AASHTOWare BrDR 7.5.0

# BrDR Tutorial

CNVRT1 – Converting Girder Line to Girder System Example

# **BrDR Training**

# CNVRT1 – Converting Girder Line to Girder System Example

This example illustrates how to convert a girder line superstructure definition to a girder system superstructure definition.

The design plans for the bridge needs to be consulted to obtain the following types of items to convert a girder line to a girder system:

- Overall width of deck, location of travelway lanes, etc.
- Appurtenance dimensions
- Number of girders
- Framing plan skews

#### Girder System Superstructure definition

In this example **PCITrainingBridge3** (**BID** 6) will be converted from a girder line to a girder system structure definition. **PCITrainingBridge3** is a single span prestressed I beam. Select **PCITrainingBridge3** on the right portion of the **Bridge Explorer** and open its **Bridge Workspace** tree.

Br		AASHTOWare B	ridge Design and Rating			? -	- □ >	<
BRIDGE EXPLORER BRIDGE FOLDE	R RATE	TOOLS VIEW						
	BID ^	Bridge ID	Bridge Name	District	County	Facility	Location	
📁 Recent Bridges	1	TrainingBridge1	Training Bridge 1(LRFD)	District 11	01 Abbeville	SR 0051	Pittsburgh	
All Bridges	2	TrainingBridge2	Training Bridge 2(LRFD)	Unknown	Unknown (P)	N/A	N/A	1
Tutorial Bridges	3	TrainingBridge3	Training Bridge 3(LRFD)	District 11	01 Abbeville	I-79	Pittsburgh	1
Deleted Bridges	4	PCITrainingBridge1	PCI TrainingBridge1(LFR)					1
- Deleted bridges	5	PCITrainingBridge2	PCITrainingBridge2(LRFD)					1
	> 6	PCITrainingBridge3	PCI TrainingBridge3(LFR)					1
	7	PCITrainingBridge4	PCITrainingBridge4(LRFD)					1
	8	PCITrainingBridge5	PCI TrainingBridge5(LFR)					
	9	PCITrainingBridge6	PCITrainingBridge6(LRFD)					
	10	Example7	Example 7 PS (LFR)					
	11	RCTrainingBridge1	RC Training Bridge1(LFR)					
	12	TimberTrainingBridge1	Timber Tr. Bridge1 (ASR)					
	13	FSys GFS TrainingBridge1	FloorSystem GFS Training Bridge 1	District 6	15 Colleton	NJ-Turnpike	NJCity	
	14	FSys FS TrainingBridge2	FloorSystem FS Training Bridge 2	District 11	333 Norfolk	1-95	NYC	
	15	FSys GF TrainingBridge3	FloorSystem GF Training Bridge 3	District 7	06 Barnwell	1-95	ATL	
							•	
				Total B	ridge Count:	32		

The following view of the expanded **Bridge Workspace** tree shows the materials and beam shapes that currently exist for this bridge. Any superstructure definitions that belong to this bridge will have access to these materials and beam shapes, so materials or beam shapes need not be added again to the bridge to convert this girder line structure definition.



## Bridge Appurtenances – Parapet

The **Components** listed do not have a parapet. Add a parapet to this bridge by selecting the **Components** tab, right clicking **Parapet** in the Components Workspace tree, and selecting **New** from the **WORKSPACE** ribbon. Enter the following data to describe the parapet and click **OK**.



#### Girder System Superstructure Definition

Now create a new **Girder System Superstructure Definition** by double clicking on **SUPERSTRUTURE DEFINITIONS** and selecting **Girder system superstructure**.



The window shown below opens. Enter the following data and click OK.

