

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



Purpose and Background:

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

The updated seismic provisions in the 2012 edition of the LRFD specifications relate to:

- (1) Changing the return period of the design earthquake from 500 years to 1000 years.
- (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 provides two additional values of the spectral acceleration [at 0.2 seconds (S_0) and 1.0 second (S_1)] allowing an improved spectral shape to be used for defining the seismic response coefficient. Consequential changes include new seismic 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 *Guide Specifications 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 and displacements. 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.

This workshop is tailored for agencies located in low to moderate seismicity. It will help each DOT determine which specification may be most appropriate to use in design by comparing details and requirements in each specification.

Workshop Benefits:

- Apply the *AASHTO LRFD & AASHTO Guide Specifications for LRFD Seismic Bridge Design* in low to moderate seismic location. (Seismic Design Categories A & B, Zones 1& 2)
- Learn more about the basis for the new design earthquake hazard of a 7.5 percent probability of exceedence 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 LRFD Bridge Design Specifications*" 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.
- Determine most appropriate seismic design specification to use in your State.

Who Should Attend:

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

To schedule, contact:

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Instructor Bios:

Derrell Manceaux, P.E., is a Senior Structural Design Engineer with the Federal Highway Administration in the Resource Center in Denver, Colorado. He received a Bachelor of Science and a Master of Engineering degree in Civil Engineering from the University of Tennessee and a Master of Science degree in Civil Engineering from University of California-Berkley. Derrell has served as a Structural Engineer with the FHWA for over 30 years in the Federal Lands Highway Division and Office of Bridge Technology. Derrell specializes in the seismic design and analysis of highway bridges and structures and has provided seismic design and retrofit training in numerous States and for several International agencies. Derrell is a registered Professional Engineer in the State of Colorado.

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Seismic Design & Retrofitting of Highway Bridges

November, 18 2014

Registration Fee

The course is free of charge to those attending, but is offered on a 'reservation-only' basis and limited to seat availability.

Course Location

1980 West Broad Street, Columbus, Ohio

Seminar Agenda

Day One

- 8:00 am Welcome, Introductions, Overview of Seismic Design & Retrofit Manuals/Specifications
- 8:30 am Seismic Hazards- Developing a Seismic Design Response Spectrum (Demand on the Structure)
- 9:30 am Break
- 9:45 am Seismic Analysis & Dynamic Methods
- 10:45 am LRFD Bridge Design Specifications (Force Based Design)
- 11:30 am Lunch (on-your-own)
- 12:30 pm Guide Specifications for LRFD Seismic Bridge Design (Displacement Based Design)
- 1:15 pm Seismic Detailing Requirements (Force Base & Displacement Base)
- 2:00 pm Adjourn

