
AASHTOWare BrR 6.8

Steel Tutorial

Steel Fishbelly Web Examples

Topics Covered

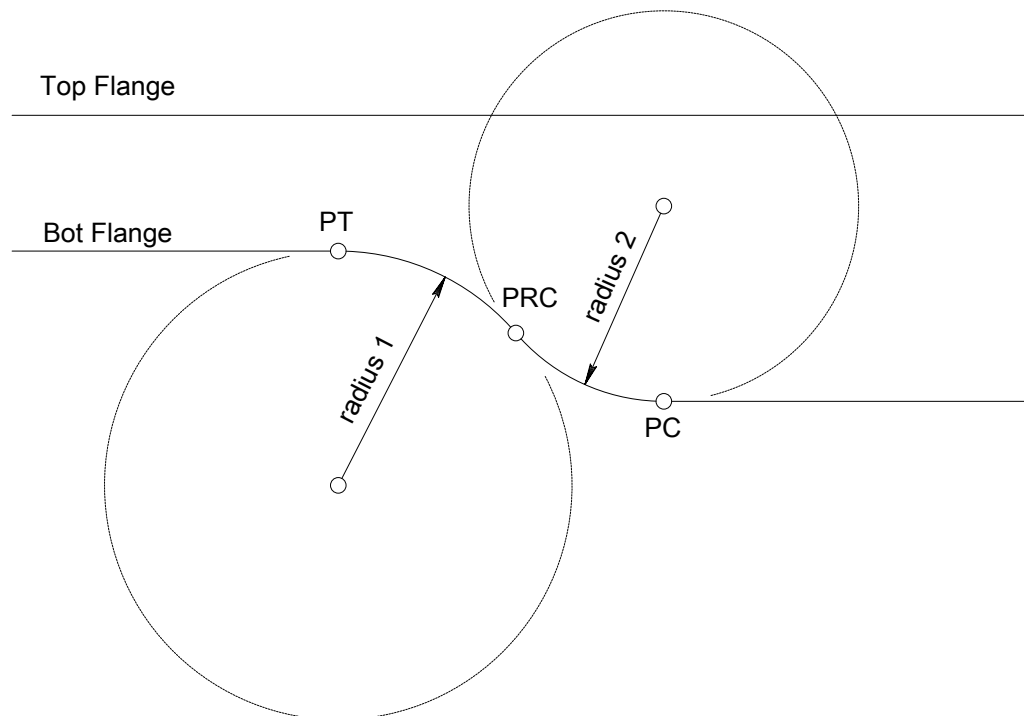
- Steel plate girder fishbelly web profiles
- Export to the BrR Std analysis engine

Fishbelly web profiles are either reverse circular or reverse parabolic web profiles. Fishbelly web profiles can be described in BrR for steel plate or built-up girders. This example reviews the input of reverse parabolic and reverse circular web profiles.

Fishbelly Web Profiles

- Only available for steel plate and built-up girders
- Available for both schedule based and cross section based input
- Fishbelly profiles must be either totally parabolic or totally circular. You cannot have adjacent parabolic and circular sections.
- BrR LFD engine is the only analysis engine currently available for rating

The following sketch illustrates a reverse circular web profile:



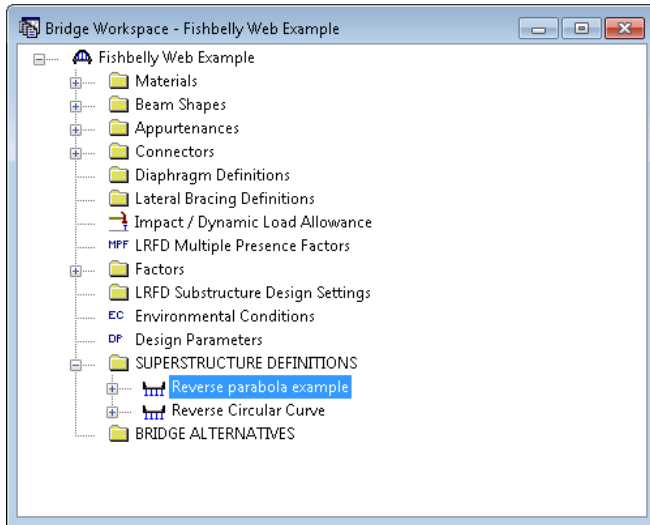
Open the Bridge Workspace for 'Fishbelly Web Example'.