lame: 6 Girde	r System						Modeling
							O Multi-girder system MCB
							With frame structure simplified definition
escription:							Deck type:
							Concrete Deck V
efault units: US Custo	omary 🗸	Enter spar	lengths				For PS/PT only
umber of spans: 1	0	along the line:	reference				Average humidity:
umber of girders: 6	0		Longth				%
		Span	(ft)				
		> 1	120				Member alt. types
							Steel
							P/S
						N	Timber
						13	рл
Horizontal curvature along	reference line —						
Horizontal curvature along	g reference line	ance from PC	to first support line:		ft		
Horizontal curvature along Horizontal curvature Superstructure alignm	g reference line Dista ent Start	ance from PC	to first support line:		ft		
Horizontal curvature along Horizontal curvature Superstructure alignm O Curved	g reference line Dista ent Start Radi	ance from PC t tangent len ius:	C to first support line:		ft ft ft		
Horizontal curvature along Horizontal curvature Superstructure alignm Curved Tangent, curved,	preference line Dista ent Start Radi tangent Dire:	ance from PC t tangent len ius: ction:	to first support line:	Left ~	ft ft ft		
Horizontal curvature along Horizontal curvature Superstructure alignm Curved Tangent, curved, Tangent, curved	reference line Distr ent Start Radi tangent Dire- End	ance from PC t tangent len ius: ction: tangent leng	to first support line:	Left ~	ft ft ft		
Horizontal curvature along Horizontal curvature Superstructure alignm Curved Tangent, curved Curved, tangent	reference line Dista ent Start Radi tangent Dire- End Dista	ance from PC t tangent len ius: ction: tangent leng ance from las	to first support line: gth: th: tsupport line to PT:	Left v	ft ft ft ft ft		
Horizontal curvature along Horizontal curvature Superstructure alignm Curved Tangent, curved Curved Curved, tangent	reference line Dista ent tangent Dire End Dist Desi	ance from PC t tangent len ius: ction: tangent leng ance from las ign speed:	to first support line: gth: tth: t support line to PT:	Left v	ft ft ft ft ft ft mph		
Horizontal curvature along Horizontal curvature Uperstructure alignm Curved Tangent, curved Curved, tangent	reference line Dista ent tangent Dire End Dist Desi Supr	ance from PC t tangent len ius: ction: tangent leng ance from las ign speed: erelevation:	to first support line: gth: tth: t support line to PT:	Left v	ft ft ft ft ft mph %		

As data is entered for the new girder system superstructure definition, open the windows for the original girder line superstructure definition to determine if there is data that needs to be copied from the original girder line superstructure. The Average Humidity on the superstructure definition window is an example of such data. Open the **Structure Definition #1** girder line window to determine that the original superstructure does not have any data for that item. If it did, copy that data to the new girder system superstructure definition.

#### Load Case Description

Now add Load Case Descriptions to the new superstructure definition. Open the **Load Case Description** for the original girder line **Structure Definition** #1 by double clicking on the **Load Case Description** node under **Structure Definition** #1 superstructure definition. The following window will be presented.

) L	oad Case Description					_		>
	Load case name	Description	Stage		Туре	Time* (days)		
>	Parapets		Composite (long term) (Stage 2)	$\sim$	D,DC $\vee$			
	FWS		Composite (long term) (Stage 2)	$\sim$	D,DW $\scriptstyle{\scriptstyle{\bigvee}}$			
re	stressed members only	Add default lo			New	Duplicate	Delet	te
		cose descripti						

Now open the **Load Case Description** window belonging to the new **6 Girder System** superstructure definition and enter these same load cases. Click the **OK** button to save these load cases to the new superstructure definition and close the window.

# Framing Plan Detail

Open the **Structure Framing Plan Details** window for the **6 Girder System** and enter the following data under **Layout** tab.

				Gi	irder spac	ing orient	ation				
	Support	Skew (degrees)			Along	support	o giraer				
>	1	0	-	_							
	2	0			Girder	Girder s (f	spacing t)				
					bay	Start of girder	End of girder				
				>	1	9	9	-			
					2	9	9		2		
					3	9	9				
					4	9	9				
					5	9	9				

Navigate to the **Diaphragms tab** and use the **Diaphragm Wizard** to create the diaphragms as shown below.

🗛 Diaphragm	Wizard	×
Select the desi	red framing plan system:	
	R	
	< Back Next >	Cancel
🗛 Diaphragm	1 Wizard	×
	Diaphragm spacing Enter number of equal spaces per span Enter equal spacing per span Enter groups of equal spacing	
	Support diaphragm load: kip	
	Interior diaphragm load: kip	
Span	Length Number of (ft) equal spaces	
> 1	120 2	A
		Ŧ
	< Back Finish	Cancel

Click on the **Finish** button to close this window and create the diaphragms.

