					
		mple-beam analysis				
		ontinuous-beam analysi				
	percentage	,,				
		rcentage				
_		(%)				
•						
	er-defined de					
⊖ Ву ⊖ Ву		a mple-beam analysis ontinuous-beam analysi:	5			
Uby						
	Girder	rcentage (%)				
÷.						
0.0	er-defined de	ead load				
Us						
005						

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

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 data shown above the **Compute** button, select **Moderate** for the **Corrosion condition** and select the **Class FX Beam Concrete 138 FT** concrete 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.

A Stress Limit Sets -	Concrete						_		×
Name:	80 FT STRE	SS LIMIT							
Description:									
Corrosion condition:	Moderate		~						
Final allowable te	ension stress	limit coef. (US	6) override:						
Concrete material:	Class FX Bea	am Concrete 8	80 FT 🗸						
	Compute								
		LFD		LRFD					
Initial allowable comp	pression:	2.52	ksi	2.73	ksi				
Initial allowable tension	on:	0.1944222	ksi	0.1942822	ksi				
Final allowable comp	ression:	3	ksi	3	ksi				
Final allowable tensio	n:	0.4248529	ksi	0.4248529	ksi				
Final allowable DL co	mpression:	2	ksi	2.25	ksi				
Final allowable slab c	ompression:		ksi		ksi				
Final allowable comp (LL+1/2(Pe+DL))	ression:	2	ksi	2	ksi				
				C	ж	Apply		Cance	el

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

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.

A Prest	tress Properties					-		×
Name:	1/2" (7W-270)) LR						
Gene	eral P/S data	Loss data - lump sum Lo	oss data - PCI					
P/S	strand material	: 1/2" (7W-270) LR	~	Jacking stress ratio:	0.75			
Loss	s method:	AASHTO Approximate	~]	P/S transfer stress ratio:				
				Transfer time:	24	Hours		
				Age at deck placement:	60	Days		
				Final age:	27375	Days		
P	oss data - AASH Percentage DL: Include elastic	0 %						
				0	ж	Apply	Cance	2

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

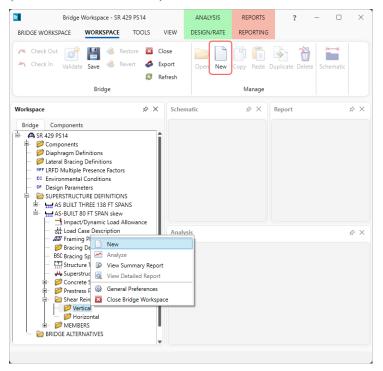
The following loss methods are available in the BrDR LRFD engine.

- AASHTO Approximate
- AASHTO Refined
- Lump Sum
- PCI
- Pre-2005 AASHTO Refined (AASHTO Refined, Third edition, 2004 without interims)

Another feature for prestress loss calculations in the BrDR LRFD engine is the ability to include elastic gains and losses due to dead load application.

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**).



Define the stirrups as shown below.

Shear	Reinforcemen	t Definition - Verti	ical				_		>
ame:	#5 K Bars								
	\cap		1						
]						
			Material:	Grade	60			~	
			Bar size:	5	\sim				
			Number of legs:	2					
		Vertical	Inclination (alpha):	90		Degrees			
		Shear Reinforcemer	nt						
						K A	pply	Cance	
							фріу	Cance	

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

Define the #5 S Bars stirrup definition as shown below. Note that the #5 S Bars are the same definition as the #5 K Bars.

A Shear Reinforcement Definition - V	ertical			_		×
Name: #5 S Bars						
	Material:	Grade 60			\sim	
	Bar size:	5 ~				
	Number of legs:	2				
Vertical	Inclination (alpha):	90	Degrees			
Shear Reinforce	ment	C	DK AF	oply	Cance	:1

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

Describing a member:

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.

A Member								-		×
Member name:	G1		Link wit	h: None	~					
Description:										
	Existin	g Current	Member alternative name	Description						
Number of span	1 û	Span no.	Span length (ft)							
		> 1	77.965301							
						ОК	Apply		Cance	1

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**.

aterial type:	Girder type:
Post tensioned concrete	PS Precast Box
Prestressed (pretensioned) concrete	PS Precast I
Reinforced concrete	PS Precast Tee
Steel	PS Precast U

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

The **Member Alternative Description** window will open as shown below. Enter the name for this member alternative as shown below. The **Schedule based Girder property input method** is the only input method available for a prestressed concrete beam.

Member Alternative Des	cription							_	
ember alternative: G1]								
Description Specs	Factors	Engine	Import	Control options					
Description:				Material type:	Prestressed (Preter	sioned)			
				Girder type:	PS Precast I				
				Modeling type:	Multi Girder System	n			
				Default units:	US Customary	\sim			
Cross-section b	ased	J		Default rating me	thod:				
				-					
Load case:	Engine Ass	igned	~	LFR	~				
Load case: Additional self load:		igned kip/ft	~						
			~						
Additional self load:		kip/ft							
Additional self load: Additional self load:	eter (Z)	kip/ft	Exposu	LFR	~				
Additional self load: Additional self load: Crack control param	eter (Z)	kip/ft %	Exposu Top of	LFR	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			
Additional self load: Additional self load: Crack control param Top of beam:	eter (Z)	kip/ft % kip/in	Exposu Top of	LFR ure factor f beam:	~	e creep			

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

Beam Details

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

Span number							
	Beam shape	Girder material	Prestress properties	n	Beam p Left end (in)	Right end (in)	
1	AASHTO TYPE III 🗸 🗸	Class FX Beam Concrete 80 FT V	1/2" (7W-270) LR 🗸		9	10.5	
	1	AASHIO MYEIII V	Class FA Beam Concrete SU FI	AASHIO TYPE III V Class FA Beam Concrete 80 F1 V 1/2* (/W-2/0) LK V	AASHIO TYPE III V Class FA Beam Concrete 80 F1 V 1/2" (/W-2/0) LK V	1 AASHTOTYPE III V Class FA beam Concrete 30 FT V 1/2" (/W-2/0) LK V 9	1 AASHIO IYPE III Class FX beam Concrete 80 FI 1/2" (/W-2/0) LK 9 10.5

Bear	n Details							_		×
Spar	n detail	Stress limit ranges	Slab in	iterface	Web end blog	ck				
	Span number	Name		Start distance (ft)	Length (ft)	End distance (ft)				
>	1 ~	80 FT STRESS LIMIT	\sim	0	79.590301	79.590301				1
							New	Duplicate	Delete	
							L			
							ОК	Apply	Cance	
										el

ø	Beam Details				_		×
	Span detail	Stress limit ranges	Slab interface	Web end block			
	Interface type		Intentionally	Roughened 🗸			
	Default interfa	ace width to beam wid	lths: 🔽				
	Interface widt	h:		in			
	Cohesion fact	or:	0.28	ksi			
	Friction factor	:	1				
	K1:		0.3				
	K2:		1.8	ksi			
				OK Apply		Cance	

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

Shrinkage Time

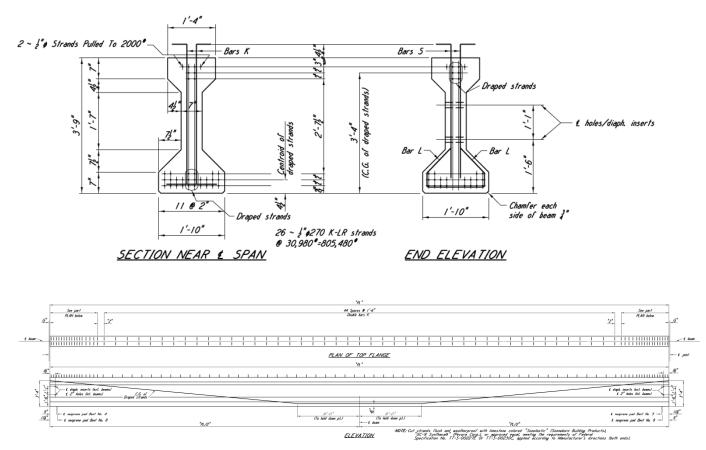
Double-click on the **Shrinkage Time** node in the **Bridge Workspace** tree to open the **Shrinkage/Time** window. Enter the data as shown below.