STL9 - Steel Fishbelly Web

Bridge Explorer (33 Bridge Design/Rating bridges retrieved for the current folder, all rows retrieved)

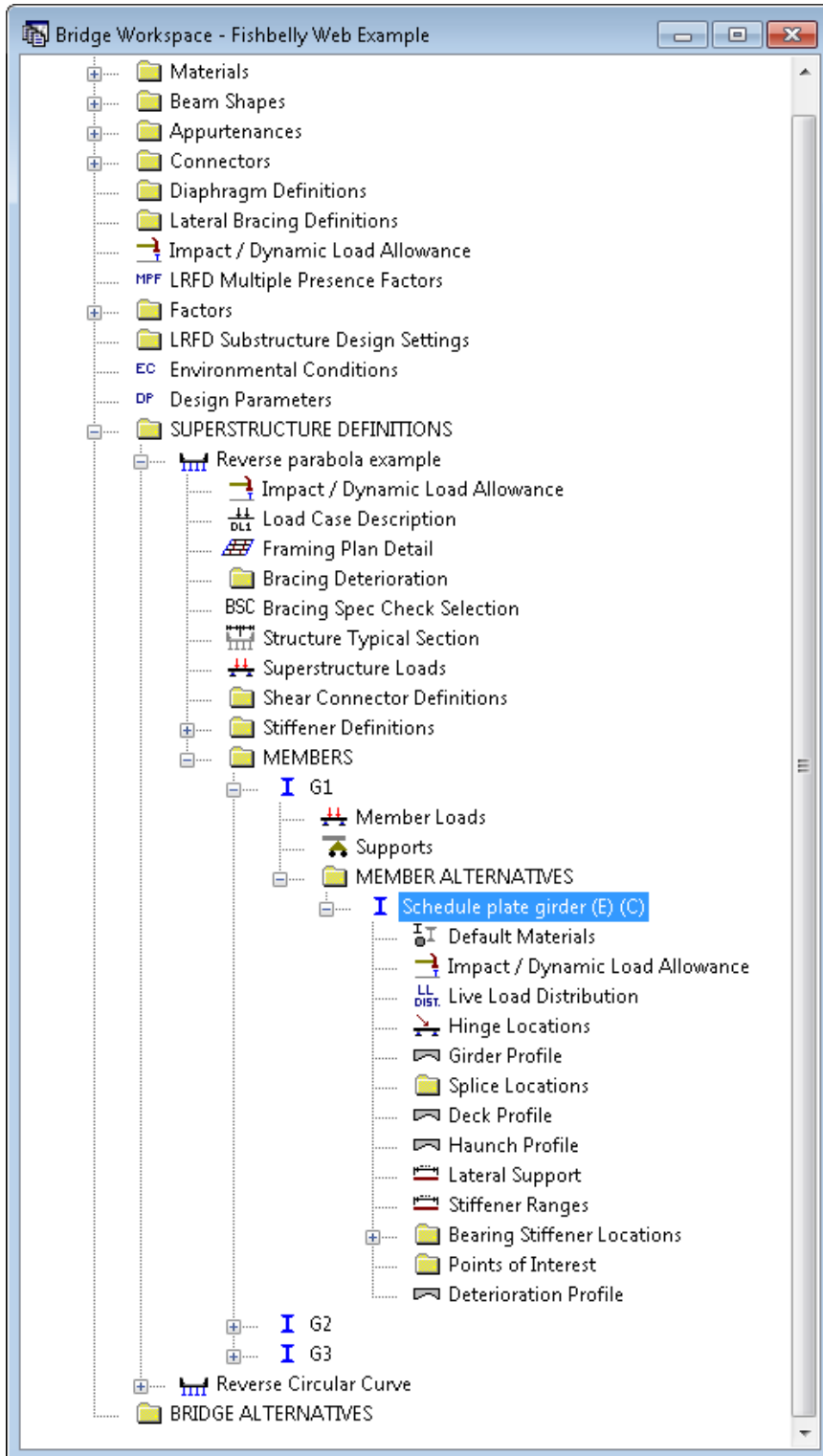
BID	Bridge ID	Bridge Name	District	County	Facility	Location	Route	Feature Intersected	Mile/Km Post (mi)	Owner	Maintainer	Area	Length (ft)	Year Built
1	TrainingBridge1	Training Brid	District	01 Abb	SR 005	Pittsburg	0051	SR 6060	17.00	State Hi	State High	Not A	161.00	1999
2	TrainingBridge2	Training Brid	Unkno	Unkno	N/A	N/A	-1	N/A		Unkno	State High	Unkn		1996
3	TrainingBridge3	Training Brid	District	01 Abb	I-79	Pittsburg	0079	Ohio River	125.00	State Hi	State High	Unkn	455.00	1999
4	PCITrainingBridge1	PCI TrainingB					-1					Unkn		
5	PCITrainingBridge2	PCI TrainingBr					-1					Unkn		
6	PCITrainingBridge3	PCI TrainingB					-1					Unkn		
7	PCITrainingBridge4	PCI TrainingBr					-1					Unkn		
8	PCITrainingBridge5	PCI TrainingB					-1					Unkn		
9	PCITrainingBridge6	PCI TrainingBr					-1					Unkn		
10	Example7	Example 7 P					-1					Unkn		
11	RCTrainingBridge1	RC Training					-1					Unkn		
12	Timber TrainingBridge1	Timber Tr. Bri					-1					Unkn		
13	FSys GFS TrainingBridge1	FloorSystem	District	333 No	I-95	NJ-Tur	NJCity					Unkn		2002
14	FSys FS TrainingBridge2	FloorSystem	District	06 Bar	I-95	ATL				State Hi	County H	Unkn		1998
15	FSys GF TrainingBridge3	FloorSystem	District	01 Abb	I-75	JAX				State Hi	State High	Unkn		2001
16	FLine GFS TrainingBridge1	FloorLine FS	District	02 Aike	I-75	GNV				State Hi	State High	Unkn		2000
17	FLine FS TrainingBridge2	FloorLine FS	District	01 Abb	I-95	NY	15		2200.00	County	Unknown	Unkn		1999
18	FLine GF TrainingBridge3	FloorLine GF	District	01 Abb	I-95	NY	5					Unkn		1930
19	TrussTrainingExample	Truss Trainin												
20	LRFD Substructure Example 1	LRFD Substr												
21	LRFD Substructure Example 2	LRFD Substr			SR 403	ERIE CO	4034	FOUR MILE	8.12				1095.8	2002
22	LRFD Substructure Example 3	LRFD Substr												
23	LRFD Substructure Example 4	LRFD Substr												
24	Visual Reference 1	Visual Refer	District	12 Che	I-76	WAITSF	I-76	MAD RIVER	1199.25	State Hi	State High	Unkn	240.00	2004
25	Culvert Example 1	Culvert Exam						STH6						
26	LFD Curved Guide Spec	LFD Curved						1						
27	MultiCell Box Examples	Multi Cell Box						100						2014
28	Gusset Plate Example	Gusset Plate	District			Some Hi				State Hi			67,900	2015
29	Splice Example	Splice Examp											240.00	2004
30	Simple DL-Cont LL-Splice	Simple DL Sp	Unkno	Unkno	N/A	N/A	-1	N/A		Unkno		Unkn		1996
34	St6_Training	2 Span Plate											180.00	
35	STL6 - Virts Corrugated Deck	2 Span Plate											180.00	
36	Fishbelly Web Example	Fishbelly We					1							

