

AASHTOWare BrD/BrR 6.8

Prestress Tutorial

PS8 – Prestressed I Beam Thicker Web

PS8 - PrestressI GirderThickerWeb

This example describes how to define thicker web of prestressed I girder stem near the support. This example assumes you have access to Example7 (BID10) in the teaching database from the installation.

Topics Covered

- How to define thicker webs near support for prestressed I girder
- Compare prestressed I girder ratings between with and without thicker web definitions

Open bridge Example7 (BID10), rate girder G1 with an HS20 vehicle using Load Factor Design. Rating results are shown below:

Analysis Results - Exterior Member

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	Inventory Location (ft)	Invent Local Span-
HS 20-44	Lane	LFD	35.70	59.62				0.992	1.656				120.00	1 - (1
HS 20-44	Axle Load	LFD	34.13	57.00				0.948	1.583				120.00	1 - (1

AASHTO LFR Engine Version 6.8.0.2004
Analysis Preference Setting: None

The rating is controlled by concrete design shear at right support.

To define thicker web at the supports, open Beam Details window of Girder G1.

Bridge Workspace - Example7

Beam Details

Span Detail | Stress Limit Ranges | Slab Interface | Web End Block

Span Number	Beam Shape	Girder Material	Prestress Properties	Use Creep	n	Beam Projection	
						Left End (ft)	Right End (ft)
1	AASHTO-	Beam Concr	AASHTO Losses	No	5.8	6.0000	6.0000

OK Apply Cancel

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Click Web End Block tab to enter thicker web information as below.

Span Number	Left End		Right End	
	Length (ft)	Web Width (in)	Length (ft)	Web Width (in)
1	2.00	17.00	2.00	17.00


Click OK to save the change to memory and close the window.

The results for rating an HS20 vehicle using Load Factor Design are shown below:

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	Inventory Location (ft)	Invent Local Span
HS 20-44	Lane	LFD	81.84	111.82				1.712	3.101				60.00	1 - (5
HS 20-44	Axle Load	LFD	55.47	106.73				1.541	2.965				60.00	1 - (5

AASHTO LFR Engine Version 6.8.0.2004
Analysis Preference Setting: None

After defining thicker web at supports of G1, rating is controlled by PS tensile stress at mid span.

Click “View Spec Check”  button to view article list.

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Specification Checks for Exterior Member - 14 of 481

Specification Reference	Limit State	Flex. Sense	Pass/Fail
✓ 6B.5.3.3 PS Concrete Compressive Stress		N/A	Passed
✓ 6B.5.3.3 PS Concrete Tensile Stress		N/A	Passed
✓ 6B.5.3.3 PS Flexure Rating		N/A	Passed
6B.5.3.3 PS Moment Capacity		N/A	General Comp.
✓ 6B.5.3.3 PS Steel Tensile Stress		N/A	Passed
8.16.2.7 Design Assumptions		N/A	General Comp.
9.15.2.3 Concrete - Cracking Stress		N/A	General Comp.
✓ 9.17 Flexural Strength		N/A	Passed
9.18.2.1 Ductility Limits - Minimum Steel		N/A	General Comp.
9.28 Embedment of Prestressed Strand		N/A	General Comp.
Computation of Vp		N/A	General Comp.
PS Basic Properties Calculation		N/A	General Comp.
PS Gross Composite Section Properties		N/A	General Comp.
Stresses		N/A	General Comp.

Compare “PS basic Properties Calculation” between location near support and mid span.

Spec Check Detail for PS Basic Properties Calculation

Mechanics of Materials
Basic PS Beam Property Calculations
(AASHTO Standard Specifications for Highway Bridges, Seventeenth Edition - 2002)

PS I Wide - **At Location = 0.8200 (ft) - Left** Stage 3

Cross Section Properties

Name: AASHTO-PCI BT-72 Girder f'c = 6.50(ksi) Girder f'ci = 5.50(ksi)

Beam Height	=	72.00(in)	Web Width	=	17.00(in)
Top Flange Width	=	42.00(in)			
Top Flange Thick	=	3.50(in)			
Top Flange Haunch Height	=	2.00(in)			
Top Flange Haunch 2 Height	=	2.00(in)			
Top Flange Haunch 2 Width	=	2.00(in)			
Bot Flange Width	=	26.00(in)			
Bot Flange Thick	=	6.00(in)			
Bot Flange Haunch Height	=	4.50(in)			

Slab f'c	=	4.00(ksi)	Haunch Width	=	42.00(in)
Effective Slab Width	=	90.00(in)	Haunch Thickness	=	0.25(in)
Effective Slab Thickness	=	7.50(in)			

Computed Basic Beam Section Properties

Area	=	1394.1438 (in^2)
Moment of Inertia	=	716510.2327 (in^4)

Dist to Natural Axis		Section Modulus	
Bot of Beam	Top of Beam	Bot of Beam	Top of Beam
(in)	(in)	(in^3)	(in^3)
37.13	34.87	19298.51	20546.72

OK

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Spec Check Detail for PS Basic Properties Calculation

Mechanics of Materials
Basic PS Beam Property Calculations
(AASHTO Standard Specifications for Highway Bridges, Seventeenth Edition - 2002)

PS I Wide - At Location = 60.0000 (ft) - Left Stage 3

Cross Section Properties

Name: AASHTO-PCI BT-72 Girder f'c = 6.50(ksi) Girder f'ci = 5.50(ksi)

Beam Height	=	72.00(in)	Web Width	=	6.00(in)
Top Flange Width	=	42.00(in)			
Top Flange Thick	=	3.50(in)			
Top Flange Haunch Height	=	2.00(in)			
Top Flange Haunch 2 Height	=	2.00(in)			
Top Flange Haunch 2 Width	=	2.00(in)			
Bot Flange Width	=	26.00(in)			
Bot Flange Thick	=	6.00(in)			
Bot Flange Haunch Height	=	4.50(in)			

Slab f'c	=	4.00(ksi)			
Effective Slab Width	=	90.00(in)	Haunch Width	=	42.00(in)
Effective Slab Thickness	=	7.50(in)	Haunch Thickness	=	0.25(in)

Computed Basic Beam Section Properties
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Area	=	767.0000 (in^2)
Moment of Inertia	=	545857.2181 (in^4)

Dist to Natural Axis	Section Modulus

OK