Curing method	d: Steam-cured	
Deck		
Curing method Drying time:	d: Moist-cured V Days	
Consider dec	k differential shrinkage loads	

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

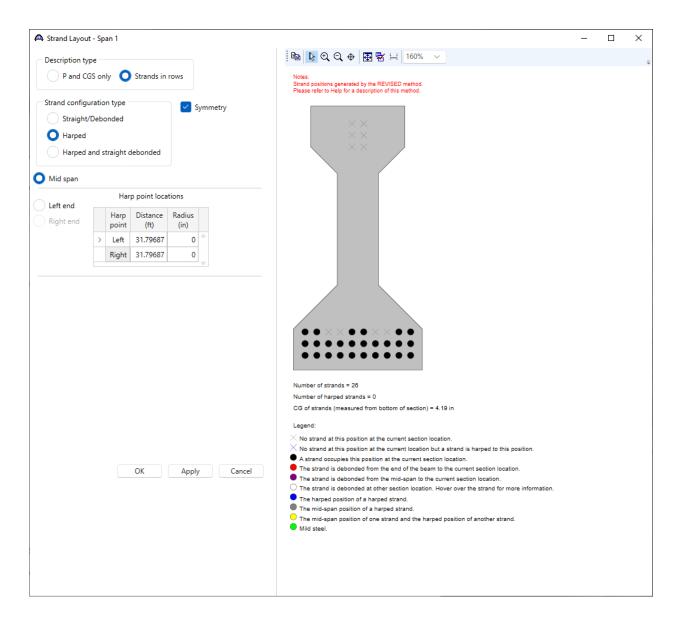
Strand Layout

Define the following strand layout at midspan using the screen captures from the drawings shown below.

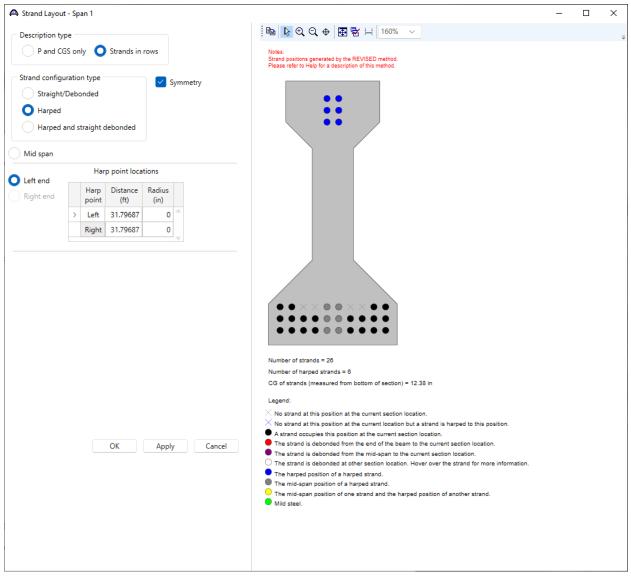


Expand the tree under **Strand Layout** and open the **Span 1** window. Use the **Zoom** buttons on the right side of this window to shrink/expand the schematic of the beam shape so that the entire beam is visible.

Select the **Description type** as **Strands in rows** and the **Strand configuration type** as **Harped**. The **Mid span** radio button will now become active. Enter details as shown below.



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



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

Deck Profile

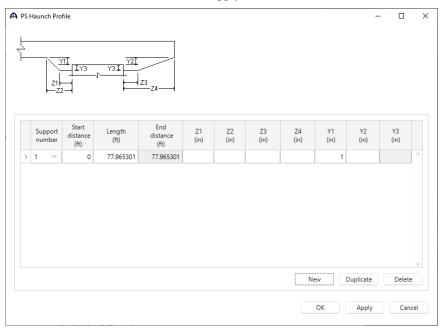
Next open the **Deck Profile** window by double-clicking the **Deck Profile** node in the **Bridge Workspace** tree and enter the data describing the structural properties of the deck. The window is shown below.

🕰 De	ecl	k Profile												-		×
	_	PS Precast I Reinforcement														
		Material		Supp num		Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n		
	>	Class AA (US)	~	1	~	0	77.965301	77.965301	7.75	83.749992	83.749992	83.749992	83.749992	8		-
		Compute from											New		Dila	Ψ.
		typical section											New	uplicate	Delete	
													ОК	Apply	Car	icel

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

Haunch Profile

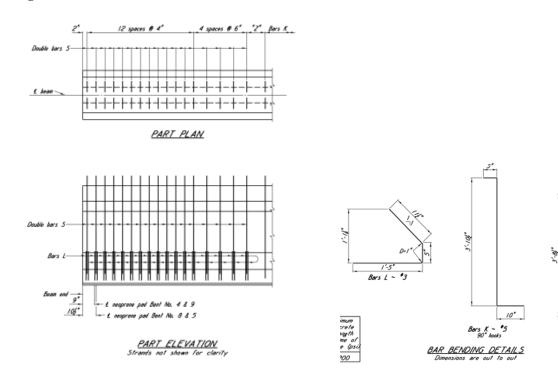
The haunch profile is defined by double-clicking on the **Haunch Profile** node in the **Bridge Workspace** tree. Enter data as shown below and Click **OK** to apply the data and close the window.



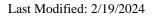
Click **OK** to apply the data and close the window.

Shear Reinforcement Ranges

Use the Stirrup wizard from the **Shear Reinforcement Ranges** window to create the following shear stirrups. Doubleclick on the **Shear Reinforcement Ranges** node in the **Bridge Workspace** tree to open the **PS Shear Reinforcement Ranges** window.



Bars 5 ~ *5 90° hoot



Enter data as shown below.

	n: 1 v							
	Name	Extends into deck	Start distance (ft)	Number of spaces	Spacing (in)	Length (ft)	End distance (ft)	
	#5 S Bars	/	0.166666	1	0	0	0.166666	-
	#5 S Bars	< 🔽	0.166666	12	4	4	4.166666	
	#5 S Bars	< 🔽	4.166666	4	6	2	6.166666	
	#5 K Bars	× 🔽	6.166666	1	7.544	0.628667	6.795333	
	#5 K Bars	× 🔽	6.795333	44	18	66	72.795333	
	#5 S Bars	< 🔽	72.795333	1	7.54	0.628333	73.423666	
	#5 S Bars	< 🔽	73.423666	4	6	2	75.423666	
>	#5 S Bars	/	75.423666	12	4	4	79.423666	

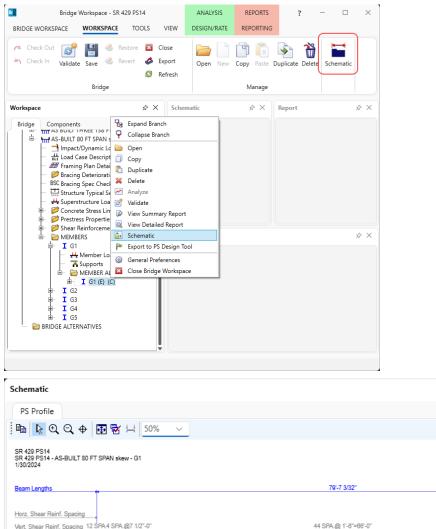
Click **OK** to apply the data and close the window.

Live Load Distribution

The live load distribution factors will be computed by the BrDR LRFD engine during analysis.

Schematic – G1 Member Alternative

While the member alternative G1 (E) (C) 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 G1 (E) (C) in the Bridge Workspace and select Schematic from the menu).



PS Profile			$^{\vee} \times$
🖻 R 🔍 Q, 🕂 🖪	▶ 🔂 🔁 📃 <u>50% ──</u>		÷
SR 429 PS14 SR 429 PS14 - AS-BUILT 80 FT 5 1/30/2024	SFAN skew - G1		
Beam Lengths	79'-7 3/32"		
Horz. Shear Reinf. Spacing Vert. Shear Reinf. Spacing 12 SF	%4 SPA@7 1.2"-0" 44 SPA@ 1'-0"=86'-0" 4 SP	PA 12 SPA @ 4"=4'-0"	
Debonded Strands			
Beam Projections	AASHTO TYPE III	× 10 1/2" ++	
Span Lengths	. 77'-11 5/8"		
	* Notes: * Al beam length dimensions are horiz. * X denotes diaphragm locations.		

