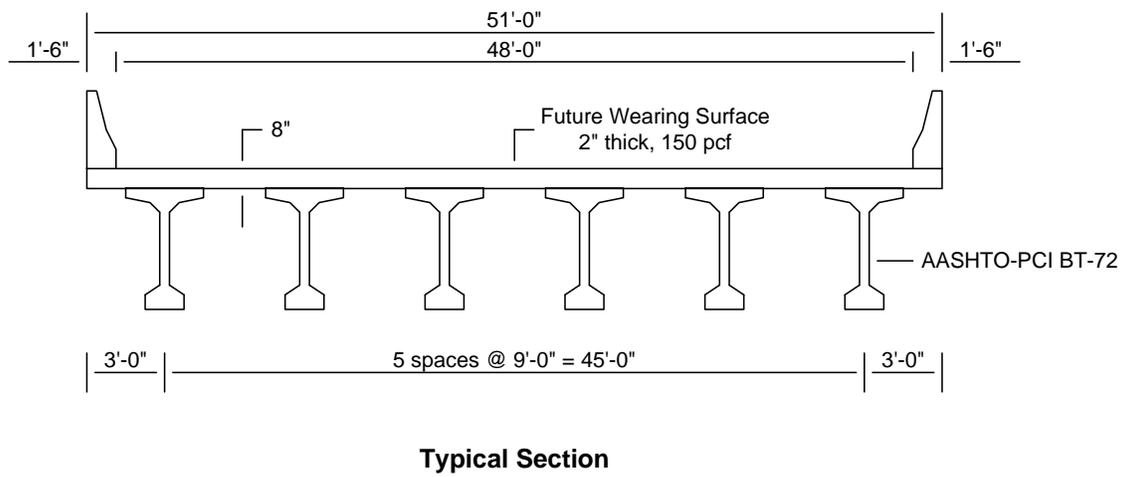
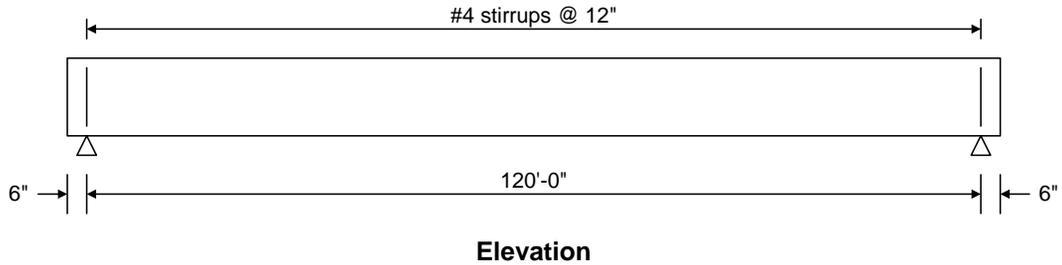


### PS1 - Simple Span Prestressed I Beam Example

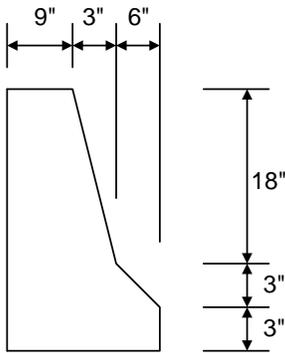


**Material Properties**

Beam Concrete:  $f'c = 6.5$  ksi,  $f'ci = 5.5$  ksi

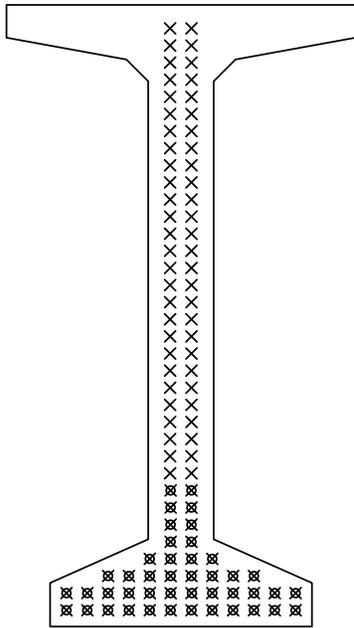
Deck Concrete:  $f'c = 4.5$  ksi

Prestressing Strand: 1/2" dia., 7 Wire strand,  $F_u = 270$  ksi, Low Relaxation

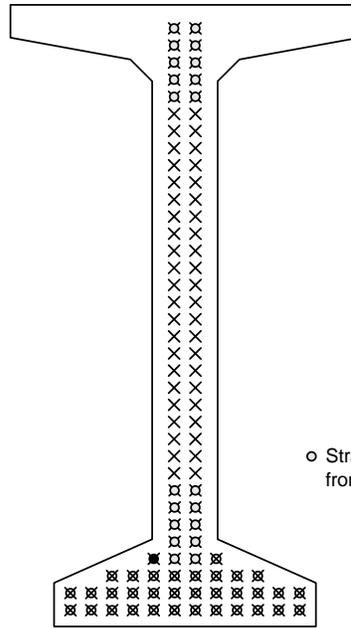


Weight = 300 plf

**Parapet Detail**



**Strand Pattern at Mid-Span**



o Strand harped at 48.5' from end of beam

**Strand Pattern at End of Beam**

## AASHTOWare Bridge Rating and Design Training

### PS1 - Simple Span Prestressed I Beam Example (BrR/BrD 6.4)

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

Bridge ID: PS1 Training Bridge    NBI Structure ID (8): PS1 Tr. Bridge     Template     Superstructures  
 Bridge Completely Defined     Culverts

Description | Description (cont'd) | Alternatives | Global Reference Point | Traffic

Name: PS1 1Span Training Bridge    Year Built:

Description: This is PCI design example 9.9.3, which uses the Load Factor Design (LFD).

Location:     Length:  ft

Facility Carried (7):     Route Number: -1

Feat. Intersected (6):     Mi. Post:

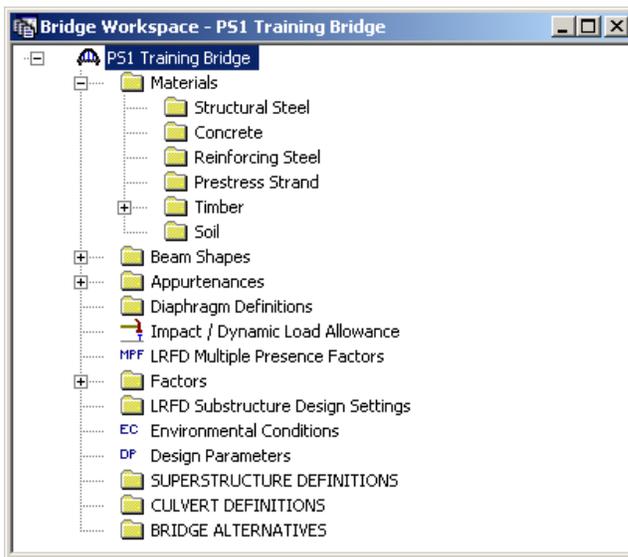
Default Units: US Customary

BridgeWare Association...     Virtis     Opis     Pontis

OK    Apply    Cancel

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

To enter the materials to be used by members of the bridge, click on the Materials. The tree with the expanded Materials branch is shown  to expand the tree for below:



To add a new concrete material click on Concrete in the tree and select File/New from the menu (or right mouse click on Concrete and select New). The window shown below will open.

**Bridge Materials - Concrete**

Name:  Description:

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

Initial compressive strength (f'ci) =  ksi

Coefficient of thermal expansion =  1/F

Density (for dead loads) =  kcf

Density (for modulus of elasticity) =  kcf

Modulus of elasticity (E<sub>c</sub>) =  ksi

Initial modulus of elasticity =  ksi

Poisson's ratio =

Composition of concrete =  ▼

Modulus of rupture =  ksi

Shear factor =

Add the concrete material “PS 6.5 ksi” that was entered into the Library in Exercise 3 by selecting from the Concrete Materials Library by clicking the Copy from Library button. This concrete will be used for the beam concrete in this example.

**Library Data: Materials - Concrete**

Name	Description	Library	Units	f'c	f'ci	alpha	DL Density	Modulus Density	Modulus of Elasticity	Poisson's Ratio
Class A	Class A cement conc	Standard	SI /	28.00		0.00	2400.0	2320.00	25426.08	0.200
Class A (US)	Class A cement conc	Standard	US	4.000		0.00	0.150	0.145	3644.15	0.200
Class B	Class B cement conc	Standard	SI /	17.00		0.00	2400.0	2320.00	19811.84	0.200
Class B (US)	Class B cement conc	Standard	US	2.400		0.00	0.150	0.145	2822.75	0.200
Class C	Class C cement conc	Standard	SI /	28.00		0.00	2400.0	2320.00	25426.08	0.200
Class C (US)	Class C cement conc	Standard	US	4.000		0.00	0.150	0.145	3644.15	0.200
PS 6.5 ksi	PS 6.5 ksi (f'ci = 5.5)	Agency	US	6.500	5.	0.00	0.150	0.150	4888.00	0.200

Select the PS 6.5 ksi material and click Ok. The selected material properties are copied to the Bridge Materials – Concrete window as shown below.

The screenshot shows a dialog box titled "Bridge Materials - Concrete". It contains the following fields and values:

Property	Value	Unit
Name:	PS 6.5 ksi	
Description:	PS 6.5 ksi (f'c = 5.5 ksi)	
Compressive strength at 28 days (f'c) =	6.500	ksi
Initial compressive strength (f'ci) =	5.500	ksi
Coefficient of thermal expansion =	0.0000060000	1/F
Density (for dead loads) =	0.150	kcf
Density (for modulus of elasticity) =	0.150	kcf
Modulus of elasticity (E <sub>c</sub> ) =	4887.73	ksi
Initial modulus of elasticity =	4496.06	ksi
Poisson's ratio =	0.200	
Composition of concrete =	Normal	
Modulus of rupture =	0.610	ksi
Shear factor =	1.000	

At the bottom of the dialog box, there are four buttons: "Copy from Library...", "OK", "Apply", and "Cancel". The "OK" button is highlighted with a dashed border.