This bridge contains a reverse parabolic and a reverse circular curve web profile example.



STL9 - Steel Fishbelly Web

Navigate to G1, 'Schedule Plate Girder' member alternative and select the Schematic for the member alternative on the Bridge Workspace toolbar.

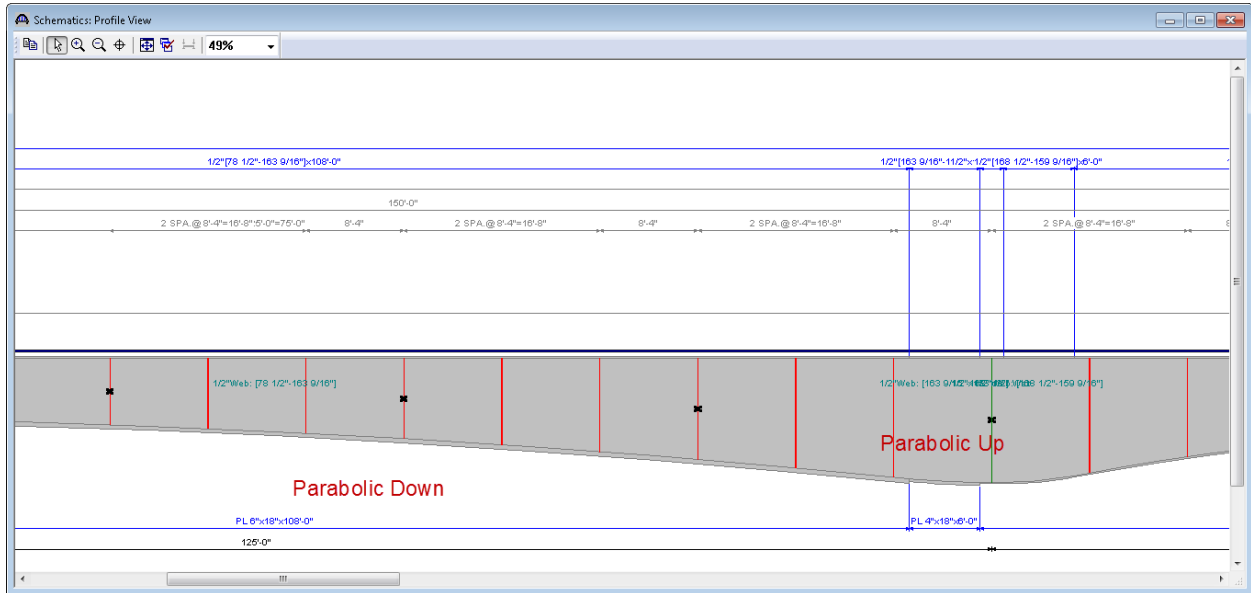


STL9 - Steel Fishbelly Web



The following shows the girder profile schematic with some additional text shown to describe where the reverse parabolic web profile exists. (The display of stiffeners in the schematic has been turned off.)

Note: The 'Parabolic Down' and 'Parabolic Up' labels shown below do not show up in BrR, they have been added to the schematic for this training example only.



The input data describing the web profile is shown below:

