Index 20502 Beveled Bearing Plate Details Prestressed Florida-U Beams

Design Criteria

AASHTO LRFD Bridge Design Specifications, 6th Edition; ***Structures Detailing Manual (SDM)***; ***Structures Design Guidelines (SDG)***

Design Assumptions and Limitations

This Index contains generic details and notes for beveled and embedded bearing plates for use with Prestressed Florida-U Beams. Completion of the "Bearing Plate Data Table" is required. Use this standard with Indexes 20210, 20248, 20254, 20263 and 20272.

Embedded Bearing Plates A and Beveled Bearing Plates B are required for all beams on grades greater than 2%.

Plan Content Requirements

In the Structures Plans:

Bearing seats (pedestals) may be finished level for beam grades less than 0.5%.

For beam grades between 0.5% and 2%, show the bearing seats (pedestals) to be finished parallel to the beam grade with no allowance for beam camber or deflection.

For beam grades greater than 2%, show the bearing seats (pedestals) to be finished level and use Bearing Plates A and B.

Complete the following "BEARING PLATE DATA TABLE" and include it in the plans when Bearing Plates are required. Fill in the table to correspond with data on the 'TABLE OF BEAM VARIABLES' using inch units for Beveled Plate dimensions 'W', 'X', 'Y' & 'Z' rounded to 1/16th of an inch. See Introduction I.3 for more information regarding use of Data Tables.

Use the average deck cross slope perpendicular to centerline of beam from End 1 and End 2, for the beam cross slope for spans with superelevation transitions.

Use the following equations to determine the Beveled Plate thicknesses for 'PLAN VIEW CASES' and 'END ELEVATION CONDITIONS' corresponding to those shown on Index 20210, when single pedestals are used beneath the beam ends. For split pedestals beneath double bearings, adjust the upper pedestal elevation to utilize the same thickness bearing plate on the left and right sides of the beam as shown below. Slope and Cross Slope parameters in these equations require decimal units and correct sign convention:

END 1	END 2
(I) PLAN VIEW CASE 1 (No Skew):	
(a) END ELEVATION CONDITION 1 (Positive Slope)	
(i) Positive Cross Slope (C.S.), Single Bearing & Left Side Double Bearing	
W = 0.5" + (C) x Slope + (D) x C.S.	W = 0.5" + (D) x C.S.
X = 0.5" + (C) x Slope	X = 0.5"
Y = 0.5"	Y = 0.5" + (C) x Slope
Z = 0.5" + (D) x C.S.	Z = 0.5" + (C) x Slope + (D) x C.S.
(ii) Negative Cross Slope (C.S.), Single Bearing & Right Side Double Bearing	
W = 0.5" + (C) x Slope	W = 0.5"
X = 0.5" + (C) x Slope - (D) x C.S.	X = 0.5" - (D) x C.S.
Y = 0.5" - (D) x C.S.	Y = 0.5" + (C) x Slope - (D) x C.S.
Z = 0.5"	Z = 0.5" + (C) x Slope
(iii) Positive Cross Slope (C.S.), Right Side Double Bearing	
W = 0.5" + (C) x Slope + (2D+E) x C.S.	W = 0.5" + (2D+E) x C.S.
X = 0.5" + (C) x Slope + (D+E) x C.S.	X = 0.5" + (D+E) x C.S.
Y = 0.5" + (D+E) x C.S.	Y = 0.5" + (C) x Slope + (D+E) x C.S.
Z = 0.5" + (2D+E) x C.S.	Z = 0.5" + (C) x Slope + (2D+E) x C.S.
(iv) Negative Cross Slope (C.S.), Left Side Double Bearing	
W = 0.5" + (C) x Slope - (D+E) x C.S.	W = 0.5" - (D+E) x C.S.
X = 0.5" + (C) x Slope - (2D+E) x C.S.	X = 0.5" - (2D+E) x C.S.
Y = 0.5" - (2D+E) x C.S.	Y = 0.5" + (C) x Slope - (2D+E) x C.S.
Z = 0.5" - (D+E) x C.S.	Z = 0.5" + (C) x Slope - (D+E) x C.S.
(b) END ELEVATION CONDITION 3 (Negative Slope)	
(i) Positive Cross Slope (C.S.), Single Bearing & Left Side Double Bearing	
W = 0.5" + (D) x C.S.	W = 0.5" - (C) x Slope + (D) x C.S.
X = 0.5"	X = 0.5" - (C) x Slope
Y = 0.5" - (C) x Slope	Y = 0.5"
Z = 0.5" - (C) x Slope + (D) x C.S.	Z = 0.5" + (D) x C.S.