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

Add a concrete material for the deck, reinforcement material and prestress strand using the same techniques. The windows will look like those shown below:

Bridge Materials - Concrete

Name:  Description:

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

Initial compressive strength (f'ci) =  ksi

Coefficient of thermal expansion =  1/F

Density (for dead loads) =  kcf

Density (for modulus of elasticity) =  kcf

Modulus of elasticity (Ec) =  ksi

Initial modulus of elasticity =  ksi

Poisson's ratio =

Composition of concrete =  ▼

Modulus of rupture =  ksi

Shear factor =

**Bridge Materials - Reinforcing Steel**

Name:  Description:

Material Properties

Specified yield strength ( $F_y$ ) =  ksi

Modulus of elasticity ( $E_s$ ) =  ksi

*Ultimate strength ( $F_u$ )* =  ksi

Type

Plain

Epoxy

Galvanized

Other

**Bridge Materials - PS Strand**

Name:  Description:

Strand diameter =  in

Strand area =  in<sup>2</sup>

Strand type =

Ultimate tensile strength ( $F_u$ ) =  ksi

Yield strength ( $F_y$ ) =  ksi

Modulus of elasticity ( $E$ ) =  ksi

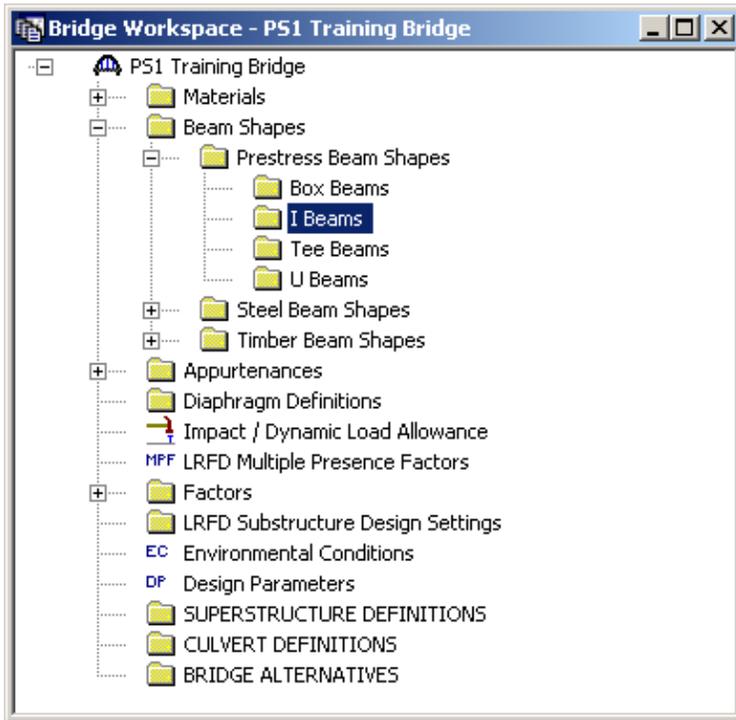
Transfer length (Std) =  in

Transfer length (LRFD) =  in

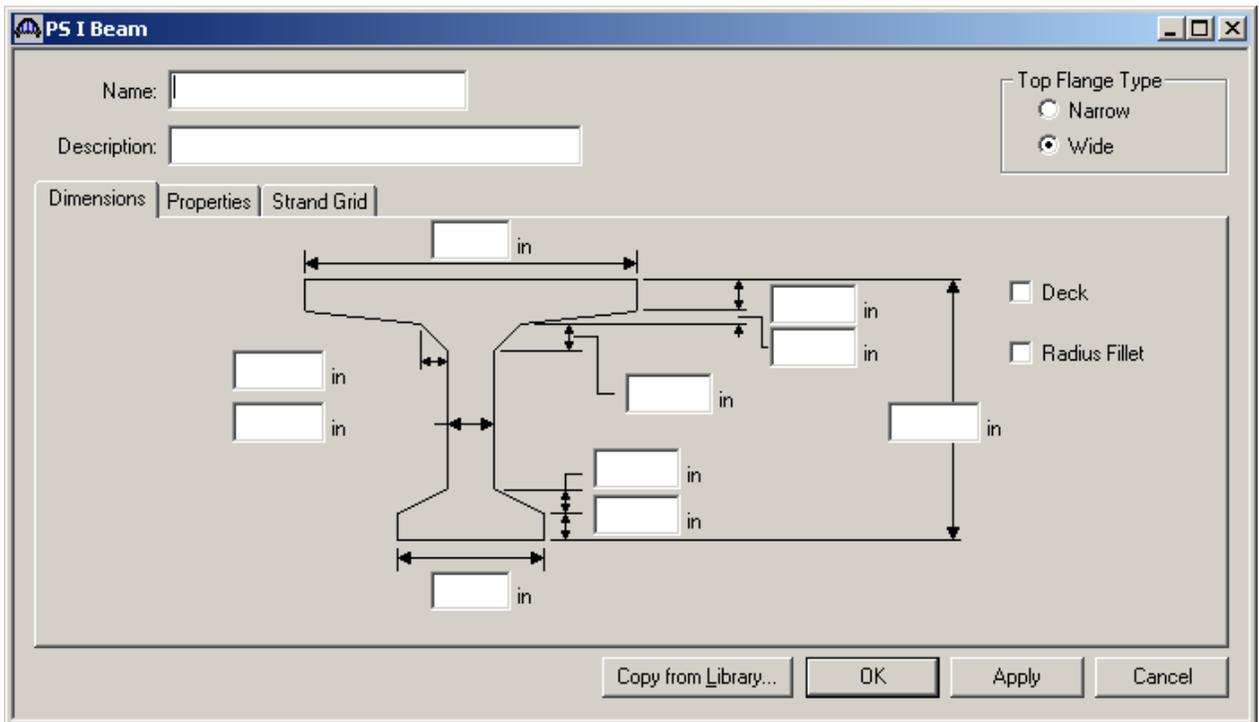
Unit load per length =  lb/ft

Epoxy coated

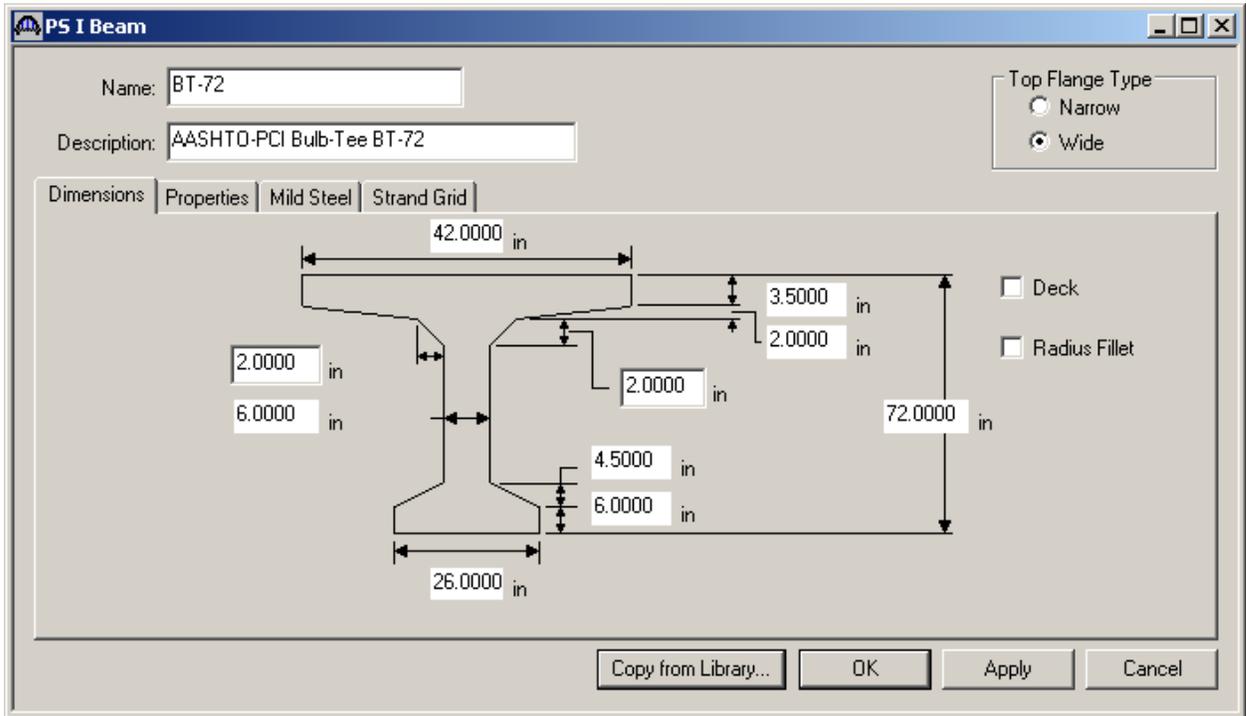
To enter a prestress beam shape to be used in this bridge expand the tree labeled Beam Shapes as shown below:



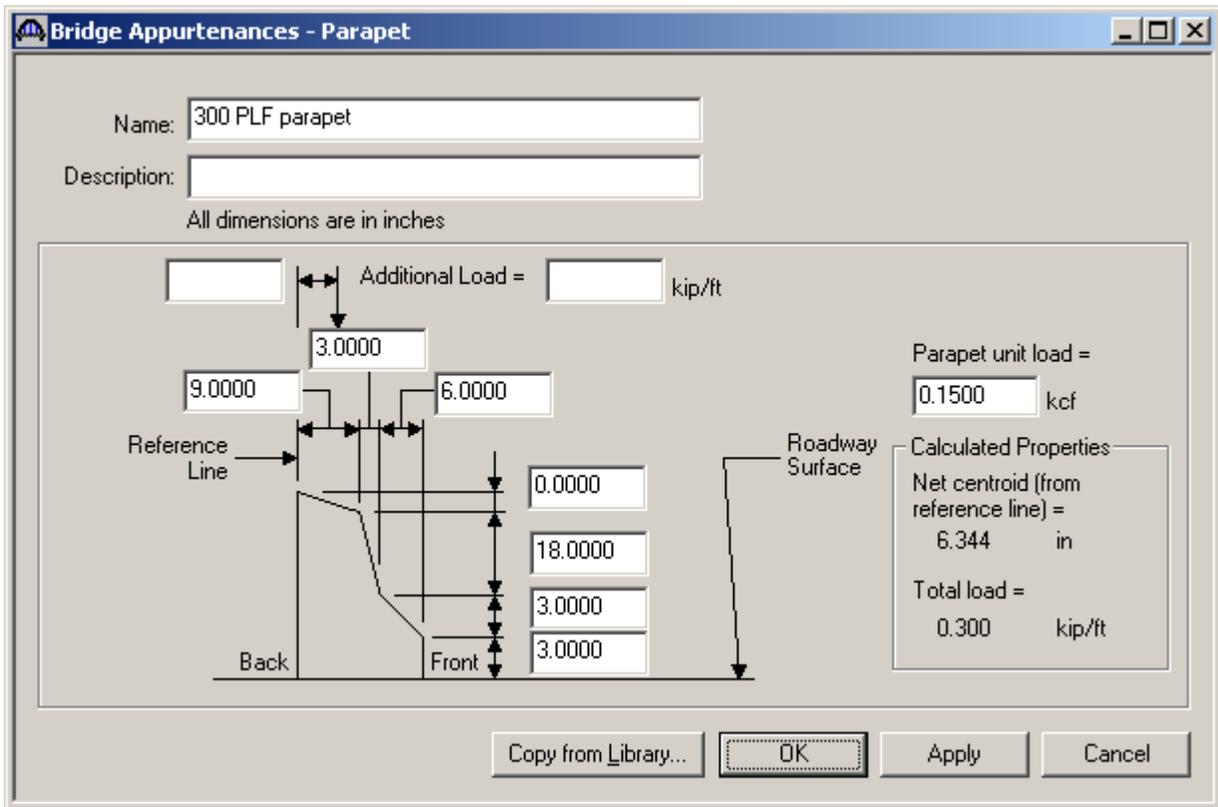
Click on I Beams in the tree and select File/New from the menu (or double click on I Beams in the tree). The window shown below will open.



Select the Top Flange Type as Wide and click on the copy from Library button. Select BT-72 (AASHTO-PCI Bulb-Tee BT-72) and click Ok. The beam properties are copied to the I Beam window as shown below.

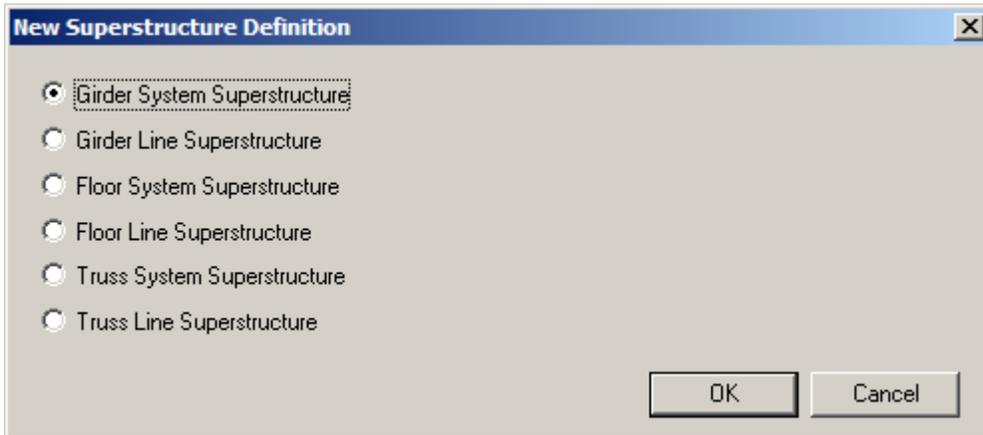


To enter the appurtenances to be used within the bridge expand the tree branch labeled Appurtenances. To define a parapet double click on Parapet in the tree and input the parapet dimensions as shown below. Click Ok to save the data to memory and close the window.

