Improving the Performance of the Transportation Industry Through Training
These NHI category icons can assist users in identifying the course category or multiple course categories. The category icons are listed below for your reference.

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ABOUT NHI

WHO WE ARE
The National Highway Institute (NHI) provides technical training to the highway transportation workforce to build skills and enhance job performance to improve the conditions and safety of our nation's roads, highways, and bridges.

As part of Federal Highway Administration's (FHWA) Office of Technical Services (OTS), NHI courses complement the targeted training and technical assistance of FHWA program offices, Resource Center, and Local and Tribal Technical Assistance Programs (LTAP/TTAP).

OUR TRAINING
NHI courses are instrumental in developing core competencies and new skills, as well as learning about leading technologies and current policies. Our instructors strive to ensure that participants leave training not only with additional knowledge, but also the ability to apply that knowledge directly to their work. NHI is an accredited training provider by the International Association of Continuing Education and Training (IACET), allowing participants to earn Continuing Education Units (CEUs) for completed coursework. NHI also is an approved provider of the American Institute of Certified Planners (AICP) certification maintenance (CM) credits.

NHI offers three types of training.

Instructor-led Training (ILT): These courses are held in-person and led by an instructor when an organization is available to host the session. Any organization may host a session by submitting a Host Request form on the NHI Web site.

Web-conference Training (WCT): These are live, online training sessions that take place at a set time. Web-conference Training sessions also require a host.

Web-based Training (WBT): These online courses are available 24/7 for six months after purchase by the registrant. Participants can control the pace at which they complete the course and may return to it as many times as they wish within the six-month access period.

LEARN MORE
For more information or to subscribe to our mailing list, please visit the NHI Web site at www.nhi.fhwa.dot.gov.

Customers with additional questions may also contact NHI Customer Service at NHICustomerService@dot.gov or by phone during regular business hours, 7:30AM – 4:30PM Eastern Time, at (877) 558-6873.
NHI MAKES HOSTING EASY

HOSTING A COURSE
NHI partners with host organizations across the country to deliver training where it is needed most. NHI provides top-notch instructors and course materials, while hosting organizations provide the facilities and equipment.

WHO CAN HOST
Any United States-based organization can host Instructor-led Trainings (ILT), which are taught in classrooms, and/or Web-conference Trainings (WCT), which are taught online.

Our instructors may tailor individual sessions to meet the unique needs and array of experiences of the hosting organization, including covering local issues and topics of special interest. Instructors also may modify case studies and exercises based on their subject matter expertise to make them pertinent to the participant's experiences.

REQUESTING TO HOST
To host a course, domestic customers can go to the NHI Web site and complete the appropriate Host Request form (ILT or WCT). The process takes just a few minutes. First-time users will need to create a user profile and check the INSTRUCTOR/HOST BOX.

If you run into any difficulty when you are logging in, filling out a Host Request form, or navigating the NHI Web site, please contact NHI Customer Service for help at (877) 558-6873 during normal business hours, 7:30am – 4:30pm Eastern time. Customers may also email NHI Customer Service at nhicustomerservice@dot.gov.

To assist the host in preparation for and coordination of the session, a hosting checklist is provided on the NHI Web site. This checklist includes important information about hosting your NHI training session, as well as valuable “best-practice” information based on NHI's 40 years of experience with our hosting partners.

CONFIRMING SESSION DATES/Locations/TIMES
After the Host Request form is received, an Instructor or a member of the NHI team will contact the host to discuss scheduling options. While preferred dates may be specified on the Host Request form, sessions are not official until the hosting organization receives formal confirmation from NHI. Once official, NHI will list the session publicly on its Web site.

Enrollment Options
The host's contact information is listed with the scheduled session. Interested participants from outside the host's organization may contact the host to enroll. Alternatively, the host may ask NHI to open public seats, which allow outside participants to enroll through NHI.

The NHI Scheduler will email all participant information to the host and instructor prior to the session start date.

HOSTING EXPENSES
To host a session, hosts are charged the per-participant price multiplied by the class-size minimum, or the host is charged per participant if the session class size exceeds the minimum. Pricing cannot be reduced if the minimum class size is not met. Therefore, if registration for a course is lower than anticipated, it is important for the host to contact NHI prior to the cancellation period (15 business days) to discuss a remedy. Please note that with sufficient notice, NHI may be able to offer marketing support for the session.