– 🗆 🗙

Harp Locat	tions
Girder	DRAPE
1	31.79688
2	31.83333
3	31.875
4	31.91667
5	31.95833

Girder 1 is complete. Girders G2-G5 are similar but the lengths are different.

Enter the girder G2-G5 and see images to update the differences in windows shown below.

Girder G2

Member Alternative Description

mber alternative: G2					
Description Specs	Factors	Engine	Import	Control options	
escription:				Material type:	Prestressed (Pretensioned)
				Girder type:	PS Precast I
				Modeling type:	Multi Girder System
				Default units:	US Customary 🗸 🗸
Girder property input Schedule based Cross-section b				Default rating me	thod:
O Schedule based		signed	~	Default rating me	thod:
O Schedule based Cross-section b	ased	signed kip/ft	~		thad:
Schedule based Cross-section b Self load Load case:	Engine As	-	~		thod:
Schedule based Cross-section b Self load Load case: Additional self load:	Engine As	kip/ft			thod:
Schedule based Cross-section b Self load Load case: Additional self load:	Engine As	kip/ft		LFR re factor	thod:

Beam Details – Span detail

						Beamin	rojection
	Span number	Beam shape	Girder material	Prestress properties	n	Left end (in)	Right end (in)
>	1	AASHTO TYPE III 🗸	Class FX Beam Concrete 80 FT 🛛 🗸	1/2" (7W-270) LR 🗸		9	10.5

Beam Details – Stress limit ranges

ipan detail		Stress limit ranges Slab interface Web end block					
	Span number	Name		Start distance (ft)	Length (ft)	End distance (ft)	
>	1 ~	80 FT STRESS LIMIT	\sim	0	79.67015	79.67015	

Beam Details – Slab interface

Span detail	Stress limit ranges	Slab interface	Web end block
Interface type	:	Intentionally	Roughened \vee
Default interfa	ace width to beam wid	ths: 🔽	
Interface widt	h:		in
Cohesion fact	or:	0.28	ksi
Friction factor	:	1]
K1:		0.3]
K2:		1.8	ksi

Strand Layout

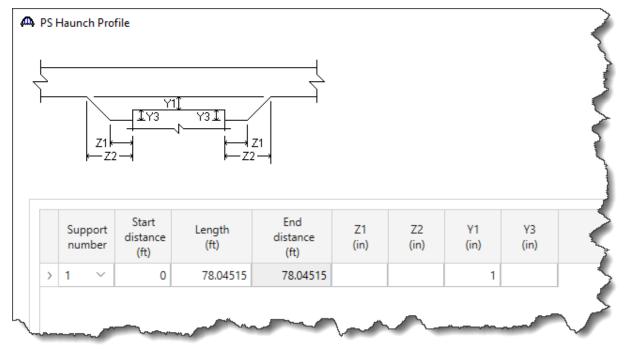
Strand layout is similar to G1, but the length is different. See below for G2 harp locations and enter them in the window by following the steps used for G1.

Harp Locat	tions
Girder	DRAPE
2	31.83333

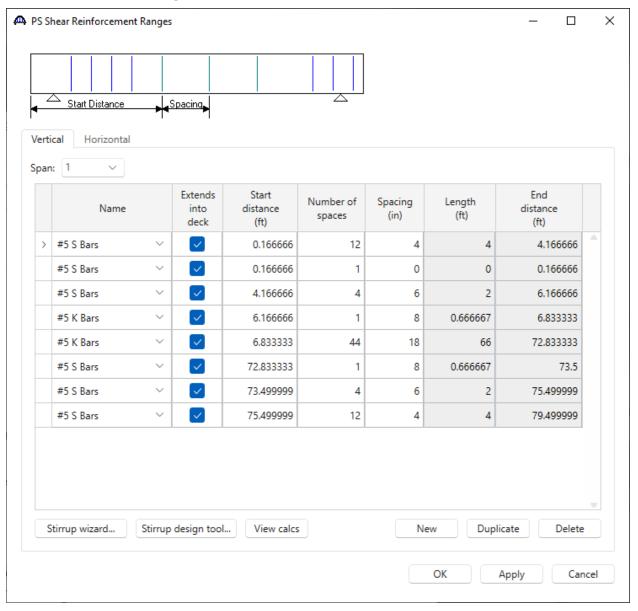
Deck Profile – Deck concrete

e:	PS Precast I										
)ec	k concrete Reinford	ement									
	Material	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n
>	Class AA (US) 🛛 🗸	1 ~	0	78.04515	78.04515	7.75	91.5	91.5	91.5	91.5	8

PS Haunch Profile



PS Shear Reinforcement Ranges



Girder G3

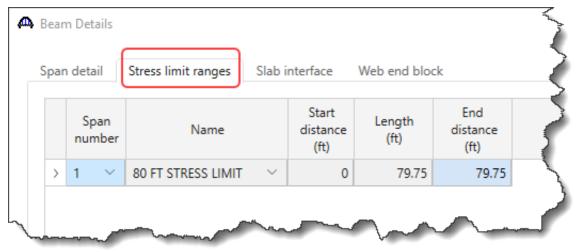
Member Alternative Description

mber alternati	ve: G3					
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 V
Cross-	erty inpu ule based section b				Default rating mo	thead
Self load	ule based	lased	signed		Default rating me	thod:
Cross-	ule based section b	Engine As		~	Default rating me	thod:
Self load	section b	Engine As	signed kip/ft %	~		hod: ✓
Schedu Cross- Self load Load case: Additional s	self load:	Engine As	kip/ft			thad:
Self load Load case: Additional s	self load:	Engine As	kip/ft		LFR re factor	thad: V Use creep

Beam Details – Span detail

bar	n detail	Stress limit ranges S	lab interface Web end block				
	Span		Girder	Prestress		Beam p	rojection
	number	Beam shape	material	properties	n	Left end (in)	Right end (in)
>	1	AASHTO TYPE III 🗸 🗸	Class FX Beam Concrete 80 FT \sim	1/2" (7W-270) LR 🗸		9	10.5





Beam Details – Slab interface

Beam Details			
Span detail	Stress limit ranges	Slab interface	Web end block
Interface type:		Intentionally	Roughened 🗸
Default interfa	ce width to beam widt	ths: 🗸	1
Interface width	1:		in
Cohesion facto	or:	0.28	ksi
Friction factor:		1]
K1:		0.3	
K2:		1.8	ksi

Strand Layout

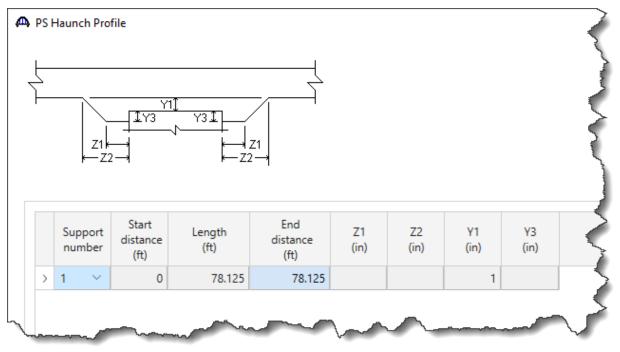
Strand layout is similar to G1, but the length is different. See below for G2 harp locations and enter them in the window by following the steps used for G1.