## CNVRT1 - Converting Girder Line to Girder System Example

iber	ог: _	Dia	herema	Number of	girders: 6							
rder	r ba	у: 1	magnis	~	Copy bay to	I	Diaph wizz	nragm ard				
	Sup	pport mber	S dis	tart tance (ft)	Diaphragm spacing	Number of spaces	Length (ft)	End distance (ft)			Diaphragm	
			Left girder	Right girder	(#)			Left girder	Right girder			
	1	$\sim$	0	0	0	1	0	0	0		No 🗡	
	1	$\sim$	0	0	60	1	60	60	60		No 🗸	
•	1	$\sim$	120	120	0	1	0	120	120		No 🗸	
									0			

The updated Structure Framing Plan Details window is shown below.

(Note: PCITrainingBridge3 as delivered in the sample database does not have any diaphragms entered in the Bracing Ranges window for Member Alternative **Member Alternative #1 (9.9.3)**. That is in error, it should have diaphragms.)

## Structure Typical Section

Open the Structure Typical Section window for 6 Girder System and enter the following on the Deck tab.

Distance from la superstructure of overhang	eft edge of deck to definition ref. line Deck thickness t Parapet Mee	Distance fro superstructu Beferenc dian Raili	m right e re definit ucture De e Line	edge of deck t tion ref. line efinition	Right ov	erhang	Chained lange			
overhang beck (cont'd)	Deck thickness  Parapet Mer	dian Raili	ng (	Generic	→ Right ov Sidewalk	erhang	String diagon			
overhang	Parapet Mer	dian Raili	ng (	Generic	Right ov	erhang	Christel Incom			
Deck (cont'd)	Parapet Me	dian Raili	ng (	Generic	Sidewalk	lane position	Christel James			
Superstructure definition	reference line is					carie position	striped lanes	Wearing surface		
	reference line is	within	+	✓ the brid Fr	dge deck.					
Distance from left edge c superstructure definition	of deck to reference line:	25.5	ft	25.5	ft					
Distance from right edge superstructure definition	of deck to reference line:	25.5	ft	25.5	ft					
Left overhang:		3	ft	3	ft	3				
Computed right overhan	g:	3	ft	3	ft					

Distance from left edg superstructure definitio the superstructure definition the superstructure	e of deck to   Di on ref. line su eck k ickness	istance from right edge of sperstructure definition ref. Superstructure Definition Reference Line — —	leck to line Right ov	erhang				
Deck Deck (cont'd) Para	pet Mediar	n Railing Generi	c Sidewalk	Lane position	Striped lanes	Wearing surface		
Deck concrete:	Class A (US)		$\sim$					
otal deck thickness:	8	in						
.oad case:	Engine Assign	ned 🗸						
Deck crack control parameter:		kip/in						
oustained modular ratio factor	2							
Deck exposure factor:				3				
							 · · · · ·	-

Next, select the **Deck** (cont'd) tab and enter the following.

The parapet locations are entered as follows on the **Parapet** tab.

🗛 s	truc	ture Typical Sec	tion										-		×
Bac	.k		Fro	nt											
D	eck	Deck (cont	d)	Parapet	Me	edian	Railir	ng Generic	Sidewalk	Lane position	Striped la	nes Wearing surface			
		Name		Load ca	ise	Measu	re to	Edge of deck dist. measured from	Distance at start (ft)	Distance at end (ft)	Front face orientation				
	>	18" Parapet	$\sim$	Parapets	$\sim$	Back	$\sim$	Left Edge $\sim$	0	0	Right $\vee$				<b>A</b>
		18" Parapet	$\sim$	Parapets	$\sim$	Back	$\vee$	Right Ed $~~$	0	0	Left $\vee$				
										3					
												New Duplica	te	Delete	
												OK A	pply	Cano	el

I	.ture typical 3	A) <del>&lt;[</del> ]*►					
	Travelw	ay 1 Superstructu	re Definition Reference Line avelway 2				
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	-24	24	-24	24		
	252.6.1			и			
ſ	RFD fatigue	ailable to trucks:					
	Override	Truck fraction:	Compute		New Dup	licate	Delete

## Open the Lane position tab and use the Compute button to compute the travelway locations.

Enter the wearing surface data as follows on the Wearing surface tab.

A Structure Typical Section	-		×
Distance from left edge of deck to Distance from right edge of deck to superstructure definition ref. line superstructure definition ref. line			
Deck Superstructure Definition thickness Reference Line			
Left overhang			
Deck Deck (cont'd) Parapet Median Railing Generic Sidewalk Lane position Striped lanes Wearing surface			
Wearing surface material: Asphalt			
Description			
N N			
Wearing surface thickness: 2 in Thickness field measured (DW = 1.25 if checked)			
Wearing surface density: 150 pcf			
Load case: Copy from library			
ОК Арр	ly	Cance	el 🛛

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

### Schematic – Structure Typical Section

Now view the schematic for the **Structure Typical Section** for **6 Girder System** by selecting **Structure Typical Section** node in the **Bridge Workspace** tree and clicking the **Schematic** button on the **WORKSPACE** ribbon (or right clicking and selecting **Schematic**).



#### The schematic is shown below.

Bridge Typical Section	- 🗆 X
	÷
CNVRT-PCITrainingBridge3 CNVRT-PCITrainingBridge3 - 6 Girder System 11/19/2023	
51'-0"	
48'-0"	•
—Deck Thickness 8" 2" Asphalt—	
Travelway 1	Л
3'-0" 5@9'-0" = 45'-0"	o'-O''

Expand the **Bridge Workspace tree** for the original girder line **Structure Definition #1**.



This structure already has data defined for the Stress Limits, Prestress Properties and Shear Reinforcement Definitions. It also has a Member Alternative for an interior member. The Member Alternative can be copied from this original superstructure definition to the new **6 Girder System** superstructure definition. When the Member Alternative is copied, the Stress Limits, Prestress Properties and Shear Reinforcement definitions belonging to the girder line superstructure will also be copied.

#### Member Alternative

Select **Member Alternative #1 (9.9.3)** in the tree and right click and select **Copy** from the menu (or select **Copy** from the **Manage** group of the **WORKSPACE** ribbon.



Now select **MEMBER ALTERNATIVES** under the Member **G2** in the **6 Girder System** superstructure definition, right click and select **Paste** (or select **Paste** from the **Manage** group of the **WORKSPACE** ribbon).

Bridge Workspace - PCITrainingBrid BRIDGE WORKSPACE TOC	dge3 DLS VIEW	ANALYSIS DESIGN/RATE	REPORTS REPORTING	?	-	0 X
<ul> <li>Check Out</li> <li>Check In</li> <li>Validate</li> <li>Save</li> <li>Revert</li> <li>Bridge</li> </ul>	Close Close Export Refresh	Open Nev	Copy Paste	Duplicate De	lete Sche	ematic
Workspace	\$	X Schem	atic 🔗	Repo	ort	\$ ×
Member Alternative     Member Alternativ	# T (9.9.3) (E) (C, te					
I G1     G1     G2     Hember Loads     A Supports		Analys				~ ~
MEMBER ALTERNATIVES	New					
∎	📋 Paste					
	🗠 Analyze					
BRIDGE ALTERNATIVES	😥 View Sun	nmary Report				
Bridge Alternative #1 (E) (C)	🔍 View Det	ailed Report				
	🎲 General P	Preferences				
L	🔀 Close Brid	dge Workspace				

A copy of **Member Alternative #1 (9.9.3)** will now appear under Member **G2** in the **6 Girder System Bridge Workspace** tree. The Stress Limit, Prestress Properties, and Shear Reinforcement Definitions will also now appear under the **6 Girder System Bridge Workspace** tree.



## Member Loads

Now check for differences between the original girder line member and the new girder system member. Open the **Member Loads** window for **Typical Interior Member** for **Structure Definition #1** and review the data on it to determine if any data such as the **Pedestrian Load** should be entered for the new **G2** member. Similar data needs to be reviewed in many locations. Open each window or use the **Report Tool** to compare the data.

There are two choices to handle how the dead loads will be entered and distributed in the new girder system superstructure definition. The method chosen will depend on the original girder line member's Member Load data and the number of calculations needed to perform.

- Method 1: Let BrDR compute and distribute the superstructure load. Some additional loads will need to be computed that should be applied to the members (stay-in-place forms, e.g.). Some of these loads may already be entered for the original girder line member lumped together with parapet loads, etc. It may take some computations to determine what portion of the original girder line member loads is due to loads that can be computed and distributed by BrDR.
- Method 2: Tell BrDR not to compute and distribute the deck load. Copy the original girder line Member Loads to the new girder system member. Dead load due to the deck slab that acts on that particular girder will need to be computed and entered as a member load for the new girder system member.