Three seats in every session are reserved for Federal Highway Administration (FHWA) employees until 15 days before the course begins. FHWA participants do not count toward the participant minimum, but should be considered in the course maximum. Hosts are not charged for FHWA personnel or participants who have paid via the NHI Web site. Hosts are not charged for any instructor expenses.

Course hosts may charge participants an additional fee to recover all or part of costs associated with hosting the course. However, we ask hosts to contact the NHI Scheduler at (703) 235-0534 with this information prior to the confirmation of the session.

Course fees, which include the cost of materials for each participant, are listed with every course description.
RECEIVING COURSE MATERIALS
NHI will ship course material to the host approximately three weeks prior to the session start date.

PROVIDING PAYMENT
Payment may be made to NHI by check, money order, or credit card. Checks and money orders must be made payable to the National Highway Institute. To make credit card payments, contact NHI Customer Service at NHICustomerService@dot.gov or 1-877-558-6873. You are not charged for any FHWA participants or for participants who paid via the NHI Web site.

CANCELLATION POLICY/REFUNDS
To avoid incurring the $1,500 cancellation fee, cancellation must be requested no later than 15 business days prior to the course start date. If a course must be cancelled, the host is required to contact NHI Customer Service at 1-877-558-6873 during normal business hours, 7:30AM – 4:30PM Eastern Time, or email NHICustomerService@dot.gov. If the course materials have been sent, the host must contact NHI Customer Service.

In the event of cancellation, it is the host’s responsibility to contact all participants (including those registered for public seats). There must be verification that the registrants received the cancellation notice. Notice to out-of-state participants is especially important so that they may alter or cancel any travel arrangements.

In the case of an emergency or weather-related closing, the cancellation fee will not apply. NHI follows the host office’s policy regarding weather and emergency closings.
RECEIVING COURSE CREDIT
Many of the courses offered at NHI can be used toward obtaining Continuing Education Units (CEUs), Certification Maintenance (CM) credits, and Professional Development Hours (PDHs). Please select the headers below for more information about receiving credits.

CONTINUING EDUCATION UNITS
NHI has been recognized as an Accredited Provider by the International Association for Continuing Education and Training (IACET). In obtaining this accreditation, NHI has demonstrated that it complies with the ANSI/IACET Standard which is recognized internationally as a standard of good practice. As a result of this Accredited Provider status, NHI is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard. IACET is an independent, non-profit association whose goal is to ensure quality continuing education for professionals. For an organization to become an IACET approved CEU Accredited Provider, it must demonstrate that it designs, develops, and delivers training in accordance with proven adult learning theory and recognizes instructional systems design practices. Each course description in the NHI catalog includes the number of CEUs offered upon successful completion of the course.

One CEU is offered for every ten contact hours of training led by a qualified instructor and qualified instruction. In order to be offered CEUs, a course participant must attend 100% of the course and must pass the course examination with a score of 70% or greater.

CEUs are offered to each course participant who fulfills the above stated requirement. NHI will maintain individual training records for seven years for the CEUs offered. Individuals and their employers are also encouraged to maintain their own training records including course name, class date(s), instructor name, class roster, and CEUs offered.

For proof of your CEU record, please contact NHI at NHICustomerService@dot.gov or 1-877-558-6873 and request your official transcript. Your official transcript displays a record of your NHI course history as well as the CEUs offered for each CEU-accredited course. Please allow at least one month after the completion of your course before requesting your official transcript.

CERTIFICATION MAINTENANCE CREDITS
NHI providers Certification Maintenance (CM) credits to assist professional planners become and maintain their membership as certified planners through the American Planning Association (APA).

American Institute of Certified Planners (AICP) is APA’s professional institute. Certified Planners have demonstrated a commitment to high standards of professional practice and a mastery of theories and tools of planning.

NHI recognizes that the certification carries a high mark of distinction and requires planners to meet rigorous standards and maintain their expertise through continuing education. Planners must earn 32 CM continuing education credits every two years in order to stay up to date on the latest trends, technologies, and best practices. NHI courses will now help them achieve that requirement.

CM credits are measured in contact hours, so that 30 minutes of instructional time equals 30 minutes of CM credit (30 minutes contact = 0.5 CM credits; 1.0 contact hours = 1.0 CM credits). An event must be at least 30 minutes in duration to be eligible for CM credit.