Harp Locat	tions
Girder	DRAPE
3	31.875

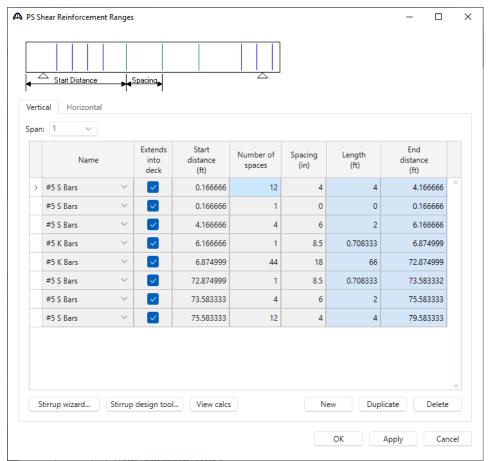
Deck Profile – Deck concrete

PS Precast I												
eck concrete Reinforceme	nt											
Material		Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n	
> Class AA (US)	~	1 ~	0	78.125	78.125	7.75	91.5	91.5	91.5	91.5		8

PS Haunch Profile

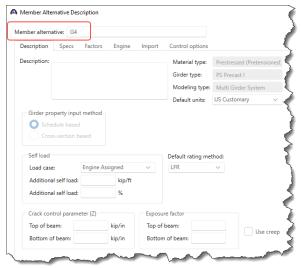


PS Shear Reinforcement Ranges



Girder G4

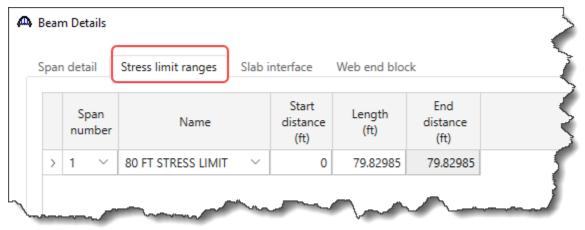
Member Alternative Description



Beam Details – Span detail

bar	n detail	Stress limit ranges S	lab interface Web end block				
	Span		Girder	Prestress		Beam p	rojection
	number	Beam shape	material	properties	n	Left end (in)	Right end (in)
>	1	AASHTO TYPE III 🗸 🗸	Class FX Beam Concrete 80 FT $$ $$ \sim	1/2" (7W-270) LR 🗸		9	10.5





Beam Details – Slab interface

Beam Details			
Span detail	Stress limit ranges	Slab interface	Web end block
Interface type:		Intentionally	Roughened 🗸
Default interfa	ce width to beam widt	ths: 🗸	1
Interface width	1:		in
Cohesion facto	or:	0.28	ksi
Friction factor:		1]
K1:		0.3	
K2:		1.8	ksi

Strand Layout

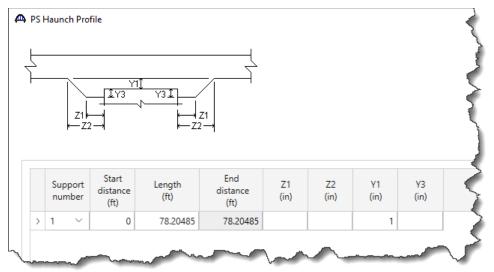
Strand layout is similar to G1, but the length is different. See below for G2 harp locations and enter them in the window by following the steps used for G1.

Harp Locat	tions
Girder	DRAPE
4	31.91667

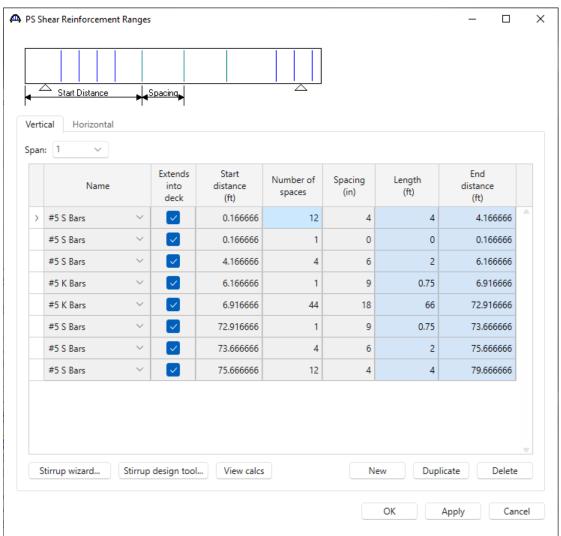
Deck Profile – Deck concrete

e: PS P	Precast I												
eck cond	crete Reinforcement												
	Material		Supp numl		Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n
> Class	s AA (US)	\sim	1	~	0	78.20485	78.20485	7.75	91.5	91.5	91.5	91.5	8

PS Haunch Profile

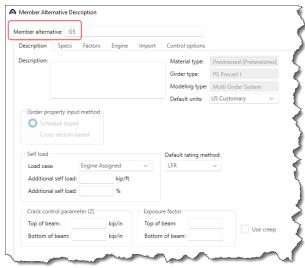


PS Shear Reinforcement Ranges



Girder G5

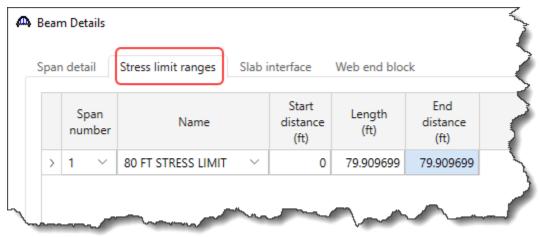
Member Alternative Description



Beam Details – Span detail

par	n detail	Stress limit ranges S	lab interface Web end block				
	6 m m m		Girder	Prestress		Beam p	rojection
	Span number	Beam shape	material	properties	n	Left end (in)	Right end (in)
>	1	AASHTO TYPE III 🗸 🗸	Class FX Beam Concrete 80 FT \sim	1/2" (7W-270) LR 🗸		9	10.5





Beam Details – Slab interface

Beam Details			
Span detail	Stress limit ranges	Slab interface	Web end block
Interface type:		Intentionally	Roughened ∨
Default interfa	ce width to beam widt	ths: 🔽	
Interface width	1:		in
Cohesion facto	or:	0.28	ksi
Friction factor:		1]
K1:		0.3]
K2:		1.8	ksi

Strand Layout

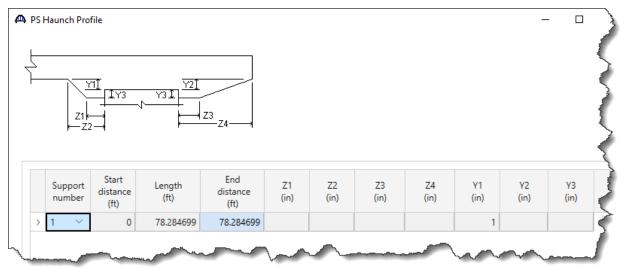
Strand layout is similar to G1, but the length is different. See below for G2 harp locations and enter them in the window by following the steps used for G1.

Harp Locat	tions
Girder	DRAPE
5	31.95833

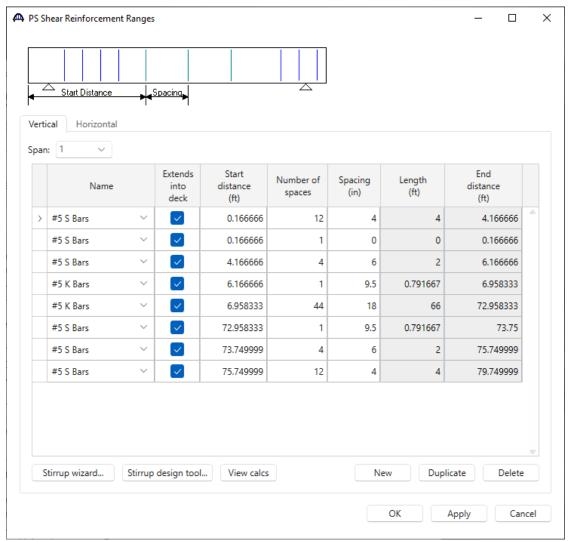
Deck Profile – Deck concrete

PS Precast I											
eck concrete	Reinforcement										
	Material	Support number	Start distance (ft)	Length (ft)	End distance (ft)	Structural thickness (in)	Start effective flange width (Std) (in)	End effective flange width (Std) (in)	Start effective flange width (LRFD) (in)	End effective flange width (LRFD) (in)	n
> Class AA (U	S) ~	1 ~	0	78.284699	78.284699	7.75	83.749992	83.749992	83.749992	83.749992	8

PS Haunch Profile

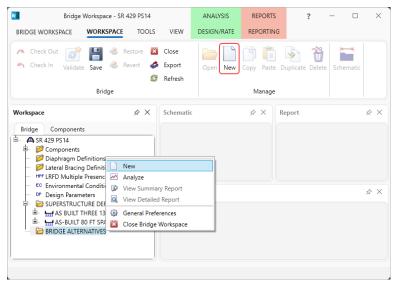


PS Shear Reinforcement Ranges



Bridge Alternative

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

ternative name: AS-BUI	LT				
Description Substruct	tures				
Description:					
Horizontal curvature	2	Global pos	itioning —		
Reference line length:	138 ft	Distance:	0	ft	
O Start bearing	End bearing	Offset:	0	ft	
Starting station:	ft	Elevation:		ft	
Bearing:	N 90^ 0' 0.00" E				
Bridge alignment		Start tangent	length:		ft
O Curved		Curve length:			ft
Tangent, curved,	tangent	Radius:			ft
Tangent, curved		Direction:	L	eft 🗸	
Curved, tangent		End tangent I	ength:		ft
Superstructure wizard	Culvert wizard				

Expand the **AS-BUILT** node in the **Bridge Workspace** tree. 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.