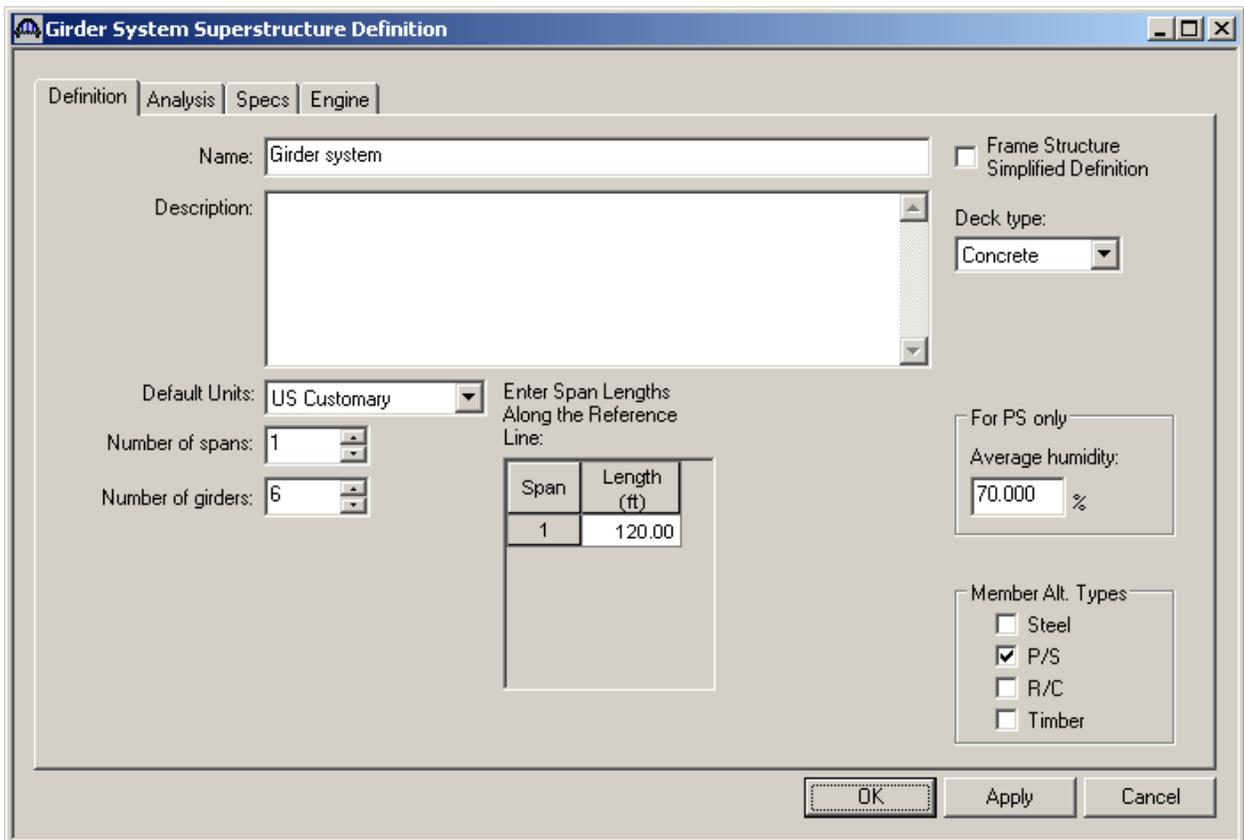


The default impact factors, standard LRFD and LFD factors will be used as they were in Example 4a so we will skip to Structure Definition. Bridge Alternatives will be added after we enter the Structure Definition.

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

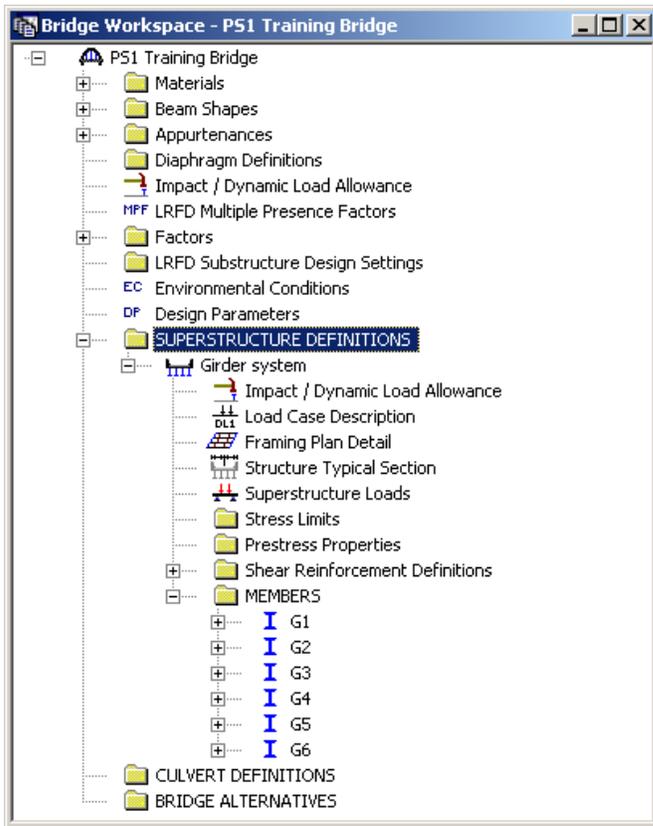


Select Girder System and the Structure Definition window will open. Enter the appropriate data as shown below:



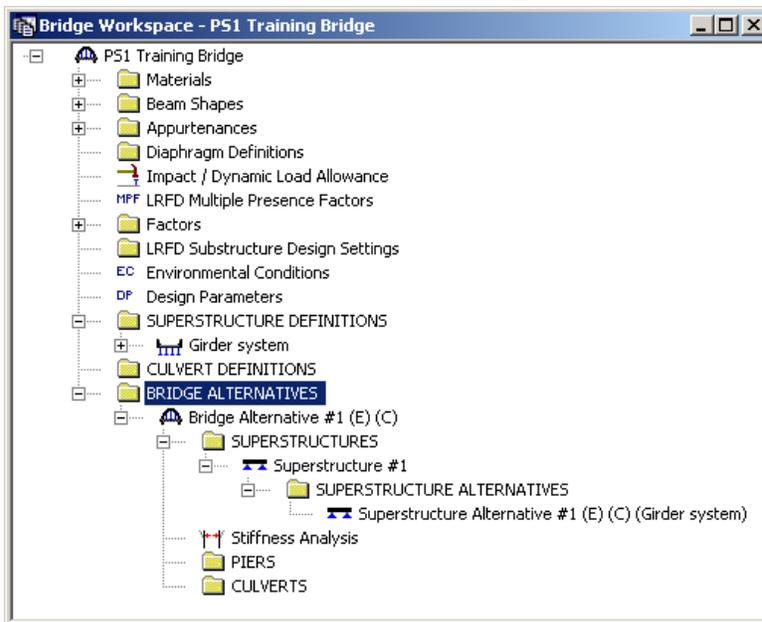
Click on Ok to save the data to memory and close the window.

The partially expanded Bridge Workspace tree is shown below:

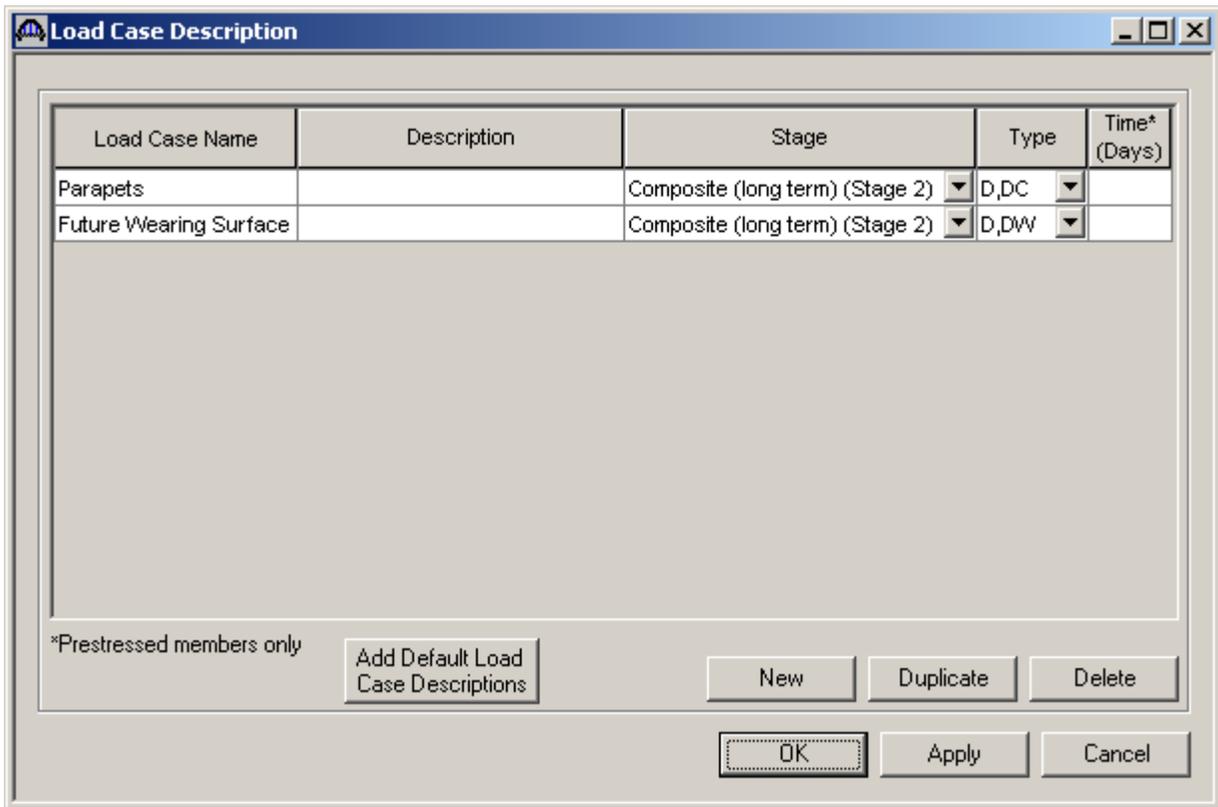


We now go back to the Bridge Alternatives and create a new Bridge Alternative, a new Structure, and a new Structure Alternative as we did in Example 4a.

The partially expanded Bridge Workspace tree is shown below:



Click Load Case Description to define the dead load cases. The completed Load Case Description window is shown below.



