

Cross-frame Axial Rigidity Coefficients – Default Behavior

Applies to the following products:

- BrD/BrR/BrDR, version 7.6 and onwards

Description

This technical note is informational only.

Prior to version 7.6, BrDR did not allow input of axial rigidity coefficients for cross-frame members. This may have led engineers to implement specific input methods to account for axial rigidity coefficients when analyzing cross-frames. In version 7.6, the ability to input axial rigidity coefficients was added to the Diaphragm Definitions window (see Figure 1). As per Article 4.6.3.3.4c of the 10th Edition of the LRFD Bridge Design Specifications, “axial rigidity of single-angle and tee-section cross-frame members should be taken as $0.65AE$ in the analysis model for the non-composite condition and $0.75AE$ for the composite condition”. In version 7.6, BrDR applies these coefficients when the cross-frame member type is a single angle or a tee section. If the input field is left blank, the analysis will apply these coefficients as per the specification.

Engineers will only observe this behavior if they use a 3D LRFD/LRFR analysis with the 10th Edition of the LRFD Bridge Design Specifications. It is important to consider the update if an alternative input method was used in a previous version of BrDR, which may lead to unintended cumulative reductions in the axial stiffness. An example for this specification update, [3DFEM6 – Axial Rigidity Coefficient Example](#), is available on AASHTOWare BrDR’s tutorial section of the training page.

Alternative Input Method to the Default Behavior

One option is to input each coefficient as 1.0 for each diaphragm member which the axial rigidity was accounted for in previous versions. This will override the default coefficient for single angle and tee sections, ensuring each member’s axial stiffness is not scaled.

Diaphragm Definitions

Name: Type 1 Diaphragm - ARC = 1.0 Diaphragm type: Type 1 Number of elements in fixed member: 1

☐ Tension-only diagonal system

Members Connections

Diaphragm types:

Diagram showing Type 1 diaphragm configuration (A, B, C, D nodes).

Member	Shape	Section orientation	Section location	Material	LRFD/LRFR axial rigidity coefficients		
					Non-composite	Composite (long term)	Composite (short term)
AB	W 12x22	Vertical		Fy= 33 ksi (fs=18 ksi)			
CD	L 3x3x3/8	Vertical	Top Left	Fy= 33 ksi (fs=18 ksi)			
AD	L 3x3x3/8	Vertical	Top Left	Fy= 33 ksi (fs=18 ksi)			
CB	L 3x3x3/8	Vertical	Top Left	Fy= 33 ksi (fs=18 ksi)			

Figure 1: Diaphragm Definitions window