

Load and Resistance Factor Design (LRFD) Seismic Bridge Design Workshop



Purpose and Background:

The American Association of State Highway and Transportation Officials (AASHTO) recently approved two major changes to the seismic design of highway bridges. The first updates seismic provisions in the AASHTO *LRFD Bridge Design Specifications*, and the second adopts a new *Guide Specification for LRFD Seismic Bridge Design*.

The updated seismic provisions in the 2007 edition of the LRFD specifications relate to:

- (1) changing the return period of the design earthquake from 500 years to 1000 years; and
- (2) keeping the specifications up-to-date and in-line with recent developments in the seismic design of bridges.

The change in return period for characterizing the seismic hazard required changing the U.S. Geological Survey (USGS) maps. These new maps not only give peak ground acceleration (PGA) but also two additional values of the spectral acceleration [at 0.2 seconds (S_s) and 1.0 second (S_1)] allowing an improved spectral shape to be used for defining the seismic response coefficient. Consequential changes include new zone boundaries, soil factors, minimum design forces, introduction of P- Δ requirements, and a revised ϕ factor for flexural resistance. In addition, new site soil classifications have been introduced.

The new *Guide Specification for LRFD Seismic Bridge Design* is an alternate, stand alone, set of provisions for the seismic design of bridges. The major difference between these provisions and those in the updated *LRFD Bridge Design Specifications* is the methodology used for determining design forces. Various displacement limit states are investigated. Accordingly, the R-factors in the current *Guide Specification for LRFD Seismic Bridge Design* are not used for concrete design. Since this methodology focuses on displacement, it is often referred to as “displacement based.” By contrast, the LRFD specifications are “force based.” Displacement based procedures are widely believed to lead to more efficient designs preventing collapse in high seismic zones. The anticipated effect of this new design methodology is improved performance of bridges during small and large earthquakes.

Workshop Benefits:

- Apply the *AASHTO LRFD & AASHTO Guide Specifications for LRFD Seismic Bridge Design*
- Learn more about the basis for the new design earthquake hazard of a 7.5 percent probability of exceedance in 75 years (i.e., 1000 year return period)
- Understand and apply the principals of displacement based & force based seismic design

Learning Outcomes:

- Apply "AASHTO 2008 Interims" to the design and analysis of new bridges.
- Apply the "AASHTO Guide Specifications for LRFD Seismic Bridge Design" to the design and analysis of new bridges

Who Should Attend:

Structural design engineers who are responsible for designing highway bridges will benefit from this workshop.

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