Contact NHI Customer Service at NHICustomerService@dot.gov or 877-558-6873 to ask for an official transcript to be used by AICP to calculate CM credits. Please allow at least one month after the completion of your course before requesting your official transcript.

PROFESSIONAL DEVELOPMENT HOURS (PDHs)
NHI does not officially offer PDHs; however, it is possible to receive PDHs for your completed NHI training courses. To receive PDHs, please submit your course certificate (which indicates the contact hours assigned to the course) and/or your official transcript (which indicates the CEUs granted for a course) to the respective licensing agency. Upon consent, the licensing agency may convert your hours and/or CEUs into PDHs and proceed with the PDH awarding process.

PDHs are offered on a ratio of one contact hour to one PDH. When converting from CEU to PDH, please note that one CEU is equal to ten PDHs (or one PDH is equal to one-tenth of a CEU).

To request your official transcript with proof of CEU record and/or contact hours, please contact NHI at NHICustomerService@dot.gov or 1-877-558-6873. Your official transcript displays a record of your NHI course history as well as
the CEUs offered for each CEU-accredited course. Please allow at least one month after the completion of your course before requesting your official transcript.

**NHI CERTIFICATES OF ACCOMPLISHMENT**

NHI’s Certificates of Accomplishment program was designed to recognize individuals who have successfully enhanced their depth and breadth of knowledge and expertise in specific disciplines or topic areas. Students would be eligible for the Certificate of Accomplishment when they have completed and passed a suite of related NHI course offerings. Currently, this program has been put on hold, although it is expected to be re-initiated in the near future.

More Information will be released as soon as it is available.
FREE WEB-CONFERENCE TRAINING

NHI is excited to offer FREE Web-conference training. These trainings save both time and money, while covering the latest topics and techniques within the transportation industry. All transportation professionals in the public and private sectors are invited to participate in these trainings.

REAL SOLUTIONS SEMINAR SERIES

This series of free monthly Webinars features a guest speaker who presents problems or issues faced in the field and what steps were taken to solve them. In some sessions, additional panelists join the guest speaker to further discuss that seminar’s topic.

Some past topics include:
• Best Practices for Integrating Climate Change Considerations in the Transportation Planning Process
• eLearning and Distance Learning within the Transportation Industry
• Smart Corridors and Complete Streets: A Look at Some Situations and Strategies
• Solving Old Traffic Noise Ills: Tennessee Type II Noise Abatement Program

Visit the Real Solutions Seminar Series section of the Web site to register for the next Real Solutions Web conference or to listen to past Web conferences.

LEARN MORE

For more information, please visit the NHI Web site at www.nhi.fhwa.dot.gov. Want to be notified when a free Web conference is scheduled? Email nhimarketing@dot.gov.
COURSE NUMBER
FHWA-NHI-130053

COURSE TITLE
Bridge Inspection Refresher Training

The major goals of this course are to refresh the skills of practicing bridge inspectors in fundamental visual inspection techniques; review the background knowledge necessary to understand how bridges function; communicate issues of national significance relative to the nation’s bridge infrastructures; re-establish proper condition and appraisal rating practices; and review the professional obligations of bridge inspectors.

This course is based on the “Bridge Inspector’s Reference Manual,” 2002 (updated in 2006) with reference to the AASHTO Manual as defined by the National Bridge Inspection Standards regulation.

Core course topics include inspector qualifications and duties, bridge mechanics, record keeping and documentation, fatigue and fracture in steel bridges, traffic safety features, safety, National Bridge Inventory (NBI) component ratings, superstructure type identification, inspection techniques and case studies for decks, superstructures, bearings, substructures, channels and culverts, and a mock bridge inspection classroom exercise.

Optional topics include fiber reinforced polymer, inspection of truss gusset plates, inspection of adjacent box beams, bridge site signing, structure inventory and appraisal overview, common NBI miscodings, element level ratings and timber superstructures.

For this version of the course (3-day), the host agency will need to select three (3) desired optional topics. Course instructors will contact the host prior to the course to complete a pre-course questionnaire, determine optional topics to be taught, and discuss the course schedule.