AS BUILT THREE		ine Substructures					
natives Vehic	cle path Eng	ine Substructures					
0 ft							
0 ft							
0 De	legrees						
ft							
	0 ft 0 D	0 ft	0 ft 0 Degrees				

Expand the AS BUILT THREE 138 FT SPANS node in the Bridge Workspace tree. 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.

🗛 s	Superstru	ucture Alternative	2			-	_		×
Alte	rnative i	name:	AS BUILT						
Dese	cription:								
Sup	erstructi	ure definition:	AS BUILT TH	IREE 138 FT SPANS	~				
Sup	erstruct	ure type:	Girder						
Nun	nber of I	main members:	5						
	Span	Length (ft)							
	1	136.708333	<u>^</u>						
	2	137.166666							
	3	136.708333							
					OK	Apply		Cance	el

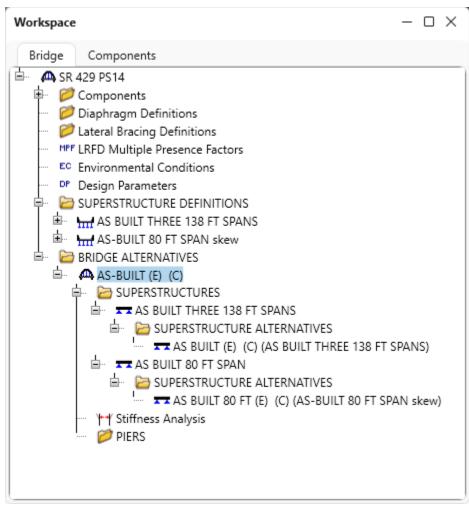
Click **OK** to apply the data and close the window.

Superstructure								
perstructure name	e: AS BUILT	80 FT SPAN						
Description A	Iternatives	Vehicle path	Engine	Substructures				
Description:								
Reference line								
Distance:	0	ft						
Offset:	0	ft						
Angle:	0	Degrees						
Starting stati	on:	ft						
					DK III	Apply	Cance	el

Similarly add another **Superstructure** definition and **Superstructure alternative** as shown below.

A Superstructure Alternation	re	_		×
Alternative name:	AS BUILT 80 FT]		
Description:				
Superstructure definition:	AS-BUILT 80 FT SPAN skew \checkmark	j		
Superstructure type:	Girder			
Number of main members:	5			
Span Length (ft)				
1 78.125	A			
	Ŧ			
	ОК	Apply	Cance	1

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



Analysis and Results

To perform an LRFD design review of the entire bridge, select the bridge **SR 429 PS14** in the **Bridge Workspace** tree and select the **Analysis Settings** button on the **Analysis** group of the **DESIGN/RATE** ribbon as shown below:

👪 Bridge W	orkspace - SR 429	PS14		ANALYS	sis	REPORTS	5	?	_	\times
BRIDGE WORKSPACE	WORKSPACE T	TOOLS	VIEW	DESIGN/	RATE	REPORTIN	IG			
Analysis Settings	Tabular Specifica Results Check D	ntion Er		ults Save						
Analysis		Resu	lts							
Workspace	,	s> ×	Schema	tic		x x	Repo	ort		x x
Bridge Components Bridge SR 429 PS14	Definitions resence Factors									
EC Environmental C DP Design Paramet	ers		Analysis							$x \approx$
B. E SUPERSTRUCTU	REE 138 FT SPANS FT SPAN skew									

Click the **Open Template** button and select the **HL93 Design Review** to be used in the rating and click **Open**.

Templates	Description	Analysis	Owner	Public / Private	
HL 93 Design Review	HL 93 Design Review	LRFD		Public	
HS 20 LFR Rating	HS 20 LFR Rating	LFR		Public	
LRFR Design Load Rating	LRFR Design Load Rating	LRFR		Public	
LRFR Legal Load Rating	LRFR Legal Load Rating	LRFR		Public	

Analysis Settings				_		×
O Design review Rating	Design m	ethod:	LRFD	~		
Analysis type: Line Girder \checkmark Lane / Impact loading type: As Requested \checkmark	Apply pre	ference setting:	None	~		
Vehicles Output Engine Description Traffic direction: Both directions Vehicle selection		Refresh Vehicle summary	Temporary vehicles	Advanced]	
VehiclesStandardAlternate Military LoadingEV2EV3HL-93 (SI)HL-93 (US)HS 20 (SI)HS 20 (SI)	Add to >> Remove from <<	□-Design vehi □-Design I HL-9 Permit k □-Fatigue 'LRFD	oads 13 (US) oads			
Reset Clear Open template Save t	emplate		ОК	Apply	Cano	el

The Analysis Settings window will be populated as shown below.

Analysis Settings - Output

Analysis Settings				_		×
O Design review Rat	ting	Design method:	LRFD	~		
Analysis type:	e Girder 🗸 🗸					
ane / Impact loading type: As I	Requested \vee	Apply preference setting	None	~		
Vehicles Output Engine	e Description					
← Tabular results		AASHTO engine re	ports			_
Dead load action reported	art.	Miscellaneous				
Live load action report		🗹 Girder pro	perties			
Concrete limit state su		Summary i	nfluence line loading			
=		Detailed in	fluence line loading			
LRFD critical loads rep		Capacity su	ummary			
LRFD specification che			etailed computations			
PS concrete stress rep			or DL analysis			
RC service stress repo			or LL analysis			
Steel limit state summ	ary report		e lines FE model			
			e lines FE actions			
			factor computations			
			factor summary			
			-			
		Regression	data			
		Camber				
		Fatigue str	-			
			tress ranges			
		Specification of	utput: conc article detailed			
			concurrence detaned			
Select all Clear all]	Select all Cl	ear all			
Reset Clear	Open template Save ter	mplate	ОК	Apply	Cano	:el

Navigate to the Output tab and enter the Analysis Settings as shown below.

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

Engine Outputs

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

The Analysis window should be reviewed for any warning messages.

Bridge We	orkspace - SR 429 PS14	Ļ	ANALYSIS	REPORTS	?	_	\times
BRIDGE WORKSPACE	WORKSPACE TOO	.S VIEW	DESIGN/RATE	REPORTING			
# 🖙 🗉		₩ ×	/ []				
Analysis Analyze Analysis	Tabular Specification						
Settings Events	Results Check Detail	Outputs Gra	ph Results				
Analysis	F	esults					

Export of prestressed concrete beams to the BrDR LRFD analysis engine.

The following steps are performed when performing a design review of a multi-span prestressed beam using the BrDR LRFD analysis engine:

1. Finite element models are generated for the dead load and live load analyses. A Stage 1 FE model is generated for the dead loads on the non-composite simple span prestressed concrete beam.

For Continuous method of analysis:

A Stage 2 FE model is generated for the continuous final span condition for composite dead load analysis. A Stage 3 FE model is generated for the continuous final span condition for the live load analysis.