Following Method 1 first in this example.

## Superstructure Loads (Using Method 1 of adding member loads)

Method 1: In a girder system superstructure, BrDR will determine the dead load due to the deck slab and appurtenances located on the deck. BrDR uses the data on the **Superstructure Loads** window to determine how to distribute this dead load.

if a sea have a sea of	Cardiantte	140.1	Distanti		
niform temperature	e Gradient tempe	erature Wind	DL distribution		
Stage 1 dead loa	d distribution				
O By tributary	/ area				
By transver	se simple-beam ana	lysis			
By transver	se continuous-beam	n analysis			
By percent	age				
Girder	Percentage (%)				
> 1					
2					
3					
4					
	d dood lood				
Stage 2 dead loa	ad distribution				
Stage 2 dead loa Uniformly t By tributary By transver	ad distribution to all girders / area se simple-beam ana	lysis			
Stage 2 dead loa Uniformly t By tributary By transver By transver	ad distribution to all girders y area se simple-beam ana se continuous-beam	lysis 1 analysis			
Stage 2 dead loa Uniformly to By tributary By transver By transver By percent	ad distribution to all girders y area se simple-beam ana se continuous-beam age	lysis a analysis			
Stage 2 dead loa Uniformly t By tributary By transver By transver By percent Girder	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis n analysis			
Stage 2 dead loa Uniformly t By tributary By transver By transver By percent Girder > 1	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis a analysis			
Stage 2 dead loa Uniformly t By tributary By transver By transver By percent X Girder X 1 2	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis a analysis			
Stage 2 dead loa Uniformly t By tributary By transver By transver By percent Side and A and By and B	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis analysis			
Stage 2 dead loa Uniformly to By tributary By transver By percent By percent 2 3 4	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis a analysis			
Stage 2 dead loa Uniformly t By tributary By transver By transver By percent S 1 2 3 4 User-defin	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis analysis			
Stage 2 dead loa Uniformly to By tributary By transver By transver By percent 3 4 User-define	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis a analysis			
Stage 2 dead loa Uniformly to By tributary By transver By transver By percent 2 3 4 User-define	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%) ded dead load	lysis n analysis			
Stage 2 dead loa Uniformly to By tributary By transver By transver By percent 3 4 User-define	ad distribution to all girders y area se simple-beam ana se continuous-beam age Percentage (%)	lysis a analysis			

Open the **Member Loads** window for the original girder line member and review the data on that window. This original member has two uniform load cases, one for the **FWS** load case and one for the **Parapets** load case. For this example, these loads are easily verifiable with the data entered on the **Structure Typical Section** window.

FWS (Future Wearing Surface):  $0.2k / ft = \frac{\left(\frac{2''}{12}\right)(48')(0.150kcf)}{6girders}$ 

Parapets:  $0.1k / ft = \frac{2 * 0.3klf}{6girders}$ 

For the girder system superstructure, the future wearing surface load and parapet load applied to each member will be computed by BrDR based on the data entered in the **Structure Typical Section** window. Therefore, no data needs to be entered in **Member Loads** for the new girder system members. For this example, determining the source of the original girder line Member Loads was easy. If the original girder line member was imported from BARS, it may not be as easy to determine what portion of the Member Load is due to the deck slab, appurtenances and wearing surface. Perform some investigation and calculations to determine what member loads should enter into BrDR for new girder system members when converting existing girder line members.

#### Supports

Open the **Supports** window for the original girder line member to see if any data should be copied to the new girder system members.

#### Live Load Distribution

The **Live Load Distribution** window for the new girder system member alternative contains the following data based on being copied from the original girder line member alternative. This data can remain or the **Compute from Typical Section** option can be used to update these values now that the travelways are in relation to the girder member location.

ve L	Load Distribu	ition												
and	dard LRF	D												
Di	istribution fr	stor innu	ut mathod											
(	Use simr	olified me	ethod	Use adv	anced metho	d Ou	lse advanc	ed metho	d with 19	94 auide	specs			
	- ose simp	, mea me			ancea meana			to metho	a with 15.	- guiac	spees			
	Allow distrib	oution fac	ctors to be (	used to com	npute effects	of permit loa	ads with ro	utine traff	ïc					
			Distrib	ution factor	r									
	Lanes loaded		(v Shear at	vheels)										
		Shear	supports	Moment	Deflection									
>	1 Lane													
	Multi-lane	1.636	1.636	1.636	1									
Con	mpute from vical section.		View calcs											
Con typ	mpute from ical section.		View calcs								0/			

The data in the remaining windows under the girder member alternative should be acceptable based on being copied from the girder line member alternative.