OUTCOMES

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

• Describe the current overall condition and condition trends for the nation’s bridges
• Identify the recent National Bridge Inspection Standards (NBIS) revisions
• Accurately code National Bridge Inventory (NBI) items
• Identify and document inspection observations using standard methods
• Evaluate defects based on the 2008 AASHTO Manual for Bridge Evaluation
• Code NBI components using the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation’s Bridges
• Determine if overall structure/structural member is fracture critical prone
• Accurately inspect and evaluate a bridge’s four traffic safety features
• List the keys to ensuring a safe work environment
• Explain bridge responses and bridge mechanic principles

TARGET AUDIENCE

The target audience for this course includes Federal, State, and local agencies and private sector personnel employed in inspecting bridges or managing bridge inspection programs. The course is built to accommodate those that have completed comprehensive bridge inspection training (130055 or similar) or met the criteria for a bridge inspector under the State’s procedures or requirements.
TRAINING LEVEL: Intermediate

FEE: 2019: $955 Per Person; 2020: $955 Per Person

LENGTH: 3 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130053A

Course Title
Bridge Inspection Refresher Training

The major goals of this course are to refresh the skills of practicing bridge inspectors in fundamental visual inspection techniques; review the background knowledge necessary to understand how bridges function; communicate issues of national significance relative to the nations’ bridge infrastructures; re-establish proper condition and appraisal rating practices; and review the professional obligations of bridge inspectors.

This course is based on the “Bridge Inspector’s Reference Manual,” 2002 (updated in 2006) with reference to the AASHTO Manual as defined by the National Bridge Inspection Standards regulation.

Core course topics include inspector qualifications and duties, bridge mechanics, record keeping and documentation, fatigue and fracture in steel bridges, traffic safety features, safety, National Bridge Inventory (NBI) component ratings, superstructure type identification, inspection techniques and case studies for decks, superstructures, bearings, substructures, channels and culverts, and two (2) mock bridge inspection classroom exercises.

Optional topics include fiber reinforced polymer, inspection of truss gusset plates, inspection of adjacent box beams, bridge site signing, structure inventory and appraisal overview, common NBI miscodings, element level ratings and timber superstructures.

For this version of the course (3.5-day), the host agency will need to select six to seven (6-7) desired optional topics. Course instructors will contact the host prior to the course to complete a pre-course questionnaire, determine optional topics to be taught, and discuss the course schedule.

Outcomes
Upon completion of the course, participants will be able to:
• Describe the current overall condition and condition trends for the nation’s bridges
• Identify the recent National Bridge Inspection Standards (NBIS) revisions
• Accurately code National Bridge Inventory (NBI) items
• Identify and document inspection observations using standard methods
• Evaluate defects based on the 2008 AASHTO Manual for Bridge Evaluation
• Code NBI components using the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation’s Bridges
• Determine if overall structure/structural member is fracture critical prone
• Accurately inspect and evaluate a bridge’s four traffic safety features
• List the keys to ensuring a safe work environment
• Explain bridge responses and bridge mechanic principles

Target Audience
The target audience for this course includes Federal, State, and local agencies and private sector personnel employed in inspecting bridges or managing bridge inspection programs. The course is built to accommodate those that have completed comprehensive bridge inspection training (130055 or similar) or met the criteria for a bridge inspector under the State’s procedures or requirements.
TRAINING LEVEL: Intermediate

FEE: 2019: $975 Per Person; 2020: $975 Per Person

LENGTH: 3.5 DAYS (CEU: 2.2 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130054

Course Title
Engineering Concepts for Bridge Inspectors

This course was updated in 2010 and provides knowledge of the elementary concepts in bridge engineering for individuals involved with the inspection of in-service highway bridges. The course covers the purpose of highway bridge inspections and the roles of inspectors through the discussion of common bridge types and materials, material properties, and bridge components as well as details, loadings, stresses, strains, and deterioration of bridge materials and members. Participants will be asked to complete an exam at the end of the course, which they must earn a 70% or better on to successfully complete the course and receive a certificate of completion.

This course prepares participants for the 2-week, intensive Instructor-led course in bridge inspection, 130055 Safety Inspection of In-Service Bridges. Upon successful completion of 130054, participants will have met the prerequisite requirement for participation in the 130055 course.* If participants would like to enroll in the 130055 course, they will be required to demonstrate their certificate of completion for 130054 as proof that the prerequisite requirement has been fulfilled.