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

Structure Framing Plan Details

Number of spans = 1      Number of girders = 6

Layout | Diaphragms

Girder Spacing Orientation

Perpendicular to girder

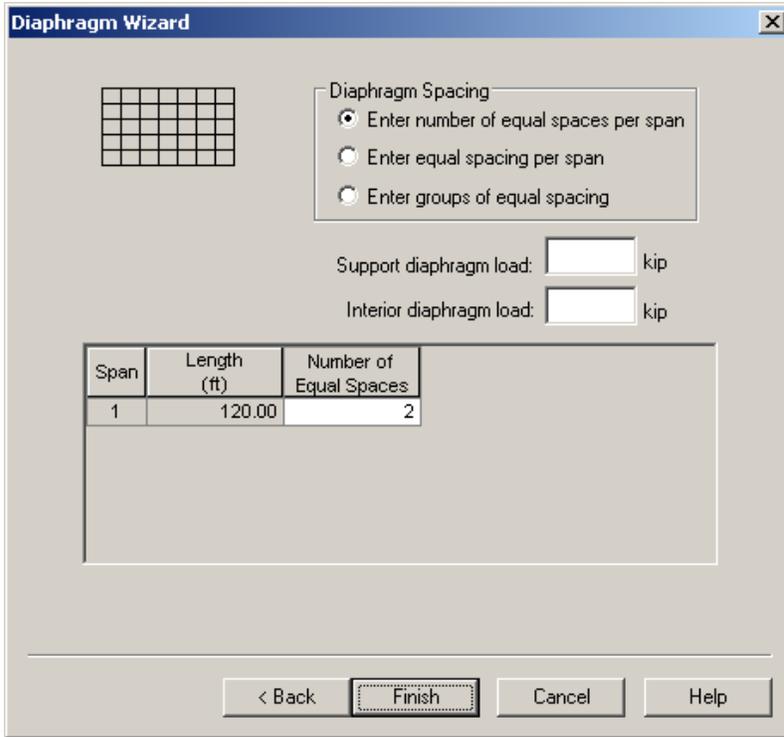
Along support

Support	Skew (Degrees)
1	0.0000
2	0.0000

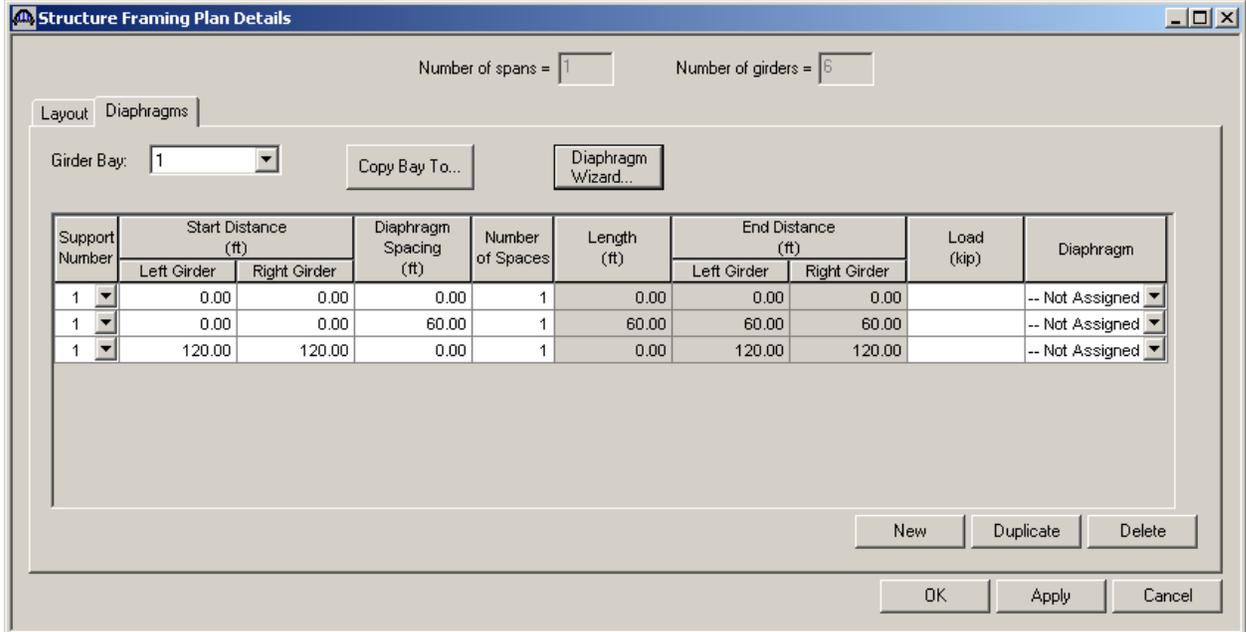
Girder Bay	Girder Spacing (ft)	
	Start of Girder	End of Girder
1	9.00	9.00
2	9.00	9.00
3	9.00	9.00
4	9.00	9.00
5	9.00	9.00

OK      Apply      Cancel

Switch to the Diaphragms tab to enter diaphragm spacing. Click the Diaphragm Wizard button to add diaphragms for the entire structure. Select the Framing Plan System and Click the Next button. Enter the following data on the dialog shown below.



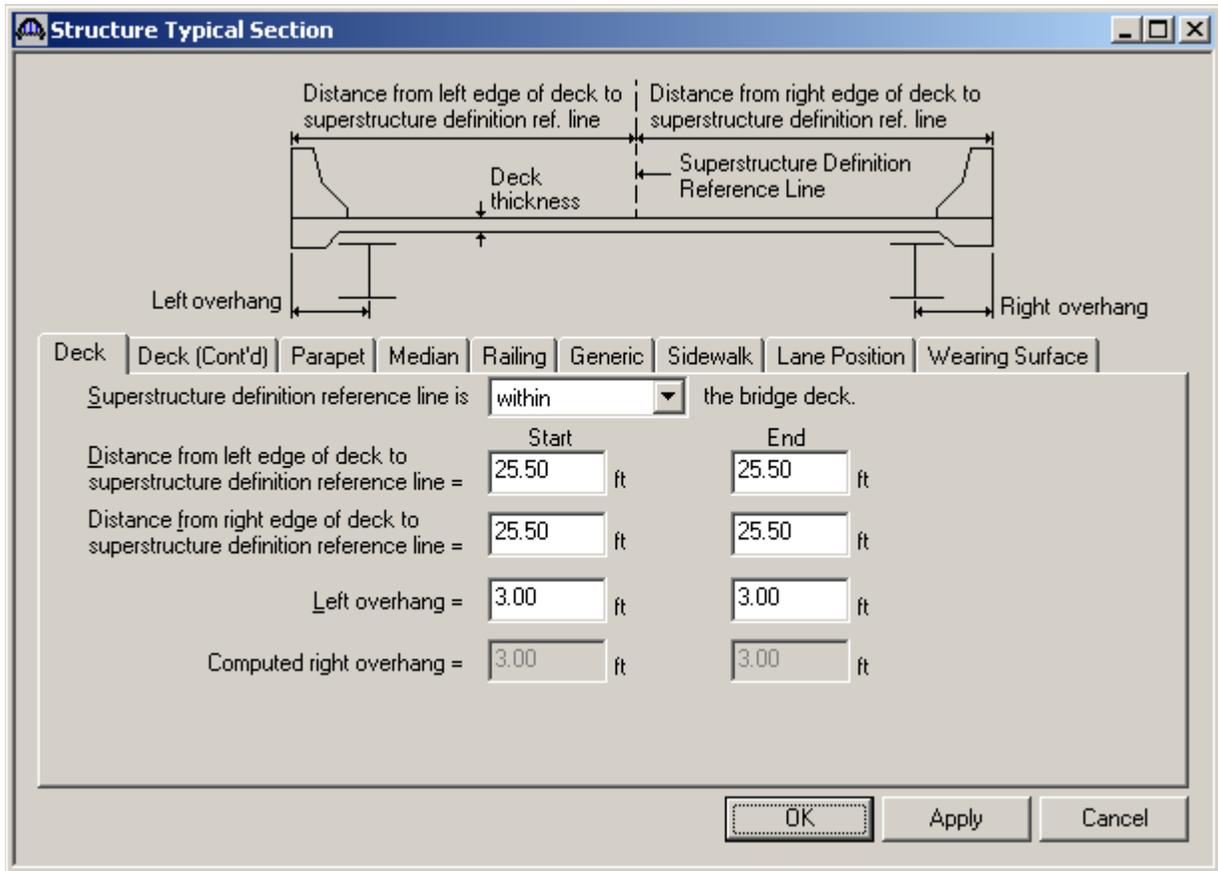
Click the Finish button to add the diaphragms. The Diaphragm Wizard will create diaphragms for all of the girder bays in the structure. The diaphragms created for Girder Bay 1 are shown below:



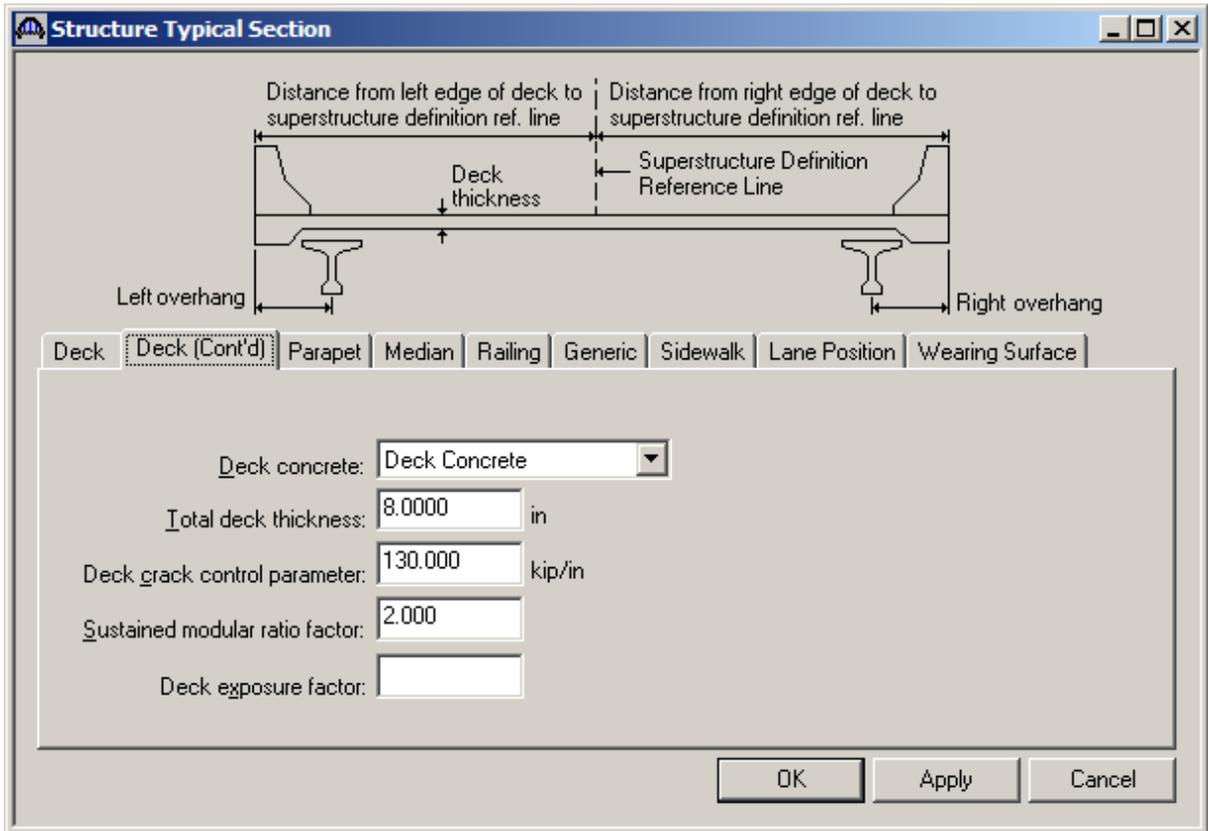
Select Ok to close the window.