# LFR Analysis – Results Comparison – (Using Method 1 of adding member loads)

On performing an **LFR** analysis using the **Analysis settings** shown below, the following two windows show a comparison of the rating factors obtained for the original girder line and the new girder system member alternatives.

Design review <b>O</b> Rating	Rating	method:	LFR	~	
nalysis type: Line Girder ane / Impact loading type: As Requested Vehicles Output Engine Description	<ul> <li>✓</li> <li>✓ Apply</li> </ul>	preference setting	None	~	
Traffic direction: Both directions		Refresh	Temporary vehicles	Advanced	
<ul> <li>➡-Vehicles</li> <li>➡-Standard</li> <li>↓—Alternate Military Loading</li> <li>↓=EV2</li> <li>↓=EV3</li> <li>↓=H 5-44</li> <li>↓=H 20-44</li> <li>↓=H 5 15-44</li> <li>↓=H 5 20-44</li> <li>↓=H 5 20-44</li> <li>↓=NRL</li> <li>→SU4</li> <li>→SU4</li> <li>→SU5</li> <li>→SU6</li> <li>→SU7</li> <li>→Type 3</li> <li>→Type 3-3</li> <l< td=""><td>Add to &gt;&gt; Remove from &lt;&lt;</td><td>Rating veh</td><td>icles ry 20-44 20-44 perating inventory operating</td><td></td><td></td></l<></ul>	Add to >> Remove from <<	Rating veh	icles ry 20-44 20-44 perating inventory operating		

Original girder line member alternative (Structure Definition #1)

۵	Analysis Re	sults - Member A	Alternative #1 (9.9.3)								-		×
	Print Print												
Rep	ort type:		C Lane/Impact	loading typ	e	Display Forma	t						
Rat	ting Results	Summary 🗸 🗸	O As rec	wested	Detailed	Single rating	level per ro	w ~					
	Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lar	ne	
	HS 20-44	Lane	LFR	Operating	38.48	1.069	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requ	uested	
	HS 20-44	Lane	LFR	Inventory	23.04	0.640	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requ	uested	
	HS 20-44	Axle Load	LFR	Operating	36.84	1.023	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requ	uested	
>	HS 20-44	Axle Load	LFR	Inventory	22.06	0.613	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requ	uested	
AAS Ana	HTO LFR En lysis prefere	gine Version 7.5. nce setting: Non	0.3001 e										
		-										Clos	e

Newly copied girder system member alternative (6 Girder System)

4	Analysis Re	sults - Membe	r Alternative #1 (9	.9.3)							- 0	×
	Print Print											
Rep	ort type:		C Lane/Im	pact loading	type	Display Fo	ormat					
Rat	ting Results	Summary	~ O As	s requested	Detailed	Single rat	ting level p	er row	$\sim$			
	Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane	
	HS 20-44	Lane	LFR	Operating	38.48	1.069	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requested	1
	HS 20-44	Lane	LFR	Inventory	23.04	0.640	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requested	I I
	HS 20-44	Axle Load	LFR	Operating	36.84	1.023	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requested	1
$\rightarrow$	HS 20-44	Axle Load	LFR	Inventory	22.06	0.613	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requested	1
		·	F 0 2001									
AAS	HIU LFK Er	igine Version /.	.5.0.3001									
Ana	lysis prefere	ence setting: No	one									
											Clo	se

The newly created member alternative for Member **G2** can now be copied to or linked with the other members in the **6 Girder System** superstructure definition. After copying this interior member alternative to one of the exterior members, the **Live Load Distribution** Factors and **Haunch** windows needs to be revisited to enter the correct data for an exterior member.

Now use Method 2 to enter the loads in BrDR.