END 1	END 2
(ii) Negative Cross Slope (C.S.), Single Bearing & Right Side Double Bearing	
W = 0.5"	W = 0.5" - (C) x Slope
X = 0.5" - (D) x C.S.	X = 0.5" - (C) x Slope - (D) x C.S.
Y = 0.5" - (C) x Slope - (D) x C.S.	Y = 0.5" - (D) x C.S.
Z = 0.5" - (C) x Slope	Z = 0.5"
(iii) Positive Cross Slope (C.S.), Right Side Double Bearing	
W = 0.5" + (2D+E) x C.S.	W = 0.5" - (C) x Slope + (2D+E) x C.S.
X = 0.5" + (D+E) x C.S.	X = 0.5" - (C) x Slope + (D+E) x C.S.
Y = 0.5" - (C) x Slope + (D+E) x C.S.	Y = 0.5" + (D+E) x C.S.
Z = 0.5" - (C) x Slope + (2D+E) x C.S.	Z = 0.5" + (2D+E) x C.S.
(iv) Negative Cross Slope (C.S.), Left Side Double Bearing	
W = 0.5" - (D+E) x C.S.	W = 0.5" - (C) x Slope - (D+E) x C.S.
X = 0.5" - (2D+E) x C.S.	X = 0.5" - (C) x Slope - (2D+E) x C.S.
Y = 0.5" - (C) x Slope - (2D+E) x C.S.	Y = 0.5" - (2D+E) x C.S.
Z = 0.5" - (C) x Slope - (D+E) x C.S.	Z = 0.5" - (D+E) x C.S.
(II) PLAN VIEW CASE 2:	
(a) END ELEVATION CONDITION 1 OR 2 (Positive Slope)	
(i) Positive Cross Slope (C.S.), Single Bearing & Left Side Double Bearing	
W = 0.5" + (C+D/tan Φ) x Slope + (D) x C.S.	W = 0.5" + (D) x C.S.
X = 0.5" + (C+D/tan Φ) x Slope	X = 0.5"
Y = 0.5"	Y = 0.5" + (C) x Slope
Z = 0.5" + (D/tan Φ) x Slope + (D) x C.S.	Z = 0.5" + (C+D/tan Φ) x Slope + (D) x C.S.
(ii) Negative Cross Slope (C.S.), Single Bearing & Right Side Double Bearing	
W = 0.5" + (C) x Slope	W = 0.5"
X = 0.5" + (C) x Slope - (D) x C.S.	X = 0.5" - (D) x C.S.
* Y = 0.5" - (D/tan f) x Slope - (D) x C.S.	Y = 0.5" + (C) x Slope - (D) x C.S.
Z = 0.5"	Z = 0.5" + (C+D/tan Φ) x Slope

END 1	END 2
(iii) Positive Cross Slope (C.S.), Right Side Double Bearing	
W = 0.5"+[(2D+E)/tanΦ+C] xSlope+(2D+E)xC.S.	W = 0.5" + (D+E)/tan Φ x Slope + (2D+E) x C.S.
X = 0.5"+[(2D+E)/tanΦ+C]xSlope+(D+E)xC.S.	X = 0.5" + (D+E)/tan Φ x Slope + (D+E) x C.S.
Y = 0.5" + (D+E)/tan Φ x Slope + (D+E) x C.S.	Y = 0.5"+[(D+E)/tanΦ+C]xSlope+(D+E)xC.S.
Z = 0.5" + (2D+E)/tan Φ x Slope + (2D+E) x C.S.	Z = 0.5"+[(2D+E)/tanΦ+C]xSlope+(2D+E)xC.S.
(iv) Negative Cross Slope (C.S.), Left Side Double Bearing	
W = 0.5" + [C-(D+E)/tan Φ] x Slope - (D+E) x C.S.	* W = 0.5" - (D+E)/tan Φ x Slope - (D+E) x C.S.
X = 0.5" + [C-(D+E)/tan Φ] x Slope-(2D+E) x C.S.	* X = 0.5" - (D+E)/tan Φ x Slope - (2D+E) x C.S.
* Y = 0.5" - (2D+E)/tan Φ x Slope - (2D+E) x C.S.	Y = 0.5" + [C-(D+E)/tan Φ] x Slope-(2D+E) x C.S.
* Z = 0.5" - (D+E)/tan Φ x Slope - (D+E) x C.S.	Z = 0.5" + [C - E/tan Φ] x Slope - (D+E) x C.S.
(b) END ELEVATION CONDITION 3 (Negative Slope)	
(i) Positive Cross Slope (C.S.), Single Bearing & Left Side Double Bearing	
W = 0.5" + (D) x C.S.	W = 0.5" - (C) x Slope + (D) x C.S.
X = 0.5"	X = 0.5" - (C) x Slope
Y = 0.5" - (C+D/tan Φ) x Slope	Y = 0.5"
Z = 0.5" - (C) x Slope + (D) x C.S.	* Z = 0.5" + (D/tan Φ) x Slope + (D) x C.S.
(ii) Negative Cross Slope (C.S.), Single Bearing & Right Side Double Bearing	
W = 0.5"	W = 0.5" - (C+D/tan Φ) x Slope
X = 0.5" - (D) x C.S.	X = 0.5" - (C+D/tan Φ) x Slope - (D) x C.S.
Y = 0.5" - (C+D/tan Φ) x Slope - (D) x C.S.	Y = 0.5" - (D/tan Φ) x Slope - (D) x C.S.
Z = 0.5" - (C) x Slope	Z = 0.5"
(iii) Positive Cross Slope (C.S.), Right Side Double Bearing	
* W = 0.5"+(D+E)/tan Φ x Slope+(2D+E) x C.S.	W = 0.5" - [C-(D+E)/tanΦ] x Slope+(2D+E) x C.S.
* X = 0.5" + (D+E)/tan Φ x Slope + (D+E) x C.S.	X = 0.5" - [C-(D+E)/tanΦ] x Slope + (D+E) x C.S.
Y = 0.5" - [C-E/tan Φ] x Slope + (D+E) x C.S.	* Y = 0.5" + (D+E)/tan Φ x Slope + (D+E) x C.S.
Z = 0.5" - [C-(D+E)/tanΦ] x Slope + (2D+E) x C.S.	* Z = 0.5" + (2D+E)/tan Φ x Slope+(2D+E) x C.S.