For Continuous and Simple method of analysis:

Two Stage 2 FE models are generated: Continuous final span condition Simple span condition

Two Stage3 FE models are generated: Continuous final span condition Simple span condition

Stage 2 models contain section properties corresponding to the sustained modular ratio factor entered in BrDR (e.g., 2n). Stage 3 models contain section properties corresponding to the modular ratio (n).

The model generated by the export to the BrDR LRFD analysis engine will always contain node points at the middle of each simple span, at simple support locations, at harp points, at debond locations and at prestress strand transfer length locations so that the prestress force distribution can be computed.

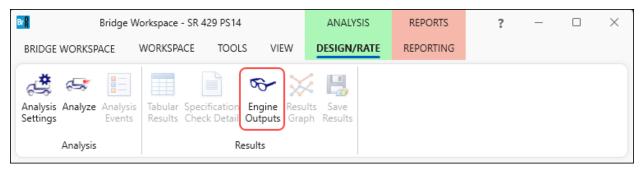
- 2. The Stage 1 and 2 FE models are analyzed for the dead load. The prestress loss calculations are then performed along with determining the prestress forces at transfer and the restraint effects for the creep and shrinkage analysis for multi-span structures.
- 3. The final analysis then takes place. The prestress forces at transfer are applied to the Stage 1 FE model solely to determine the prestress camber in the beam. They are not included in the load combination generation. Creep and shrinkage forces are applied to the Stage 2 FE model.

The Stage 1 and 2 FE models are analyzed for the dead load. The Stage 3 FE model is loaded with unit loads at each node to generate influence lines for the beam. The influence loads are then loaded with the selected vehicles to find the maximum live load effects.

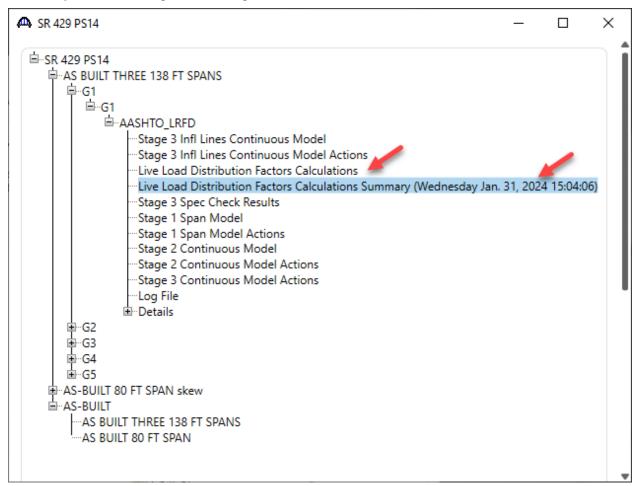
4. Load combinations are generated for the loadings and specification checks are performed at each of the nodes in the finite element model. For the Continuous and Simple method of analysis the maximum force effects between the 2 sets of models are used to generate the load combinations.

Engine Outputs

Click the **Engine Outputs** button from the **Results** group of the **DESIGN/RATE** ribbon to open the following window.

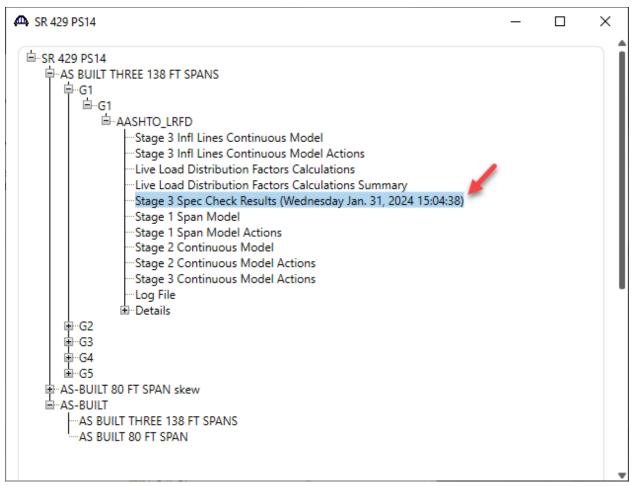


A summary and a detailed report of the computed live load distribution factors are available.



////								
LRFD Dist F	actor Summary - Note	pad				_		×
	rmat View Help							
	***************************************			****				^
	this file contai by the BrD wizard			**				
	the date and tim		-					
	atch those shown			**				
** the BrD b	ridge description	after these dis	tribution _	**				
	ere computed.			**				
*****	*************	**************	******	****				
Bridge: SR 4 Bridge ID: S BID: 0	29 PS14 R 429 PS14	NBI Structure	ID: 00000					
Superstructu Member: G1 Member Alter	re Def: AS BUILT	THREE 138 FT SPA	NS					
nember niter								
Date: 1/31/	2024 Time:	3:04:05 PM						
AASHTO LRED	Bridge Design Spe	cifications. Edi	tion 9. Interim (3				
			-	-				
	Moment Distributi	on Factor Schedu	le					
Start	End	Single Lane	Multi Lane					
Distance	Distance	DF	DF					
(ft)	(ft)	(Lanes)	(Lanes)					
0.00	109.14	0.764(L)	0.621(A)					
109.14	174.72	0.764(L)	0.621(A) 0.621(A)					
174.72	235.59	0.764(L)						
235.59	301.18	0.764(L)	0.621(A)					
301.18	410.32	0.764(L)	0.621(A)					
			-					
	Shear Distributio	n ractor Schedul	e					
Start	End	Single Lane						
Distance	Distance	DF	DF					
(ft)	(ft)	(Lanes)	(Lanes)					
0.00	6.83	0.765(L)	0.640(A)					
6.83	20.49	0.764(L)						
20.49	34.14	0.764(L)	0.640(A)					
34.14	47.80	0.764(L)	0.640(A)					
47.80	61.46	0.764(L)	0.640(A)					
61.46 68.29	68.29 136.58	0.764(L) 0.764(L)	0.639(A) 0.639(A)					
136.58	273.74	0.764(L)	0.639(A)					
273.74	342.03	0.764(L)	0.639(A)					
342.03	348.86	0.764(L)	0.639(A)					
348.86	362.52	0.764(L)	0.640(A)					
362.52	376.17	0.764(L)	0.640(A)					
376.17 389.83	389.83 403.49	0.764(L) 0.764(L)	0.640(A) 0.640(A)					
403.49	410.32	0.765(L)	0.640(A)					
								~
<								>
			Ln 14, Col 48	80%	Windows (CRLF)	UTF-	8	
				0070	(ener)	0.1	-	

A summary report of the specification check results is also available. This summary report lists the design ratios for each spec article at each spec check location point. The design ratio is the ratio of capacity to demand. A design ratio less than one indicates the demand is greater than the capacity and the spec article fails. A design ratio equal to 99.0 indicates the section is subject to zero demand. To view the LRFD spec check results (shown below), double click on the **Stage 3 Spec Check Results** under the **AASHTO_LRFD** branch in this window.



The following file opens.

 A Stage 3 Spec Check Results - □ ×
 Bridge ID : SR 429 PS14 Bridge : SR 429 PS14 Superstructure Def : AS BUILT THREE 138 FT SPANS Member : G1 Analysis Preference Setting :

AASHTO LRFD Specification, Edition 9, Interim 0

Specification Check Summary

Article	Status
Initial Stress at Transfer (5.9.2.3.1a, 5.9.2.3.1b)	Pass
Splitting Resistance in Anchorage Zones (5.9.4.4.1)	Pass
Final Stress due to Permanent and Transient Loads (5.9.2.3.2a, 5.9.2.3.2b)	Pass
Flexure (5.6.3.2, 5.6.3.3)	Pass
Shear (5.7.3.3, 5.7.2.5, 5.7.2.6, 5.7.3.5)	Pass
Deflection (5.6.3.5.2)	Pass

Initial Compression Stress At Transfer of Prestress

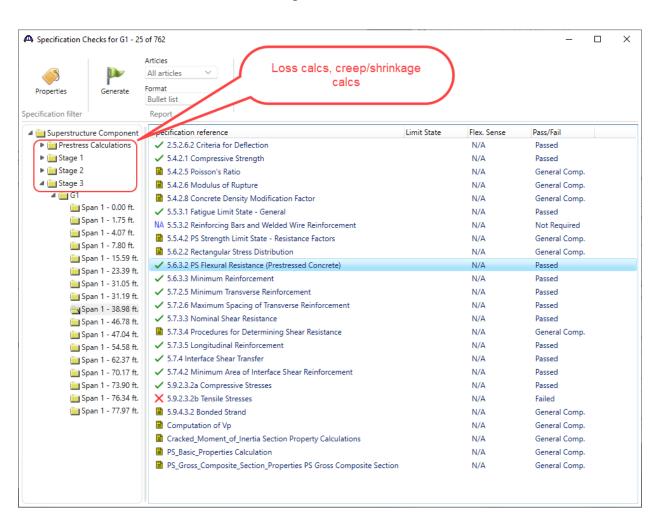
-0.101 -0.434 -0.473 -0.544	-3.290	4.639 1.171 1.185 1.212	Pass Pass
-0.473	-3.290	1.185	Pass
-0.544	-3.217	1.212	Pass
			- 400
-0.570	-3.190	1.222	Pass
-0.479	-3.284	1.188	Pass
-0.290	-3.479	1.121	Pass
-0.298	-3.471	1.124	Pass
		-0.298 -3.471	-0.298 -3.471 1.124

>

Specification Check Detail

The specification checks can be viewed by selecting the **Specification Check Detail** button from the **Results** group of the **DESIGN/RATE** ribbon.

📲 Bridge W	/orkspace - SR 429 PS14		ANALYSIS	REPORTS		?	_		×
BRIDGE WORKSPACE	WORKSPACE TOOLS	VIEW	DESIGN/RATE	REPORTING					
Analysis Analyze Events Analysis Analysis Analysis	Tabular Results Check Detail Results Results	ine Resi outs Gra	vits Save ph Results						
Workspace	\$ X	Sch	ematic	\$ ×	Report			5	× ×
Bridge Components Bridge Components SR 429 PS14 Components Diaphragm Def Components CEC Environmental C	Definitions Presence Factors Conditions								
	JRE DEFINITIONS AREF 138 FT SPANS DEFI SPAN skew Dynamic Load Allowance se Description Plan Detail Deterioration Spec Check Selection e Typical Section ructure Loads e Stress Limits s Properties einforcement Definitions RS Member Loads upports MEMBER ALTERNATIVES I G1 (E) (C) IATIVES	Anz	alysis					5	* ×



Open the spec check detail window for the flexural resistance (**5.6.3.2 PS Flexural Resistance (Prestressed Concrete**)) at the middle of the simple span (**38.98 ft**). The following is noted for this window, other spec articles are similar:

- 1. For each spec check location, both the left and right sides of the point are evaluated. The Deflection article is an exception to this since deflection must be the same between the left and right sides of a point.
- 2. The design ratio is printed out for the article. The design ratio is the ratio of capacity to demand. A design ratio less than one indicates the demand is greater than the capacity and the spec article fails. A design ratio equal to 99.0 indicates the section is subject to zero demand.
- 3. The Strength-I, Service-I, Service III and Fatigue limit states are the only limit states investigated. For each limit state, the max and min force effect is checked. Thus, each limit state shows two rows of data.
- 4. The LL load combination is shown in this column. If the location is not at a node in the FE model (e.g., the node is at a point where the rebar is fully developed), this column will list two load combinations separated by a comma. The first load combination is the combination considered at the left end and the second load combination is the combination considered at the right end of the FE element that contains this location. The resulting load displayed is a linear interpolation between the two displayed load cases.

📲 Spec Check Deta	ail for 5.6.3.2 PS FI	exural R	esistance (Prestressed	Concrete)								-		×
5.6.3 Flexura 5.6.3.2 Flexu	l Members ral Resistanc	e	l Effects - B Re fications, Ninth	-										Î
PS I Narrow -	At Location	= 38.9	827 (ft) - Left	Stage 3	1									
	Cross	Sectio	n Properties		•									
Name: AASHTO Girder f'c = Slab f'c =	5.00(ksi)	Girde	er f'ci = 4.20(ks	i)										
Effective Sla Effective Sla Haunch Width Haunch Thickn Beam Height	b Thickness	-	83.75(in) 7.75(in) 16.00(in) 0.50(in) 45.00(in)											
Total Aps = Total CGS =														
Eff Aps = Eff CGS =														
			rol Option: No No, redistribut	ion did not	occur.									I
			verridden, the R s computed as pe			l as overrid	e phi*over		Mr=	2	NA		Max Con	-
Limit State	Load		Mu	DeltaMu	Phi	Mn	Phi	Mn	Phi * Mn	Mr/Mu	Depth	Ac	Stress	C
	Combinatio	n	kip-ft	kip-ft		kip-ft		kip-ft	kip-ft		in	in^2	ksi	
STR-I	1		3788.52		1.000	4115.98			4115.98	1.086	4.59	347.63		.00
STR-I	1		1009.68		1.000	4115.98			4115.98	4.077	4.59	347.63		.00
STR-I	2		3469.92		1.000	4115.98			4115.98	1.186	4.59	347.63		.00
STR-I	2		1009.68		1.000	4115.98			4115.98	4.077	4.59	347.63		.00
SER-I	1		2485.40		1.000	4115.98			4115.98	1.656	4.59	347.63		.00
SER-I	1		1121.86		1.000	4115.98			4115.98	3.669	4.59	347.63		.00
SER-I SER-I	2		2303.34		1.000	4115.98			4115.98	1.787	4.59	347.63		.00
SER-III	1		1121.86 2212.69		1.000	4115.98 4115.98			4115.98 4115.98	3.669	4.59	347.63 347.63		.00
SER-III	1		1121.86		1.000	4115.98			4115.98	3.669	4.59	347.63		.00
SER-III	2		2067.05		1.000	4115.98			4115.98	1.991	4.59	347.63		.00
SER-III	2		1121.86		1.000	4115.98			4115.98	3,669	4.59	347.63		.00
FAT-I	3		1001.57		1.000	4115.98			4115.98	4.110	4.59	347.63		.00
FAT-I	3		0.00		1.000	4115.98			4115.98	99.000	4.59			.00
FAT-II	3		457.86		1.000	4115.98			4115.98	8.990	4.59	347.63	0	.00
FAT-II	3		0.00		1.000	4115.98			4115.98	99.000	4.59	347.63	0	.00
Load Combinat	ion Legend:													
	hicle													_
4														• *
														-
													OK	

The loads making up the Mu = 3788.52 k-ft for the maximum Strength-I limit state can be tracked down in Moment Summary report.

Report Tool – Moment Summary

The **Moment Summary** report can be viewed by selecting the **Report Tool** button from the **Bridge** group of the **TOOLS** ribbon as shown below.

Bridge V	Norkspace - SR 42	9 PS14		ANALYSIS	REPORTS	?	_	×
BRIDGE WORKSPACE	WORKSPACE	TOOLS	VIEW	DESIGN/RATE	REPORTING			
Multimedia Attachments Bridge	Report Tool	Culvert Design Tool	Impo Design					

Select the **LRFD analysis output** as the **Report type**. Select the **Moment summary** checkbox and click on the **Generate** button to populate the moment summary report as shown below.

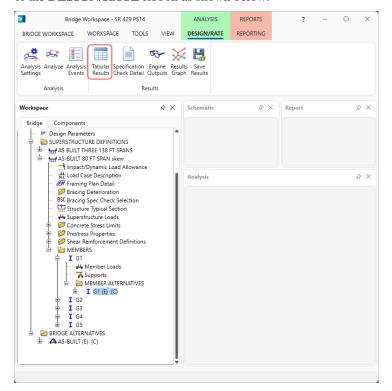
🕰 SR 429 PS14 - Report Tool	- 🗆 X
44 SR 429 PS14 - Report Tool Report type : LRFD analysis output Advanced Begin each topic on a new page when printed Report New Open Merge Save Save As Generate Reactions Moment summary Shear summary Shear summary Flexure analysis summary Shear analysis summary Initial stresses at transfer of prestress Final stresses - design loads Final tensile stresses - design loads Final stresses in slab Camber summary PS	Image: Construct of the system struct def Bws report (all superstructure definitions) Girder system struct def Girder system struct def Floor system GFS system struct def Floor system GF struct def Floor system GF struct def Floor floor system GF struct def Floor floor system FS struct def Floorline GF struct def Floorline GF struct def Truss system TFS struct def Truss system TF struct def Trussine TFS struct def Trussine TFS struct def Slab system struct def Multicellbox system struct def Advanced multicellbox struct def Culvert definition
Select all Delete	Close

The resulting maximum moment for Strength-I at the midspan is equal to (1.25 * 1121.86) + (1.75 * 1363.54) = 3788.52 kft.