Superstructure Loads (Using Method 2 of adding member loads)

Method 2: Tell BrDR not to distribute the superstructure loads for us on the **Superstructure Loads** window for **6** Girder System

Superstructure Loads					
Uniform temperature	Gradient temperature	Wind	DL distribution		
C Stage 1 dead load	distribution				
By tributary a	rea				
By transverse	simple-beam analysis				
By transverse	continuous-beam analysis				
By percentag	e				
Girder	Percentage (%)				
> 1					
2					
3					
4					
Stage 2 dead load Uniformly to By tributary a	distribution all girders rea				
Stage 2 dead load Uniformly to By tributary a By transverse By transverse	distribution all girders rea simple-beam analysis continuous-beam analysis				
Stage 2 dead load Uniformly to By tributary a By transverse By transverse By percentag	distribution all girders rea simple-beam analysis continuous-beam analysis e				
Stage 2 dead load Uniformly to By tributary a By transverse By transverse By percentag Girder	distribution all girders rea simple-beam analysis continuous-beam analysis e Percentage (%)				
Stage 2 dead load Uniformly to By tributary a By transverse By percentag Girder	distribution all girders rea simple-beam analysis continuous-beam analysis e Percentage (%)				
Stage 2 dead load Uniformly to By tributary a By transverse By transverse By percentag Girder 1 2	distribution all girders rea simple-beam analysis continuous-beam analysis e Percentage (%)				
Stage 2 dead load Uniformly to By tributary a By transverse By percentag Girder 1 2 3	distribution all girders rea simple-beam analysis continuous-beam analysis e Percentage (%)				
Stage 2 dead load Uniformly to By tributary a By transverse By transverse By percentag Girder 1 2 3 4	distribution all girders rea simple-beam analysis continuous-beam analysis e Percentage (%)				
Stage 2 dead load Uniformly to By tributary a By transverse By percentag Girder 1 2 3 4	distribution all girders rrea simple-beam analysis continuous-beam analysis e Percentage (%)				
Stage 2 dead load Uniformly to By tributary a By transverse By percentag Girder	distribution all girders rrea simple-beam analysis continuous-beam analysis e Percentage (%)				
Stage 2 dead load Uniformly to By tributary a By transverse By percentag Girder 1 2 3 4	distribution all girders rea simple-beam analysis continuous-beam analysis e Percentage (%)		01		

# Load Case Description

Compute the dead load on each girder system member due to the deck slab since it will not be computed by BrDR now. First create an additional Load Case Description for the deck slab. Open the **Load Case Description** window and add the following load case:

	Load case name	Description	Stage		Ту	pe	Time* (days)	
>	Parapets		Composite (long term) (Stage 2)	$\sim$	D,DC	$\sim$		
	FWS		Composite (long term) (Stage 2)	$\sim$	D,DW	~		
	Deck		Non-composite (Stage 1)	$\sim$	D,DC	~		
		Add default I	oad					

The deck slab dead load acting on Member G2 is:

$$0.9k / ft = \left(\frac{8''}{12}\right)(9')(0.150kcf)$$

## Girder Member Loads

Open the **Member Loads** window and enter each of the following three load cases. The first two load cases are those that exist in the original girder line member.

dest	trian load:		lb/ft				
Jnif	orm Distribu	ited (	Concentrated	Settlement			
	Load ca name	se	Span	Uniform load (kip/ft)	Description		
>	Parapets	$\sim$	All Spans	0.2			-
	FWS	$\sim$	All Spans	0.1			
	Deck	$\sim$	All Spans	0.9			

# LFR Analysis – Results Comparison – (Using Method 2 of adding member loads)

Now analyze Member G2 and get the same rating results as following Method 1.

<b>A</b>	Analysis Re	sults - Membe	r Alternative #1 (9	.9.3)							- 0	×
	Print Print											
Rep	ort type:		C Lane/Im	pact loading	type	Display Fo	ormat					
Rat	ing Results	Summary	~ <b>O</b> A	s requested	Detailed	Single rat	ting level p	er row	$\sim$			
	Live Load	Live Load V	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane	
	HS 20-44	Lane	LFR	Operating	38.48	1.069	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requester	A
	HS 20-44	Lane	LFR	Inventory	23.04	0.640	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requester	ł
	HS 20-44	Axle Load	LFR	Operating	36.84	1.023	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requester	ł
>	HS 20-44	Axle Load	LFR	Inventory	22.06	0.613	120.00	1 - (100.0)	Design Shear - Concrete	As Requested	As Requester	ł
AAS Ana	HTO LFR Er lysis prefere	igine Version 7 ence setting: No	.5.0.3001 one									
		2									Clc	ose