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

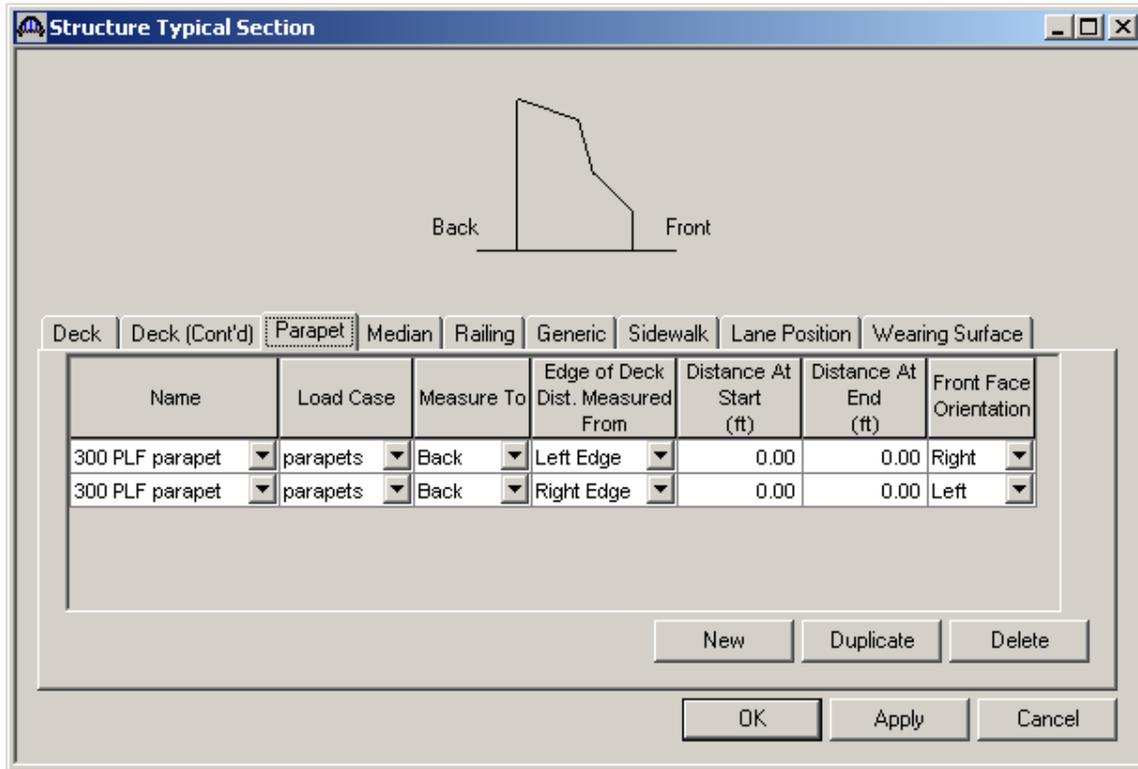
Basic deck geometry:



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



Parapets:  
Add two parapets as shown below.



**Lane Positions:**

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

The screenshot shows a software dialog box titled "Structure Typical Section". At the top, there is a diagram of a bridge cross-section with two travelways. Dimension (A) is the distance from the left edge of Travelway 1 to the Superstructure Definition Reference Line. Dimension (B) is the distance from the right edge of Travelway 1 to the Superstructure Definition Reference Line. Below the diagram is a tabbed interface with "Lane Position" selected. A table displays the computed values for Travelway 1.

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	-24.00	24.00	-24.00	24.00

Below the table, there is an "LRFD Fatigue" section with a checkbox for "Override Truck fraction:" and a "Compute..." button. At the bottom right, there are buttons for "New", "Duplicate", "Delete", "OK", "Apply", and "Cancel".

**Wearing Surface:**

Enter the data shown below.

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

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

Deck thickness

Superstructure Definition Reference Line

Left overhang

Right overhang

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

Wearing surface material: Bituminous

Description:

Wearing surface thickness = 2.0000 in  Thickness field measured (DW = 1.25 if checked)

Wearing surface density = 150.000 pcf

Load case: Future Wearing Surface

Copy from Library...

OK Apply Cancel

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

Now define a Stress Limit. A Stress Limit defines the allowable concrete stresses for a given concrete material. Double click on the Stress Limits tree item to open the window. Select the “PS 6.5 ksi” concrete material. Default values for the allowable stresses will be computed based on this concrete 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. Click Ok to save this information to memory and close the window.

	LFD	LRFD
Initial allowable compression:	3.300 ksi	3.300 ksi
Initial allowable tension:	0.200 ksi	0.200 ksi
Final allowable compression:	3.900 ksi	3.900 ksi
Final allowable tension:	0.484 ksi	0.484 ksi
Final allowable DL compression:	2.600 ksi	2.925 ksi
Final allowable slab compression:	2.700 ksi	2.700 ksi
Final allowable compression: (LL + 1/2(Pe + DL))	2.600 ksi	2.600 ksi

Double click on the Prestress Properties tree item to open a window in which to define the prestress properties for this structure definition. Define the Prestress Property as shown below. We are using the AASHTO Approximate method to compute losses so the “General P/S Data” tab is the only tab that we have to visit. Click Ok to save to memory and close the window.

**Prestress Properties**

Name: 1/2" LR AASHTO Loss

General P/S Data | Loss Data - Lump Sum | Loss Data - PCI

P/S strand material: 1/2" (7W-270) LR      Jacking stress ratio: 0.750

Loss method: AASHTO Approximate      P/S transfer stress ratio:

Transfer time: 24.0 Hours

Age at deck placement: 30.00 Days

Final age: 1825.00 Days

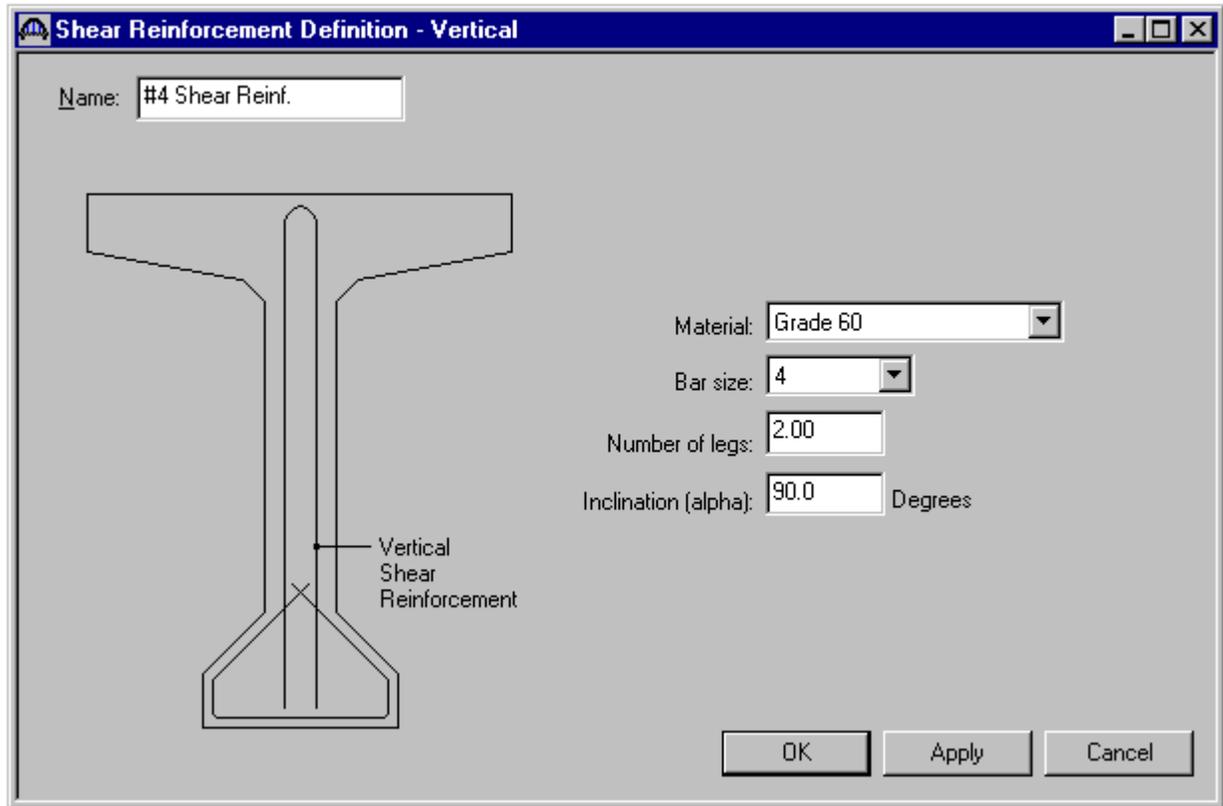
Loss Data - AASHTO

Percentage DL: 0.0 %

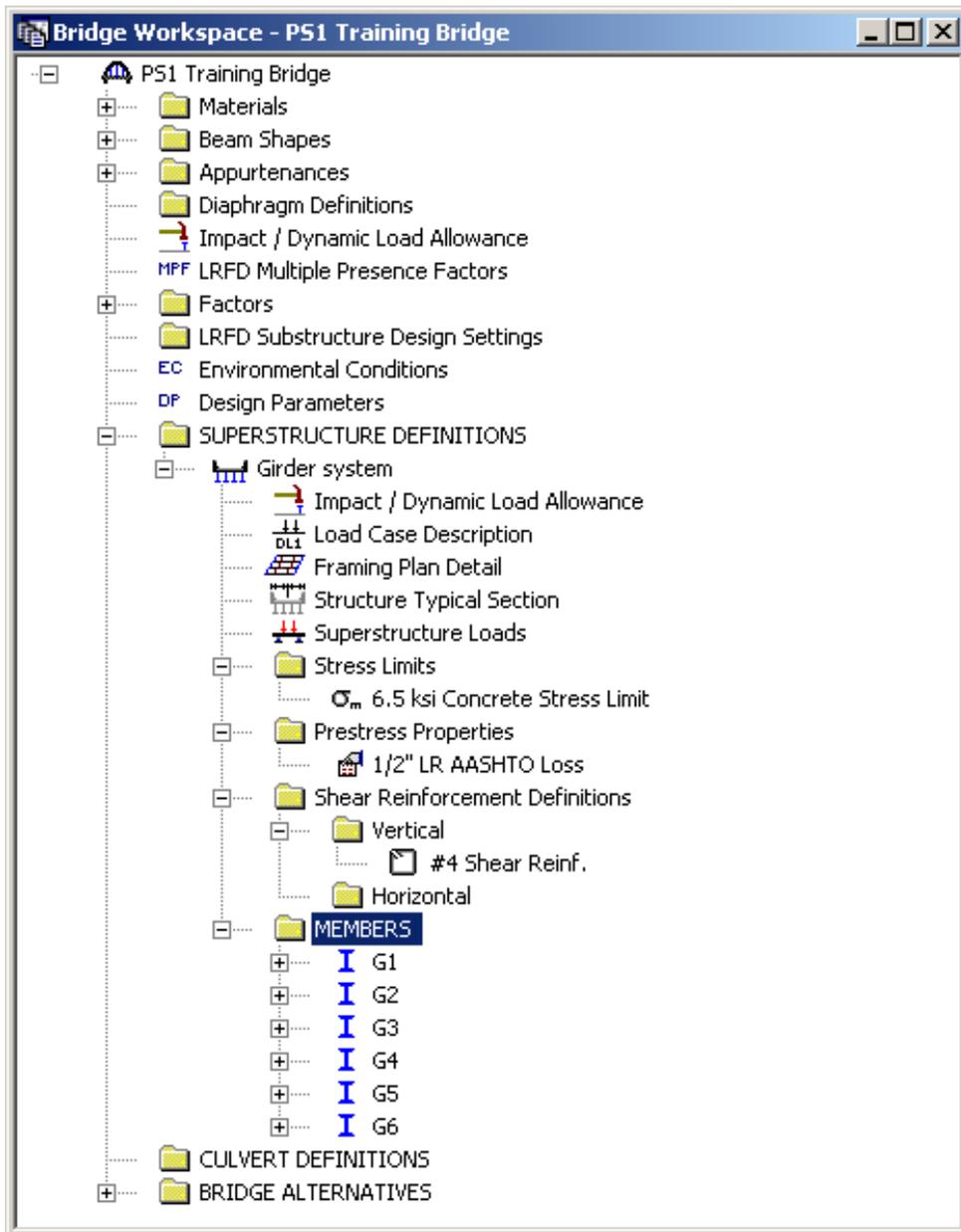
Include elastic gains

OK    Apply    Cancel

Now define the vertical shear reinforcement by double clicking on Vertical (under Shear Reinforcement Definitions in the tree). Define the reinforcement as shown below. Click Ok to save to memory and close the window.

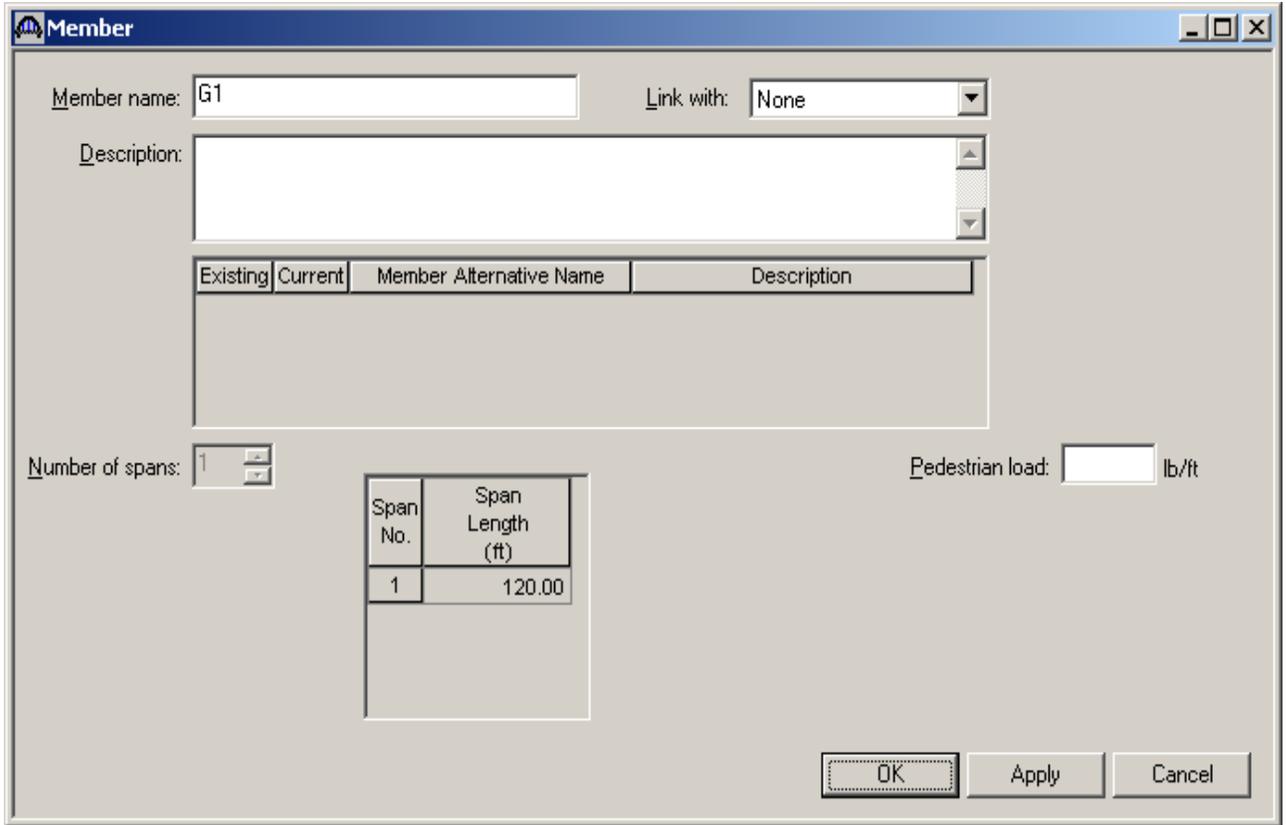


A partially expanded Bridge Workspace is shown below.



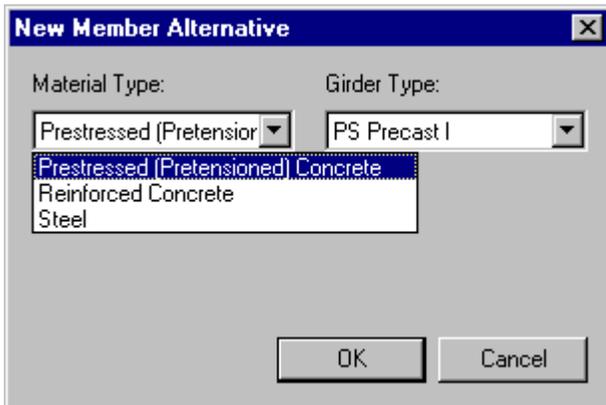
Describing a member:

The member window shows the data that was generated when the structure definition was created. No changes are required at this time. The first Member Alternative that we create will automatically be assigned as the Existing and Current Member alternative for this Member.



Defining a Member Alternative:

Double-click MEMBER ALTERNATIVES in the tree to create a new alternative. The New Member Alternative dialog shown below will open. Select Prestressed (Pretensioned) Concrete for the Material Type and PS Precast I for the Girder Type.



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

The Member Alternative Description window will open. Enter the appropriate data as shown below. The Schedule-based Girder property input method is the only input method available for a prestressed concrete beam.

**Member Alternative Description**

Member Alternative:

Description | Specs | Factors | Engine | Import | Control Options

Description:

Material Type:

Girder Type:

Default Units:

Girder property input method

Schedule based

Cross-section based

Default rating method:

Additional Self Load

Additional self load =  kip/ft

Additional self load =  %

Crack control parameter (Z)

Top of beam:  kip/in

Bottom of beam:  kip/in

Exposure factor

Top of beam:

Bottom of beam:

OK Apply Cancel

Next describe the beam by double clicking on Beam Details in the tree. The Beam Details windows with the appropriate data are shown below.

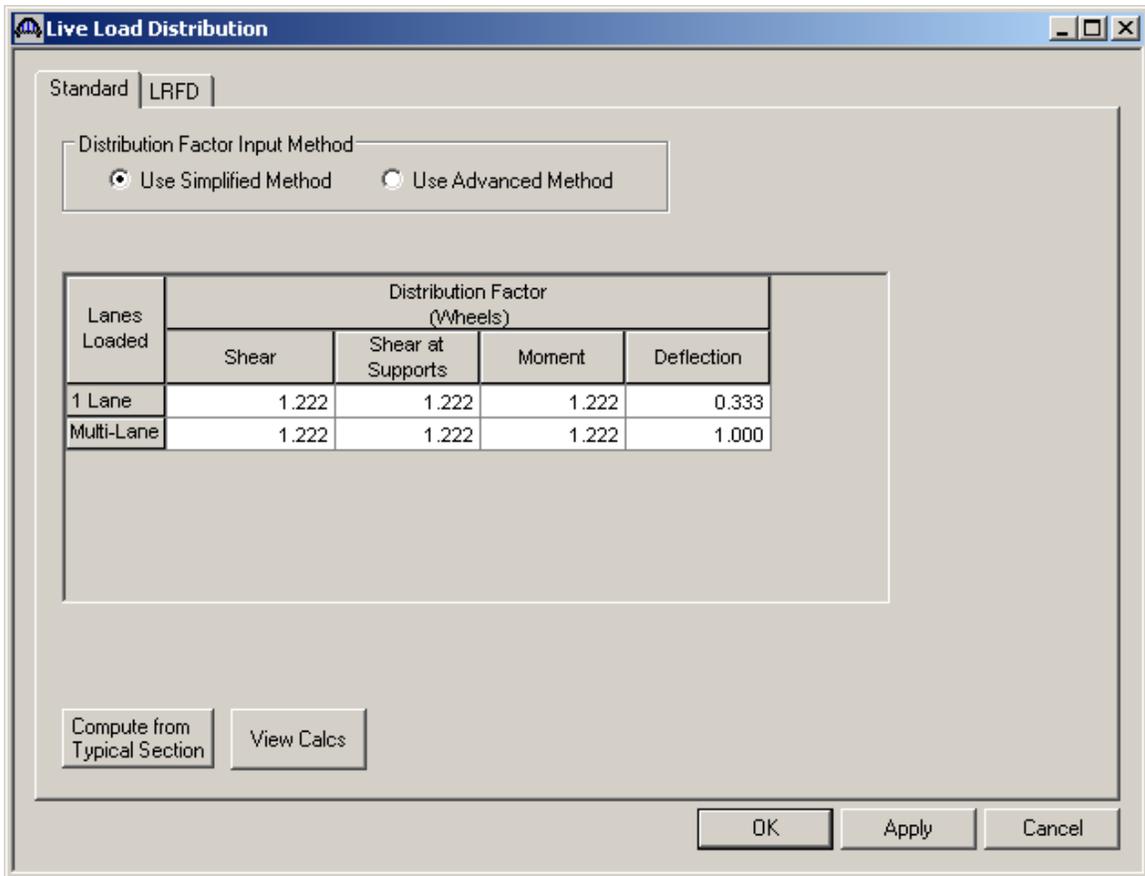
Span Number	Beam Shape	Girder Material	Prestress Properties	Use Creep	n	Beam Projection	
						Left End (in)	Right End (in)
1	BT-72	PS 6.5 ksi	1/2" LR AASHTO Los	No		6.0000	6.0000

Buttons: OK, Apply, Cancel

If we try to use the Compute from Typical Section button on the Live Load Distribution – Standard tab to populate the LFD live load distribution factors for this member alternative, we will receive a message that Virtis/Opis cannot calculate the distribution factors because beam shapes are not assigned to adjacent member alternatives. This is due to the fact that Virtis/Opis does not yet know if we have adjacent box beams or spread box beams.

Virtis/Opis uses the beam shape assigned to this member alternative and also the beam shapes assigned to the adjacent member alternatives to determine if we have adjacent or spread box beams. Since we do not have any member alternatives for the adjacent members defined yet in this training example, we will enter the following distribution factors by hand.

During actual production use of Virtis/Opis you can revisit this window after member alternatives have been created for all members in your superstructure. Then the Compute button will correctly determine if you have adjacent or spread box beams and compute the distribution factors for you.



Go back to the Beam Details Window and complete the remaining information. Note that Stress Limit Ranges are defined over the entire length of the precast beam, including the projections of the beam past the centerline of bearing which were entered on the Span Detail tab.

The screenshot shows the 'Beam Details' window with the 'Stress Limit Ranges' tab selected. The window title is 'Beam Details'. The tabs are 'Span Detail', 'Stress Limit Ranges', 'Slab Interface', and 'Web End Block'. The 'Stress Limit Ranges' tab contains a table with the following data:

Span Number	Name	Start Distance (ft)	Length (ft)	End Distance (ft)
1	6.5 ksi Concrete	0.00	121.00	121.00

Below the table are buttons for 'New', 'Duplicate', and 'Delete'. At the bottom of the window are buttons for 'OK', 'Apply', and 'Cancel'.

