Course Number

FHWA-NHI-132094

Course Title

LRFD Seismic Analysis and Design of Transportation Structures, Features, and Foundations

This course is a comprehensive and practical training course for analysis and design of transportation geotechnical features including soil and rock slopes, earth embankments, retaining walls, MSE walls, and buried structures; and bridge structural foundations including shallow and deep foundations, and abutment walls. It is developed in consideration of the requirements and recommendations of the seismic provisions in both the 2009 AASHTO LRFD Bridge Design Specifications and the AASHTO Guide Specifications for LRFD Seismic Bridge Design, the Final Report from NCHRP Project 12-70 "Seismic Analysis and Design of Retaining Walls, Buried Structures, Slopes, and Embankments", and 2006 FHWA Seismic Retrofitting Manual for Highway Structures.

In addition, the course reviews the fundamental principles including engineering seismology, earthquake hazard analysis, site characterization, ground motion characterization, and site response analysis, and highlight updated topics such as the 1000-yr USGS hazard map; updated AASHTO site classes/factors and spectral shapes; the "3-Point" Design Spectrum Construction method; derivation of the relative displacement spectrum; and regional differences in ground motion characteristics (i.e. western US (WUS) characteristics versus central and eastern US (CEUS). It addresses geotechnical hazards which can adversely impact bridges and other transportation structures and features during seismic event including slope instability, soil liquefaction, ground settlement, and fault Rupture. Liquefaction-induced lateral spread failures are also addressed.

Outcomes

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

- Recognize sources of primary and secondary damage due to earthquakes
- Describe the AASHTO seismic design philosophy
- Describe the input for a seismic hazard analysis and interpret the output for a bedrock site condition
- Develop an AASHTO acceleration response spectra and adjust it for local site conditions
- Estimate the residual undrained shearing resistance of liquefied sand
- Develop the input for an equivalent linear seismic site response analysis
- Determine the appropriate seismic coefficient for a pseudo static slope stability analysis and calculate the permanent seismic displacement of an unstable soil slope
- Evaluate the potential for liquefaction triggering and consequences
- Identify potential mitigation measures for slope instability, liquefaction and lateral spreading
- Evaluate external stability of gravity and semi-gravity walls subject to seismic loading
- Discuss types of soil-foundation-structure interaction and how its effects are modeled
- Evaluate the geotechnical and structural capacity of a spread footing
- Identify the primary capacity considerations for deep foundations under seismic loading
- Develop the abutment spring stiffness relationship

Target Audience

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

Training Level: Basic

Fee: 2017: $1225 Per Person; 2018: N/A

Length: 5 DAYS (CEU: 3 UNITS)

Class Size: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov