

Bridge seismic design per AASHTO LRFD 2007

Design Code	
Name:	AASHTO LRFD 2007
Description:	Automatic seismic design of bridges based on AASHTO Guide Specifications for LRFD bridge seismic design
Topic:	Bridge seismic design
Program:	CSiBridge
Program version:	V14 and higher

The substructure seismic-design process in the [bridge modeler](#) is documented in the [Bridge Seismic Design](#) manual. This manual, based on AASHTO specifications for LRFD bridge seismic design, describes the automated seismic-design procedure for bridges. Displacement-demand formulation is based on Article 4.8 of the AASHTO Guide Specifications for LRFD bridge seismic design.

On this page:

- [Applicability](#)
- [Seismic design category](#)
- [Hinges](#)
- [Pushover analysis](#)
 - [Pushover analysis for integral substructure](#)
 - [Pushover target displacement ratio](#)
- [See Also](#)

Applicability

Design procedures implemented in the [bridge modeler](#) are applicable to reinforced-concrete columns.

Seismic design category

The seismic design category, determined through AASHTO Article 3.5, is based on the design spectral acceleration of a one-second period.

Hinges

Caltrans [hinges](#) are assigned according to the bridge-seismic-design request. Because Caltrans hinges are specific to certain types of cross section, users should ensure that column sections are rectangular, circular, or from the Section Designer.

Pushover analysis

During [pushover analysis](#), when a structure is pushed beyond its displacement capacity, numerical problems arise due to instability. Under such conditions, analysis terminates prior to reaching target displacement. In spite of termination, the calculated pushover capacity displacements are still correct since they are automatically identified from the pushover curve just before strength loss.

Pushover analysis for integral substructure

For bridge models with integral substructure, users should reconsider [pushover analysis](#) for individual [bents](#) since the integral connection between bents and superstructure will cause frame action. Users may choose to investigate pushover response for the entire bridge (including deck) along the longitudinal axis. This may be done outside the bridge modeler.

Pushover target displacement ratio

Pushover target displacement ratio generates target displacement as follows:

- Demand displacement is derived from [response-spectrum analysis](#)

- Target displacement for pushover analysis is derived as the product of demand displacement and target displacement ratio

During implementation, a pushover target displacement ratio equal to 1 pushes the structure to demand displacement. Setting this parameter equal to 2 pushes the structure to twice the demand displacement. Since pushover-curve drop indicates bent failure, users should review pushover curves to determine whether or not the structure achieves failure, and increase the target displacement ratio as necessary.

See Also

- [Bridge Seismic Design](#) manual
- [Model from Bridge Seismic Design Request manual](#) article
- [Caltrans hinge](#) article