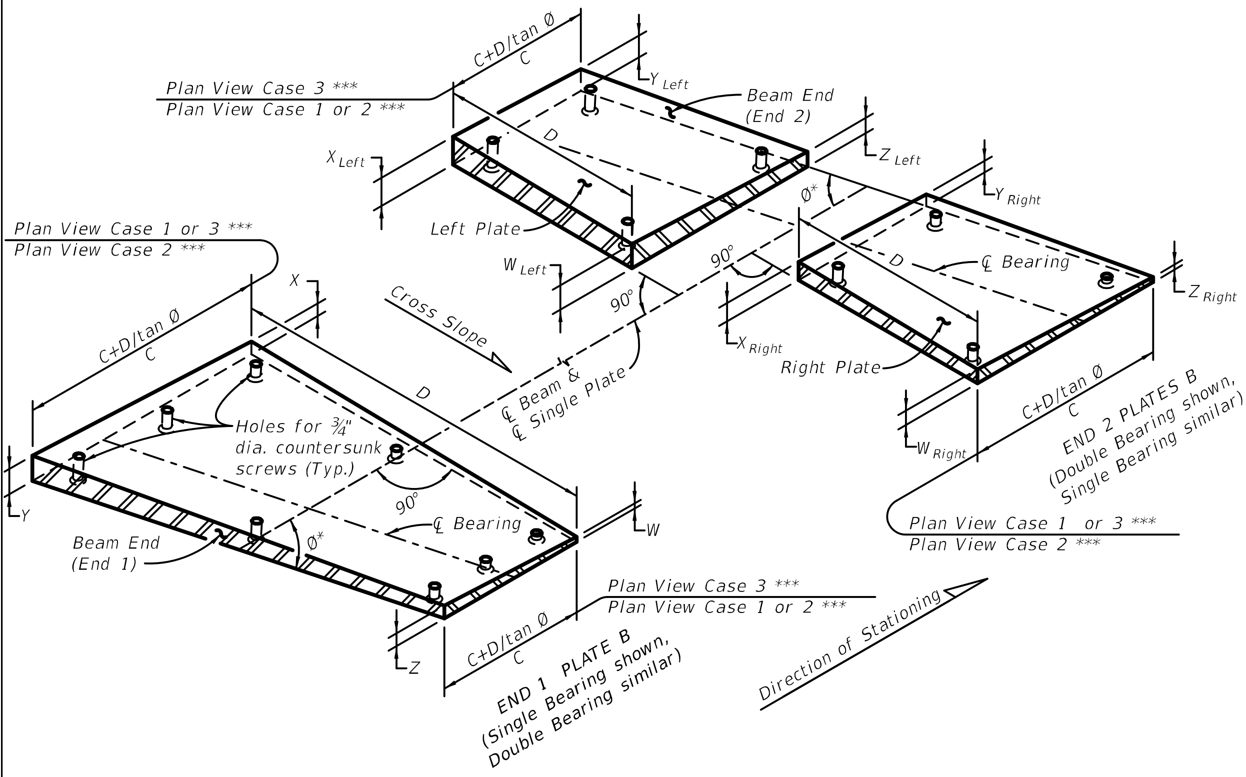
END 1	END 2
(iv) Negative Cross Slope (C.S.), Left Side Double Bearing	
W = 0.5" - (D+E)/tan Φ x Slope - (D+E) x C.S.	W = 0.5" - [C+(2D+E)/tanΦ] x Slope-(D+E) x C.S.
X = 0.5" - (D+E)/tan Φ x Slope - (2D+E) x C.S.	X = 0.5" - [C+(2D+E)/tanΦ] x Slope-(2D+E) x C.S.
Y = 0.5" - [C+(2D+E)/tanΦ] x Slope-(2D+E) x C.S.	Y = 0.5" - (2D+E)/tan Φ x Slope - (2D+E) x C.S.
Z = 0.5" - [C + (D+E)/tan Φ] x Slope - (D+E) x C.S.	Z = 0.5" - (D+E)/tan Φ x Slope - (D+E) x C.S.
(III) PLAN VIEW CASE 3:	
(a) END ELEVATION CONDITION 1 OR 2 (Positive Slope)	
(i) Positive Cross Slope (C.S.), Single Bearing & Left Side Double Bearing	
W = 0.5" + (C) x Slope + (D) x C.S.	W = 0.5" + (D) x C.S.
X = 0.5" + (C) x Slope	X = 0.5"
Y = 0.5"	Y = 0.5" + (C+D/tan Φ) x Slope
* Z = 0.5" - (D/tan Φ) x Slope + (D) x C.S.	Z = 0.5" + (C) x Slope + (D) x C.S.
(ii) Negative Cross Slope, Single Bearing & Right Side Double Bearing	
W = 0.5" + (C+D/tan Φ) x Slope	W = 0.5"
X = 0.5" + (C+D/tan Φ) x Slope-(D) x C.S.	X = 0.5" - (D) x C.S.
Y = 0.5" - (D/tan Φ) x Slope - (D) x C.S.	Y = 0.5" + (C+D/tan Φ) - (D) x C.S.
Z = 0.5"	Z = 0.5" + (C) x Slope
(iii) Positive Cross Slope, Right Side Double Bearing	
W = 0.5"+[C-(D+E)/tanΦ] x Slope+(2D+E) x C.S.	* W = 0.5" - (D+E)/tanΦ x Slope + (2D+E) x C.S.
X = 0.5" + [C-(D+E)/tanΦ] x Slope+(D+E) x C.S.	* X = 0.5" - (D+E)/tanΦ x Slope + (D+E) x C.S.
* Y = 0.5" - (D+E)/tanΦ x Slope + (D+E) x C.S.	Y = 0.5" + (C-E/tanΦ] x Slope + (D+E) x C.S.
* Z = 0.5" - (2D+E)/tanΦ x Slope+(2D+E) x C.S.	Z = 0.5" + [C-(D+E)/tanΦ] x Slope+(2D+E) x C.S.
(iv) Negative Cross Slope, Left Side Double Bearing	
W = 0.5"+[C+(2D+E)/tanΦ] x Slope-(D+E) x C.S.	W = 0.5" + (D+E)/tanΦ x Slope - (D+E) x C.S.
X = 0.5"+[C+(2D+E)/tanΦ] x Slope-(2D+E) x C.S.	X = 0.5" + (D+E)/tanΦ x Slope - (2D+E) x C.S.
Y = 0.5" + (2D+E)/tan Φ x Slope - (2D+E) x C.S.	Y = 0.5"+[C+(2D+E)/tanΦ] x Slope-(2D+E) x C.S.
Z = 0.5" + (D+E)/tanΦ x Slope - (D+E) x C.S.	Z = 0.5" + [C + (D+E)/tanΦ] x Slope - (D+E) x C.S.

