Course Number

FHWA-NHI-130093A

Course Title

Displacement-Based Seismic Design of Bridges

This 3-day NHI training course 130093A entitled "Displacement-Based Seismic Analysis and Design of Bridges" is a shortened version of the 5-day NHI 130093 Course "LRFD Seismic Analysis and Design of Bridges" focusing specifically on the displacement-based design philosophies. It is a comprehensive and practical training course that addresses the requirements and recommendations of the seismic provisions in the AASHTO Guide Specifications for LRFD Seismic Bridge Design.

The 130093A course reviews the fundamental principles of seismic design including engineering seismology, structural dynamics (SDOF and MDOF), seismic and geotechnical hazards, and methods for modeling and analyzing bridges subject to earthquake ground motions. The 130093A course then discusses the principles and applications of capacity design to piers, foundations, superstructures and connections, and a brief introduction to the principles and some application of seismic isolation.

The course is accompanied by a prerequisite Web-based Training (WBT) 130093W Course "Introduction to Earthquake Engineering". The participants are highly recommended to complete the WBT course prior to the Instructor Led course. The WBT prerequisite course consists of 5 lessons including Introduction to Earthquake Seismology (L1); Damages to Bridges due to Strong Motion (L2); Single Degree of Freedom (SDOF) Systems and Response Spectra (L3); AASHTO Design Ground Motion Characterization (L4); and Introduction to Geotechnical Hazards (L5).

Outcomes

Upon completion of the course, participants will be able to:

- Identify types of bridge damage to avoid
- Use acceleration and displacement response spectra to estimate peak forces and displacements
- List three elements of Capacity Design
- Describe the most common method for determining dynamic seismic response (i.e. multi-mode response spectrum)
- Calculate, by hand, inelastic displacements of simple pier systems
- Compare and contrast various bridge modeling techniques from stick models to finite element models
- Describe the relationship between detailing of transverse steel and ductility demand on a column
- Develop the design overstrength forces for a column
- Explain how liquefaction affects the seismic design process
- Describe strategies for protecting superstructures from damage
- Compute required support lengths in accordance with AASHTO design specifications
- Describe common processes embedded in both the LS and GS
- List the four seismic design categories in the GS and the key requirements for each category
- Describe the basic purpose of seismic isolation

Target Audience

This course is intended to engage a target audience of bridge engineers with zero and up to 20 years of experience, through instructor-led presentations, discussions, Q&A, group activities, walkthrough examples, and hands-on student exercises and design example practices.

Training Level: Intermediate

Fee: 2016: $1020 Per Person; 2017: $1020 Per Person

Length: 3 DAYS (CEU: 1.8 UNITS)

Class Size: MINIMUM: 20; MAXIMUM: 30

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