Girder Profile

Type: Plate Girder

Web: Top Flange Bottom Flange

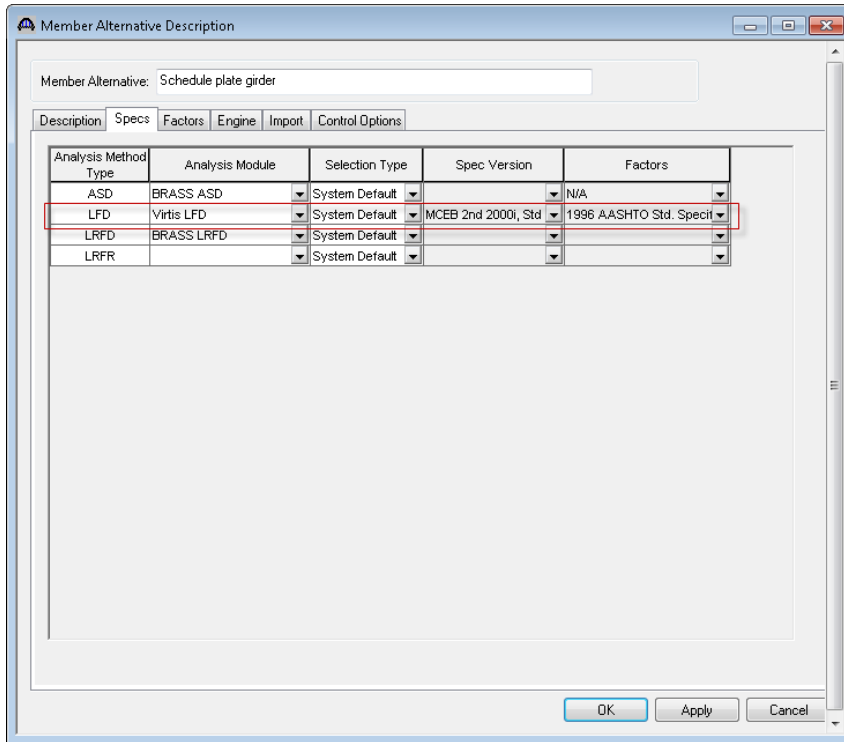
Begin Depth (in)	Depth Vary	End Depth (in)	Thickness (in)	Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)	Material	Weld at Right
78.5040	None	78.5040	0.5000	1	0.00	10.00	10.00	Grad	-- No
78.5040	Parabolic	163.5720	0.5000	1	10.00	108.00	118.00	Grad	-- No
163.5720	Parabolic	168.5040	0.5000	1	118.00	6.00	124.00	Grad	-- No
168.5040	None	168.5040	0.5000	1	124.00	2.00	126.00	Grad	-- No
168.5040	Parabolic	159.5760	0.5000	2	1.00	6.00	7.00	Grad	-- No
159.5760	Parabolic	102.5040	0.5000	2	7.00	37.50	44.50	Grad	-- No
102.5040	None	102.5040	0.5000	2	44.50	161.00	205.50	Grad	-- No
102.5040	Parabolic	159.5760	0.5000	2	205.50	37.50	243.00	Grad	-- No
159.5760	Parabolic	168.5040	0.5000	2	243.00	6.00	249.00	Grad	-- No
168.5040	None	168.5040	0.5000	2	249.00	2.00	251.00	Grad	-- No
168.5040	Parabolic	163.5720	0.5000	3	1.00	6.00	7.00	Grad	-- No
163.5720	Parabolic	78.5040	0.5000	3	7.00	108.00	115.00	Grad	-- No
78.5040	None	78.5040	0.5000	3	115.00	10.00	125.00	Grad	-- No

New Duplicate Delete

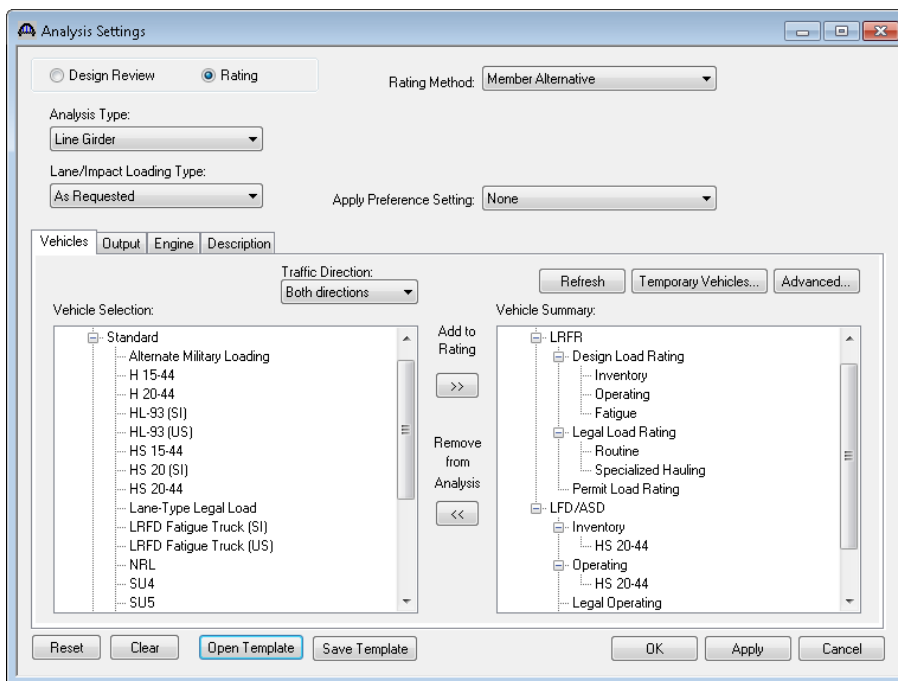
OK Apply Cancel

STL9 - Steel Fishbelly Web

Open the 'Schedule Plate Girder' member alternative and select the BrR LFD engine as the LFD analysis engine. This is currently the only analysis engine available for fishbelly web profiles.