END 1	END 2
(b) END ELEVATION CONDITION 3 (Negative Slope)	
(i) Positive Cross Slope (C.S.), Single Bearing & Left Side Double Bearing	
W = 0.5" + (D) x C.S.	W = 0.5"-(C+D/tan Φ) x Slope+(D) x C.S.
X = 0.5"	X = 0.5" - (C+D/tan Φ) x Slope
Y = 0.5" - (C) x Slope	Y = 0.5"
Z = 0.5"-[C+D/tan Φ] x Slope + (D) x C.S.	Z = 0.5" - (D/tan Φ) x Slope + (D) x C.S.
(ii) Negative Cross Slope (C.S.), Single Bearing & Right Side Double Bearing	
W = 0.5"	W = 0.5" - (C) x Slope
X = 0.5" - (D) x C.S.	X = 0.5" - (C) x Slope - (D) x C.S.
Y = 0.5" - (C) x Slope - (D) x C.S.	Y = 0.5" + (D/tan Φ) x Slope - (D) x C.S.
Z = 0.5" - (C+D/tan Φ) x Slope	Z = 0.5"
(iii) Positive Cross Slope (C.S.), Right Side Double Bearing	
W = 0.5" - (D+E)/tan Φ x Slope + (2D+E) x C.S.	W = 0.5"-[C+(2D+E)/tanΦ] x Slope+(2D+E) x C.S.
X = 0.5" - (D+E)/tan Φ x Slope + (D+E) x C.S.	X = 0.5"-[C+(2D+E)/tanΦ] x Slope+(D+E) x C.S.
Y = 0.5"-[C + (D+E)/tanΦ] x Slope + (D+E) x C.S.	Y = 0.5" - (D+E)/tan Φ x Slope + (D+E) x C.S.
Z = 0.5"-[C+(2D+E)/tanΦ] x Slope+(2D+E) x C.S.	Z = 0.5" - (2D+E)/tan Φ x Slope + (2D+E) x C.S.
(iv) Negative Cross Slope (C.S.), Left Side Double Bearing	
* W = 0.5" + (D+E)/tan Φ x Slope - (D+E) x C.S.	W = 0.5" - [C - (D+E)/tanΦ] x Slope - (D+E) x C.S.
* X = 0.5" + (D+E)/tan Φ x Slope - (2D+E) x C.S.	X = 0.5" - [C - (D+E)/tanΦ] x Slope-(2D+E) x C.S.
Y = 0.5"-[C - (D+E)/tanΦ] x Slope - (2D+E) x C.S.	* Y = 0.5" + (2D+E)/tanΦ x Slope - (2D+E) x C.S.
Z = 0.5" - [C - (E)/tan Φ] x Slope - (D+E) x C.S.	* Z = 0.5" + (D+E)/tan Φ x Slope - (D+E) x C.S.

* Could be less than 0.5" for steep slopes. Adjust plate thickness equally at all corners of both left and right side plates to provide a minimum 0.5" thickness.

BEARING PLATE DATA TABLE																			Table Date 1-01-08
GENERAL BEARING PLATE DATA									EMBEDDED PLATE DIMENSIONS (PLATE A) (inches)			BEVELED PLATE REQUIRED	BEVELED PLATE DIMENSIONS (PLATE B) (inches)						
BRG. PLATE MARK ***	SPAN NO(s).	BEAM NO(s).	BEARING TYPE	BEAM END	PLAN VIEW CASE	CROSS SLOPE (%) ##	SLOPE (%) **	ANGLE Ø *	C	D	C+D/TAN Ø	(Yes/No)	C	D	C+D/TAN Ø	W	X	Y	Z

NOTES:
* Ø = Acute angle (≤ 90°) measured from left or right side of ℄ Beam as required (See Plan View Case No.).
** Slope measured along ℄ of Beam at ℄ of Bearing.
\## Cross Slope measured perpendicular to ℄ of Beam at bottom of beam.
*** See "TABLE OF BEAM VARIABLES" and Index No. 20210.
See Index No. 20502 for additional notes and details.



ISOMETRIC VIEW OF BEVELED BEARING PLATES FOR FLORIDA-U BEAMS
(SKEWED PLATES SHOWN, NON-SKEWED PLATES SIMILAR)

Payment

The cost of beveled and embedded bearing plates is incidental to the cost of the prestressed beams they are used with. No separate payment is made.