Enter value in Slab Interface tab as shown below.

The screenshot shows a software dialog box titled "Beam Details" with four tabs: "Span Detail", "Stress Limit Ranges", "Slab Interface", and "Web End Block". The "Slab Interface" tab is selected. The settings are as follows:

- Interface type: Intentionally Roughened (dropdown menu)
- Default interface width to beam widths:
- Interface width:  in
- Cohesion factor:  ksi
- Friction factor:
- K1:
- K2:  ksi

At the bottom right, there are three buttons: "OK", "Apply", and "Cancel".

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

Expand the tree under Strand Layout and open the Span 1 window. Place the cursor in the schematic view on the right side of the screen. The toolbar buttons in this window will become active. Select the Zoom button to shrink 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. You can now define the strands that are present at the middle of the span by selecting strands in the right hand schematic. Select the bottom 44 strands in the schematic so that the CG of the strands is 5.82 inches.

**Strand Layout - Span 1**

100%

Description Type  
 P and CGS only     Strands in rows

Strand Configuration Type  
 Straight/Debonded     Symmetry  
 Harped  
 Harped and straight debonded

Mid span

Harp Point Locations

Harp Point	Distance (ft)	Radius (in)
Left	0.00	0.0000
Right	0.00	0.0000

OK    Apply    Cancel

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

Number of strands = \*\*\*  
 Number of harped strands = 6  
 CG of strands measured from bottom of section = 5.82 ft

Legend:

- ✕ No strand at the position at the center/reaction location
- ✕ No strand at the position at the center/location but strand is harped to the position
- Strand occupied at the position at the center/reaction location
- The strand is debonded at the center/reaction location
- The strand is debonded between the center/reaction and the mid-span
- The harped portion of harped strand.
- The mid-span portion of harped strand.
- The mid-span portion of one strand and the harped portion of another strand.

Now select the Left end radio button to enter the following harped strand locations at the left end of the precast beam. Place the cursor in the schematic view on the right side of the screen. You can now define the strands that are present at the left end of the span by selecting strands in the right hand schematic. Select the top 10 strands in the schematic so that the CG of the strands is 18.09 inches. Close the window by clicking Ok. This saves the data to memory and closes the window.

Strand Layout - Span 1
\_ □ ×

📄 🖱️ 🔍 🔍 ⊕ 🏠 📏
100%

Description Type

P and CGS only     Strands in rows

---

Strand Configuration Type

Straight/Debonded     Symmetry

Harped

Harped and straight debonded

---

Mid span

---

Left end

Right end

Harp Point Locations		
Harp Point	Distance (ft)	Radius (in)
Left	48.50	0.0000
Right	48.50	0.0000

Note:  
Strand positions generated by the RELEASED method.  
Please refer to the report description of the method.

Number of strands = \*\*

Number of harped strands = 10

CG of strands (measured from bottom of section) = 18.09"

Legend:

- × No strand at the position at the center reaction location
- × No strand at the position at the center location but a strand is harped to the position
- ◊ A strand occupies the position at the center reaction location
- ◆ The strand is debonded at the center reaction location
- The strand is debonded between the center reaction and the mid-span
- ◆ The harped position of a harped strand.
- The mid-span position of a harped strand.
- ◆ The mid-span position of one strand and the harped position of another strand.

OK
Apply
Cancel

Next open the Deck Profile and enter the data describing the structural properties of the deck. The window is shown below.

The screenshot shows a software window titled "Deck Profile". At the top, there is a "Type:" field containing "PS Precast I". Below this, there are two tabs: "Deck Concrete" (which is selected) and "Reinforcement". The main area contains a table with the following columns: 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), and n. A single row of data is present in the table. Below the table, there are buttons for "Compute from Typical Section...", "New", "Duplicate", and "Delete". At the bottom right, there are "OK", "Apply", and "Cancel" buttons.

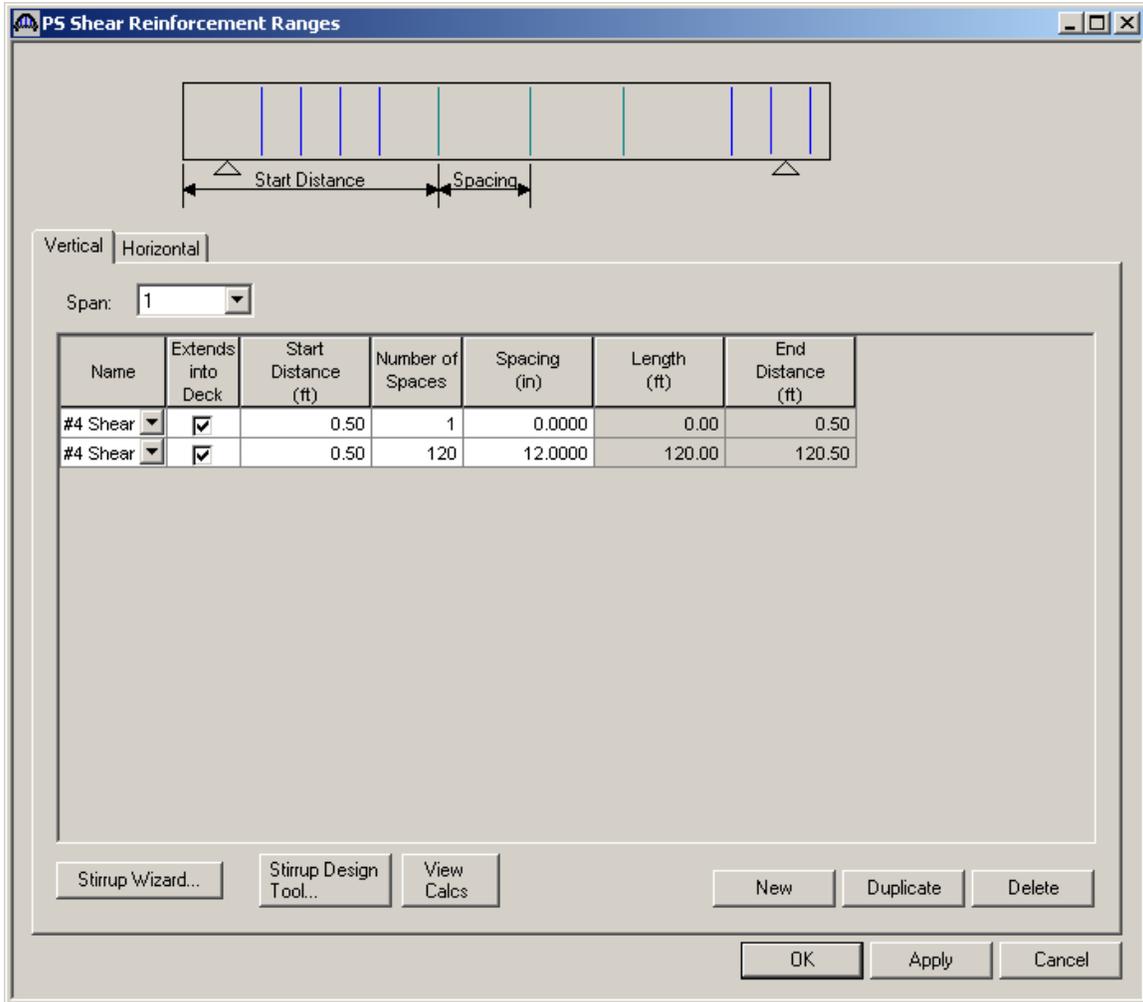
Material	Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)	Structural Thickness (in)	Start Effective Flange Width (Std) (in)	End Effective Flange Width (Std) (in)	Start Effective Flange Width (LRFD) (in)	End Effective Flange Width (LRFD) (in)	n
Deck Concrete	1	0.00	120.00	120.00	7.5000	90.0000	90.0000	108.0000	108.0000	

No reinforcement is described.

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

Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)	Z1 (in)	Z2 (in)	Z3 (in)	Z4 (in)	Y1 (in)	Y2 (in)	Y3 (in)
1	0.00	120.0	120.00	0.0000	0.0000	0.0000	0.0000	0.5000	0.5000	0.0000

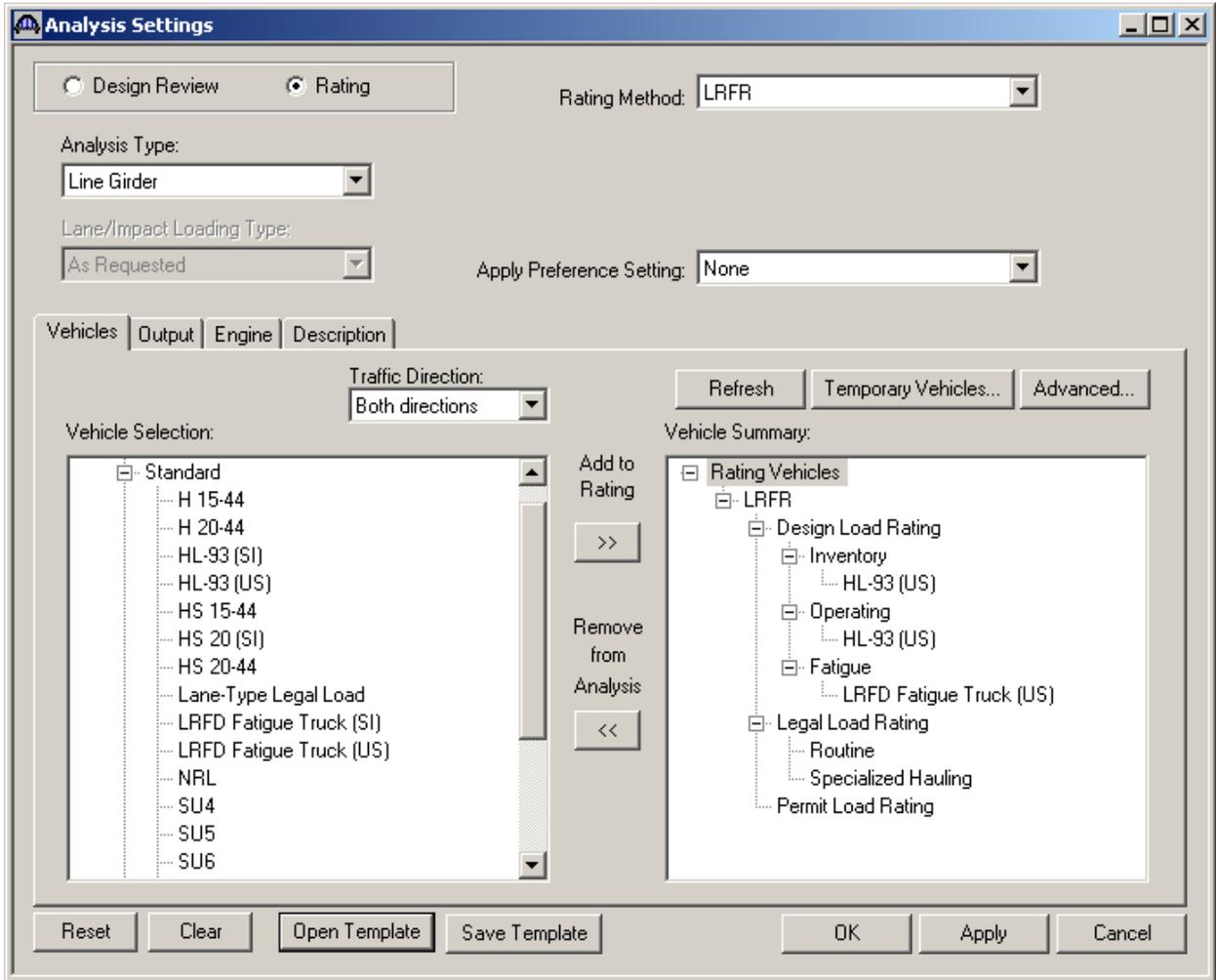
The Shear Reinforcement Ranges are entered as described below. The vertical shear reinforcement is defined as extending into the deck on this tab. This indicates composite action between the beam and the deck. Data does not have to be entered on the Horizontal tab to indicate composite action since we have defined that by extending the vertical bars into deck.



The description of an exterior beam for this structure definition is complete.

To compute LRFD live load distribution factors the interior girder adjacent to exterior girder must be defined. Copy Precast I Beam Alternative of G1 and paste to G2 as a member alternative. Open Live Load Distribution window, LRFD tab, use Compute from Typical Section button to compute LRFD live load distribution factors.

The member alternative can now be analyzed. To perform LRFR rating, select the View Analysis Settings button on the toolbar to open the window shown below. Click Open Template button and select the LRFR Design Load Rating to be used in the rating and click Ok.

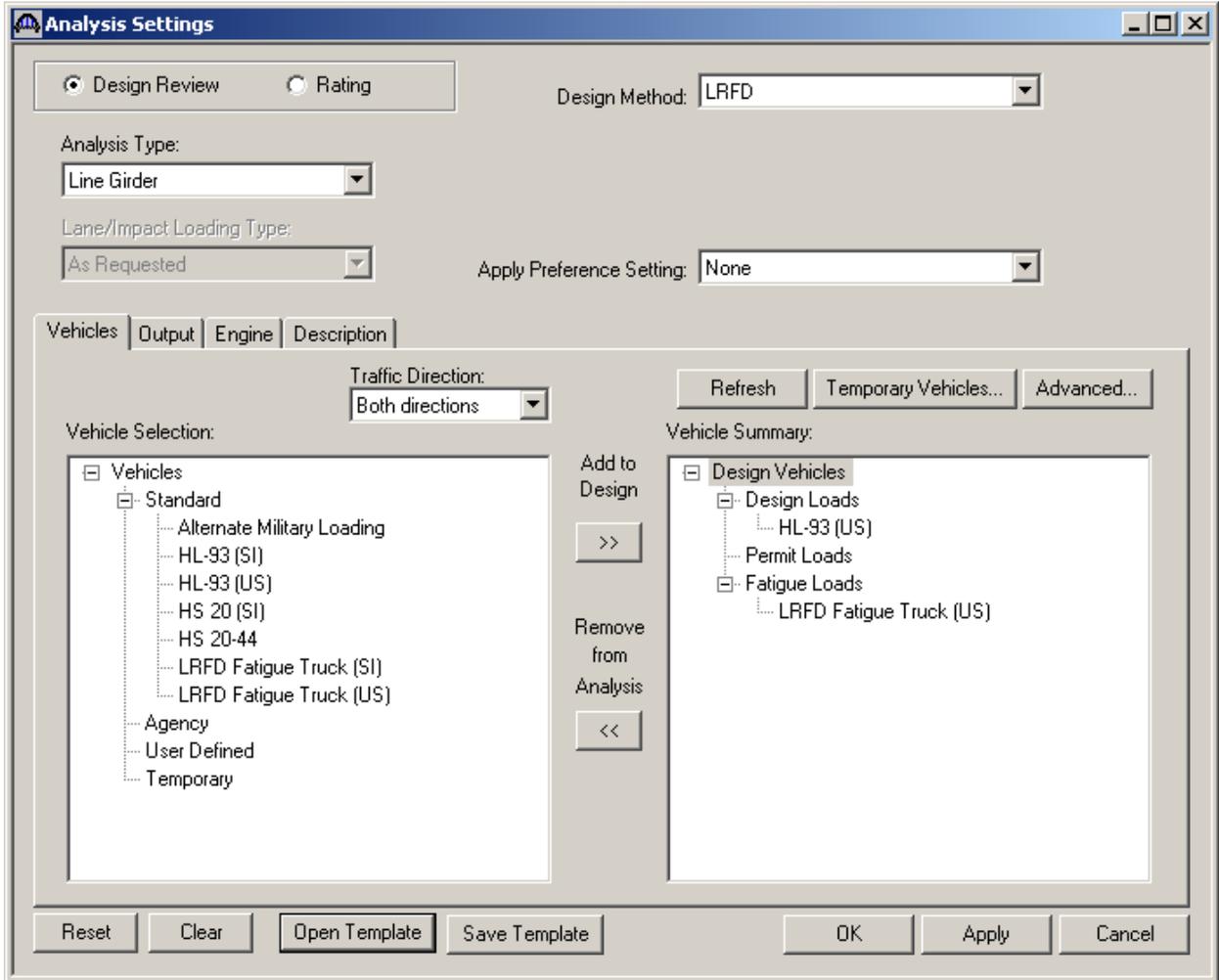


Next click the Analyze button on the toolbar to perform the rating. When the rating is finished you can review the results by clicking the View analysis Report on the toolbar. The window shown below will open.

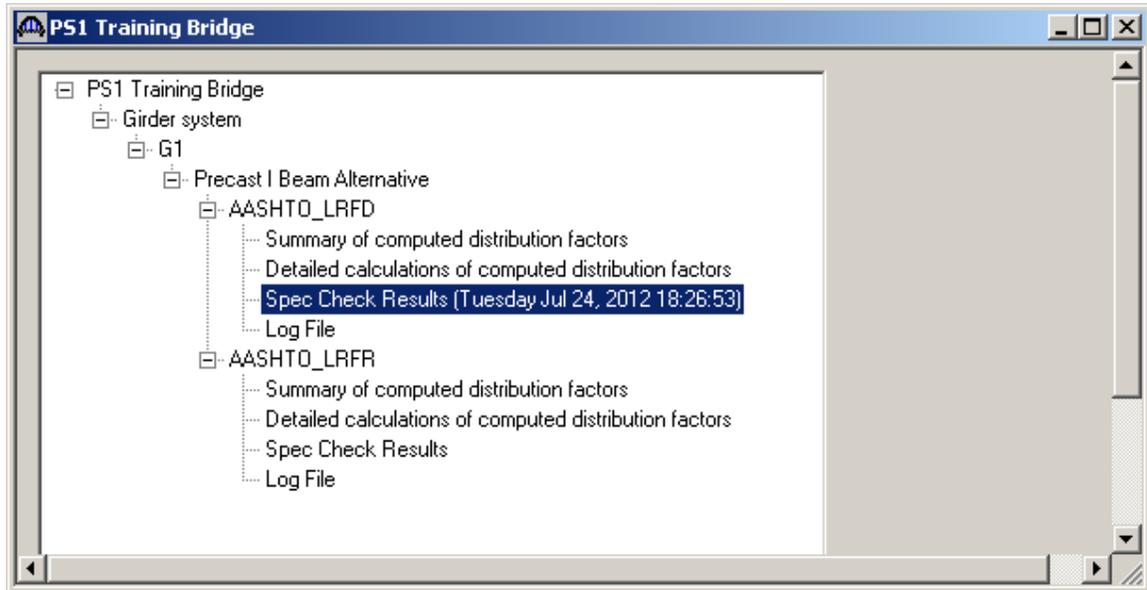
The screenshot shows a software window titled "Analysis Results - Precast I Beam Alternative". At the top, there are three dropdown menus: "Report Type" (set to "Rating Results Summary"), "Lane/Impact Loading Type" (with radio buttons for "As Requested" and "Detailed"), and "Display Format" (set to "Multiple rating levels per row"). Below these is a table with 14 columns: Live Load, Live Load Type, Rating Method, Inventory Load Rating (Ton), Operating Load Rating (Ton), Legal Load Rating (Ton), Permit Load Rating (Ton), Inventory Rating Factor, Operating Rating Factor, Legal Rating Factor, Permit Rating Factor, Inventory Location (ft), Inventory Location Span-(%), Operating Location (ft), and Operating Location Span-%. The table contains two rows of data for HL-93 (US) loads. Below the table is a scroll bar and the text "AASHTO LRFR Engine Version 6.4.0.2003" and "Analysis Preference Setting: None". A "Close" button is located in the bottom right corner.

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Legal Load Rating (Ton)	Permit Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Legal Rating Factor	Permit Rating Factor	Inventory Location (ft)	Inventory Location Span-(%)	Operating Location (ft)	Operating Location Span-%
HL-93 (US)	Truck + Lane	LRFR	41.25	62.92			1.146	1.748			60.00	1 - (50.0)	60.00	1 - (50.0)
HL-93 (US)	Tandem + Lane	LRFR	48.91	74.60			1.358	2.072			60.00	1 - (50.0)	60.00	1 - (50.0)

An LRFD design review of this girder for HL93 loading can be performed by AASHTO LRFD. To do LRFD design review, enter the Analysis Settings window as shown below:



AASHTO LRFD analysis will generate a spec check results file. Click  on tool bar to open the following window.



To view the spec check results, double click the Spec Check Results in this window.

C:\Documents and Settings\XLI\My Documents\AASHTOWARE\VirtualDps64\PS1 Training\Bridge\Girdersyst - Windows Internet Explorer

C:\Documents and Settings\XLI\My Documents\AASHTOWARE\VirtualDps64\PS1 Training\Bridge\Girdersyst\G1\Precast\BeamAlternative\AASHTO\_LRFD\Stage 3 Spec Check Results.XML

File Edit View Favorites Tools Help

Superstructure Def: Girder system  
Member: G1  
Analysis Preference Setting: None  
Member Alt: Precast I Beam Alternative

AASHTO LRFD Specification, Edition 5, Interim 2010

### Specification Check Summary

Article	Status
Initial Stress at Transfer (5.9.4.1.1, 5.9.4.1.2)	Pass
Final Stress due to Permanent and Transient Loads (5.9.4.2.1, 5.9.4.2.2)	Pass
Flexure (5.7.3.2, 5.7.3.3.2)	Pass
Shear (5.8.3.3, 5.8.2.5, 5.8.2.7, 5.8.3.5)	Pass
Deflection (5.7.3.6.2)	Pass

### Initial Compression Stress At Transfer of Prestress

Location (ft)	Allowable Stress (ksi)	Actual Stress Top of Beam (ksi)	Actual Stress Bot of Beam (ksi)	Ratio	Code
0.000	-3.30	-0.02	-0.64	5.20	Pass
2.000	-3.30	-0.15	-3.14	1.05	Pass
6.311	-3.30	-0.20	-3.09	1.07	Pass
12.000	-3.30	-0.28	-3.01	1.10	Pass
24.000	-3.30	-0.34	-2.94	1.12	Pass
36.000	-3.30	-0.32	-2.96	1.11	Pass
48.000	-3.30	-0.21	-3.08	1.07	Pass
60.000	-3.30	-0.26	-3.03	1.09	Pass
72.000	-3.30	-0.21	-3.08	1.07	Pass
84.000	-3.30	-0.32	-2.96	1.11	Pass
96.000	-3.30	-0.34	-2.94	1.12	Pass
108.000	-3.30	-0.28	-3.01	1.10	Pass
113.689	-3.30	-0.20	-3.09	1.07	Pass
118.000	-3.30	-0.15	-3.14	1.05	Pass
120.000	-3.30	-0.02	-0.64	5.20	Pass

NR = Spec check not required at this location

### Initial Tension Stress At Transfer of Prestress

Location (ft)	Allowable Stress (ksi)	Actual Stress Top of Beam (ksi)	Actual Stress Bot of Beam (ksi)	Ratio	Code
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Done