Open the Analysis Settings window and select the HS20 Rating template and analyze the 'Schedule plate girder' member alternative.



STL9 - Steel Fishbelly Web

The rating results are shown below:

Analysis Results - Schedule plate girder

Report Type: Rating Results Summary | Lane/Impact Loading Type: As Requested | Display Format: Multiple rating levels per row

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Legal Operating Load Rating (Ton)	Permit Inventory Load Rating (Ton)	Permit Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Legal Operating Rating Factor	Permit Inventory Rating Factor	Permit Operating Rating Factor
HS 20-44	Lane	LFD	46.89	78.15				1.302	2.171			
HS 20-44	Axle Load	LFD	67.16	111.93				1.866	3.109			

Virtis Standard Engine - Version 6.3.0.3001 - Jun. 30, 2011 ** Virtis Std ASD/LFD Export Version 6.8.0.2004
Analysis Preference Setting: None

This superstructure definition also contains the reverse parabola described as a cross-section based plate girder. Open the 'Cross Section Ranges' window for the member alt in G3 as shown below:

Bridge Workspace - Fishbelly Web Example

Cross Section Ranges

Start Distance | Length | Start Section | End Section

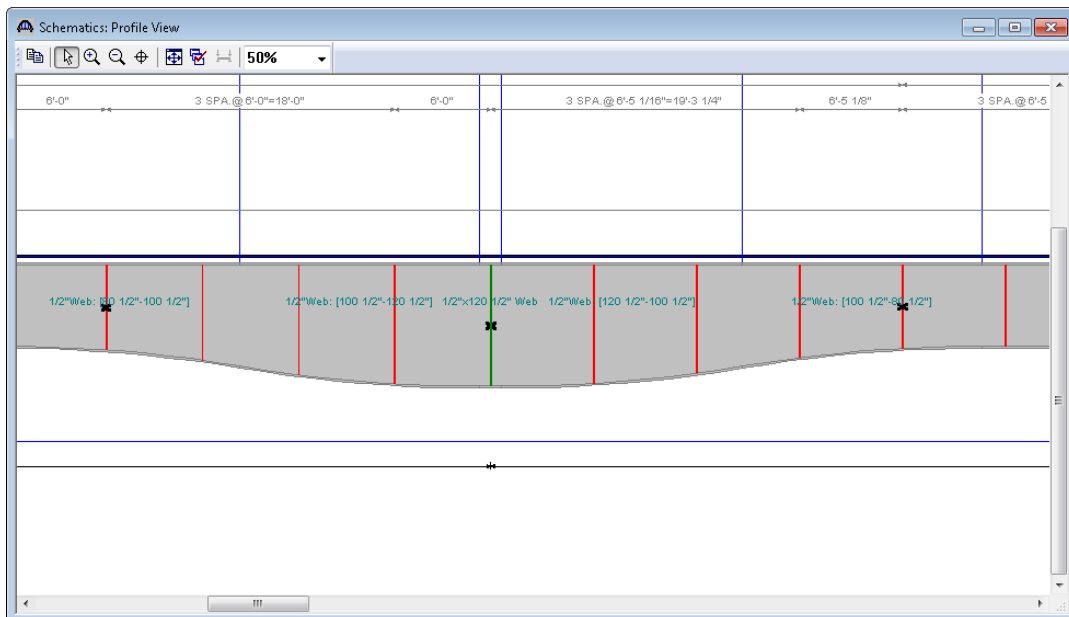
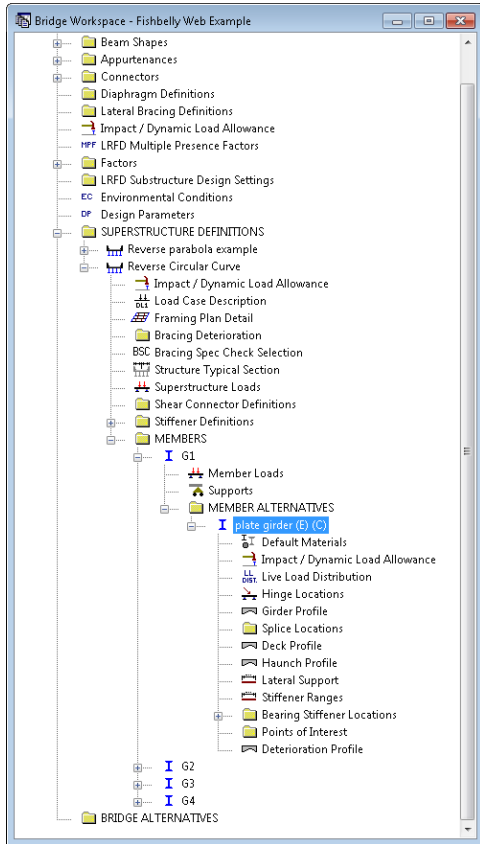
Start Section	End Section	Web Variation	Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)
Section 1	Section 1	None	1	0.00	10.00	10.00
Section 2	Section 3	Parabolic Concave	1	10.00	108.00	118.00
Section 4	Section 5	Parabolic Convex	1	118.00	6.00	124.00
Section 7	Section 7	None	1	124.00	2.00	126.00
Section 7	Section 8	Parabolic Convex	2	1.00	6.00	7.00

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

STL9 - Steel Fishbelly Web

Rating this member alternative gives the same rating results as the schedule based alternative for G1.

A reverse circular curve web profile is included in this bridge as well. Open the 'plate girder' member alternative for G1 in the 'Reverse Circular Curve' superstructure definition. The member alternative schematic is shown below.



STL9 - Steel Fishbelly Web

The Girder Profile window describing the reverse circular webs is shown below along with the BrR LFD ratings for an HS20 vehicle.

Girder Profile

Type: Plate Girder

Web | Top Flange | Bottom Flange

Begin Depth (in)	Depth Vary	End Depth (in)	Thickness (in)	Support Number	Start Distance (ft)	Length (ft)	End Distance (ft)	Material	Weld at Right
80.5000	None	80.5000	0.5000	1	0.00	89.31	89.31	Grad	-- No
80.5000	Circular	100.5000	0.5000	1	89.31	15.00	104.31	Grad	-- No
100.5000	Circular	120.5000	0.5000	1	104.31	15.00	119.31	Grad	-- No
120.5000	None	120.5000	0.5000	1	119.31	1.38	120.68	Grad	-- No
120.5000	Circular	100.5000	0.5000	2	0.69	15.00	15.69	Grad	-- No
100.5000	Circular	80.5000	0.5000	2	15.69	15.00	30.69	Grad	-- No
80.5000	None	80.5000	0.5000	2	30.69	118.51	149.20	Grad	-- No
80.5000	Circular	100.5000	0.5000	2	149.20	15.00	164.20	Grad	-- No
100.5000	Circular	120.5000	0.5000	2	164.20	15.00	179.20	Grad	-- No
120.5000	None	120.5000	0.5000	2	179.20	1.38	180.57	Grad	-- No
120.5000	Circular	100.5000	0.5000	3	0.69	15.00	15.69	Grad	-- No
100.5000	Circular	80.5000	0.5000	3	15.69	15.00	30.69	Grad	-- No
80.5000	None	80.5000	0.5000	3	30.69	118.51	149.20	Grad	-- No
80.5000	Circular	100.5000	0.5000	3	149.20	15.00	164.20	Grad	-- No
100.5000	Circular	120.5000	0.5000	3	164.20	15.00	179.20	Grad	-- No
120.5000	None	120.5000	0.5000	3	179.20	1.38	180.57	Grad	-- No

New Duplicate Delete

OK Apply Cancel

Analysis Results - plate girder

Report Type: Rating Results Summary

Lane/Impact Loading Type: As Requested Detailed

Display Format: Multiple rating levels per row

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Legal Operating Load Rating (Ton)	Permit Inventory Load Rating (Ton)	Permit Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Legal Operating Rating Factor	Permit Inventory Rating Factor	Permit Operating Rating Factor	In L
HS 20-44	Lane	LFD	26.06	43.53				0.724	1.209				
HS 20-44	Axle Load	LFD	64.43	107.60				1.790	2.989				

ASHTO LFR Engine Version 6.8.0.2004

Analysis Preference Setting: None

Close