			Live Load	t Summary : HL-93 (US) t = ** %			
1							
Location (ft)	Percent	DC (kip-ft)	DW (kip-ft)	+(LL+I) (kip-ft)	Controlling Live Load	-(LL+I) (kip-ft)	Controlling Live Load
0.00(R)	0.0	0.00	N/A	0.00	Tandem + Lane	0.00	Tandem + Lane
1.75(B)	2.2	98.46	N/A	128.37	Truck + Lane	0.00	Tandem + Lane
7.80(B)	10.0	403.87	N/A	521.64	Truck + Lane	0.00	Tandem + Lane
15.59(B)	20.0	717.99	N/A	913.69	Truck + Lane	0.00	Tandem + Lane
23.39(B)	30.0	942.37	N/A	1176.14	Truck + Lane	0.00	Tandem + Lane
31.05(B)	39.8	1075.37	N/A	1327.72	Truck + Lane	0.00	Tandem + Lane
31.19(B)	40.0	1076.99	N/A	1329.51	Truck + Lane	0.00	Tandem + Lane
38.98(B)	50.0	1121.86	N/A	1363.54	Truck + Lane	0.00	Tandem + Lane
46.78(B)	60.0	1076.99	N/A	1329.51	Truck + Lane	0.00	Tandem + Lane
47.04(B)	60.3	1073.90	N/A	1326.08	Truck + Lane	0.00	Tandem + Lane
54.58(B)	70.0	942.37	N/A	1176.14	Truck + Lane	0.00	Tandem + Lane
62.37(B)	80.0	717.99	N/A	913.69	Truck + Lane	0.00	Tandem + Lane
70.17(B)	90.0	403.87	N/A	521.64	Truck + Lane	0.00	Tandem + Lane
76.34(B)	97.9	91.58	N/A	119.41	Truck + Lane	0.00	Tandem + Lane
77.97(L)	100.0	0.00	N/A	0.00	Tandem + Lane	0.00	Tandem + Lane
: " indicates not a indicates not ava							

Tabular Results

To review the dead load and live load analysis results, click on the **Tabular Results** button from the **Results** group of the **DESIGN/RATE** ribbon as shown below.



The Analysis Results window will open as shown below.

Note: These values include dynamic load allowance, distribution factors and any live load scale factor entered on the *Analysis Settings* window.

ጦ	Analys	is Results -	G1								- 🗆	×
	Print Print											
lep	ort type	2:			Stage				Dead L	oad Case		
Dea	ad Load	Actions		\sim	Non-comp	osite (St	age 1)	~	Load (Case 1 - Self Lo	ad(Stage 1 🗸	
	Span	Location (ft)	% Span	Side	Moment (kip-ft)	Shear (kip)	Axial (kip)	Torsion (kip-ft)	Reaction (kip)	X Deflection (in)	Y Deflection (in)	
	1	0.00	0.0	Right	0.00	22.72	0.00	0.00	22.72	0.0000	0.0000	
	1	1.75	2.2	Both	38.87	21.70	0.00	0.00		0.0000	-0.0646	
	1	7.80	10.0	Both	159.42	18.18	0.00	0.00		0.0000	-0.2827	
	1	15.59	20.0	Both	283.41	13.63	0.00	0.00		0.0000	-0.5348	
	1	23.39	30.0	Both	371.98	9.09	0.00	0.00		0.0000	-0.7322	
	1	31.05	39.8	Both	424.48	4.63	0.00	0.00		0.0000	-0.8560	
	1	31.19	40.0	Both	425.12	4.54	0.00	0.00		0.0000	-0.8575	
	1	38.98	50.0	Both	442.83	0.00	0.00	0.00		0.0000	-0.9005	
	1	46.78	60.0	Both	425.12	-4.54	0.00	0.00		0.0000	-0.8575	
	1	47.04	60.3	Both	423.90	-4.70	0.00	0.00		0.0000	-0.8546	
	1	54.58	70.0	Both	371.98	-9.09	0.00	0.00		0.0000	-0.7322	
	1	62.37	80.0	Both	283.41	-13.63	0.00	0.00		0.0000	-0.5348	
	1	70.17	90.0	Both	159.42	-18.18	0.00	0.00		0.0000	-0.2827	
	1	76.34	97.9	Both	36.15	-21.77	0.00	0.00		0.0000	-0.0600	
	1	77.97	100.0	Left	0.00	-22.72	0.00	0.00	22.72	0.0000	0.0000	
							0.00	0.000	2202	0,0000	0,0000	
		RFD Engine eference se			001							Close

	Print Print																			
ep	ort typ	e:		Stac	je -			Live L	oad		(Live Load	d Type							
ive	Load	Actions		~ Co	mposite (sh	ort term)	(Stage: 🗸	HL-9	IL-93 (US) V Axle Load V											
												Lane								
	Span	Location (ft)	% Span	Positive Moment (kip-ft)	Negative Moment (kip-ft)	Positive Shear (kip)	Negative Shear (kip)	Positive Axial (kip)	Negative Axial (kip)	Positive Torsion (kip-ft)	Negative Torsion (kip-ft)	Axle Lo F		tive ection	Negative X Deflection (in)	Positive Y Deflection (in)	Negative Y Deflection (in)	% Impact Pos Reaction	% Impact Neg Reaction	
	1	0.00	0.0	0.00	0.00	58.09	0.00	0.00	0.00			Truck ·	+ Lane	.0000	0.0000	0.0000	0.0000	33.000	0.000	
	1	1.75	2.2	98.98	0.00	56.61	-0.66	0.00	0.00					.0000	0.0000	0.0000	-0.0260			
	1	7.80	10.0	401.11	0.00	51.49	-2.93	0.00	0.00			lander	m + Lane	.0000	0.0000	0.0000	-0.1143			
	1	15.59	20.0	699.40	0.00	44.88	-6.46	0.00	0.00					0.0000	0.0000	0.0000	-0.2181			
	1	23.39	30.0	894.89	0.00	38.27	-12.32	0.00	0.00					0.0000	0.0000	0.0000	-0.3010			
	1	31.05	39.8	1006.78	0.00	31.79	-18.37	0.00	0.00					0.0000	0.0000	0.0000	-0.3526			
	1	31.19	40.0	1008.08	0.00	31.67	-18.48	0.00	0.00					0.0000	0.0000	0.0000	-0.3533			
	1	38.98	50.0	1028.72	0.00	25.07	-25.07	0.00	0.00					0.0000	0.0000	0.0000	-0.3727			
	1	46.78	60.0	1008.08	0.00	18.48	-31.67	0.00	0.00					0.0000	0.0000	0.0000	-0.3534			
	1	47.04	60.3	1005.58	0.00	18.26	-31.90	0.00	0.00					0.0000	0.0000	0.0000	-0.3521			
	1	54.58	70.0	894.89	0.00	12.32	-38.27	0.00	0.00					0.0000	0.0000	0.0000	-0.3010			
	1	62.37	80.0	699.40	0.00	6.46	-44.88	0.00	0.00					0.0000	0.0000	0.0000	-0.2181			
	1	70.17	90.0	401.11	0.00	2.93	-51.49	0.00	0.00					0.0000	0.0000	0.0000	-0.1143			
	1	76.34	97.9	92.08	0.00	0.61	-56.72	0.00	0.00					0.0000	0.0000	0.0000	-0.0242			
	1	77.97	100.0	0.00	0.00	0.00	-58.09	0.00	0.00			58.09	0.00	0.0000	0.0000	0.0000	0.0000	33.000	0.000	