Participation in 130054 is not the only option to fulfill the prerequisite requirement for 130055.* Individuals have the option to 1) successfully complete the Web-based training and assessment (130101 Introduction to Safety of In-Service Bridges) or 2) for those with engineering backgrounds or prior knowledge and experience in the field of bridge inspection may “test-out” through a Web-based assessment (130101A Introduction to Safety Inspection of In-Service Bridges).

*Please note: Upon successful completion of this prerequisite course, you will be eligible to take the 130055 training course for up to 2 years.

Outcomes
Upon completion of the course, participants will be able to:
• Describe the basis for bridge inspection
• Describe the various roles of the bridge inspection team
• Identify common bridge types and major components, primary members, secondary members and features of highway bridges
• Name the common materials used in bridges
• Describe the basic properties, strengths, and weaknesses of each material
• Describe basic engineering concepts
• Describe standard highway bridge loadings
• Describe the types, signs, and causes of structural distress
• Identify other features associated with bridges
• Name protective measures required to mitigate hazards

Target Audience
This course is designed for Federal, State, and local technicians and inspectors who have limited experience with the inspection of in-service highway bridges. Engineers without bridge experience or those who need a refresher in basic bridge design concepts will also benefit from the course. Individuals completing this course could serve on a bridge inspection team, but would require additional experience and training to qualify as team leaders.
TRAINING LEVEL: Basic

FEE: 2019: $1175 Per Person; 2020: $1175 Per Person

LENGTH: 5 DAYS (CEU: 3 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130055

Course Title
Safety Inspection of In-Service Bridges

NOTE: This course was updated in 2012 and 2015 and now contains mandatory prerequisite requirements for participants and host requirements in preparation for the field exercises. See details below.

This course is based on the 2015 FHWA “Bridge Inspector’s Reference Manual (BIRM)” and provides training on the safety inspection of in-service highway bridges. The course includes two virtual bridge inspection exercises* facilitated using NHI’s virtual bridge inspection (VBI) computer-based training (CBT) technology; instruction on critical findings, their identification and response; curriculum on the American Association of State Highway and Transportation Officials (AASHTO) element level inspection approach using the 2013 AASHTO Manual for Bridge Element Inspection 2015 Interim Revisions; and activities that maximize participant engagement throughout the course. This course does not go into depth on fracture critical, underwater, or complex bridge inspections. Other specialty courses, 130078 Fracture Critical Inspection Techniques for Steel Bridges and 130091 Underwater Bridge Inspection, cover these topics.

Participants will be asked to complete mid-term and end-of-course assessments each with a cumulative score of 70% or better to successfully complete the course and receive a certificate of completion. The sponsoring agency/State may monitor the examinations and retain the scores to qualify or certify bridge inspectors. Satisfactory completion of this course will fulfill the comprehensive bridge inspection training requirements of the National Bridge Inspection Standards. Note: Many States have additional requirements to become a bridge inspection team leader.

Participant Prerequisite Requirement: ALL participants must have met one of the three prerequisite requirements for participation in this course** and bring a course completion certificate bearing their name to the first day of the class. The passing score for all prerequisites is 70% or better. Individuals have the option to complete one of the following three prerequisite requirements: 1) 130054 Engineering Concepts for Bridge Inspectors, a 5-day Instructor-led course; 2) 130101 Introduction to Safety Inspection of In-Service Bridges, a 14-hour Web-based training and assessment; or 3) 130101a Prerequisite Assessment for Safety Inspection of In-Service Bridges, a Web-based assessment.

Host Requirements: Hosts must provide a training room large enough to accommodate at least 30 participants as well as the 15 NHI virtual bridge laptops (provided by NHI Instructors) that will be used for the virtual bridge exercises. Additionally, the host must ensure that ALL students have successfully met the prerequisite requirement** and have a valid course completion certificate for one of the three prerequisite options.

*Alternatively, the State can exercise the option to request to have a physical field trip in lieu of one or both virtual bridge exercises. If this option is exercised, the host/sponsoring agency is required to provide transportation for course participants to attend the field trip portion of this course at the host/sponsoring agency’s own expense. The host must coordinate with the instructor to identify bridges for inspection during the field trip exercises, in advance of the course delivery.

**Please note: prerequisite must be completed within two years of the course start date. Additionally, it is recommended that prior to attending this course participants spend some time in the field, at bridge inspection sites, but not required.

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

• Discuss the duties and responsibilities of a bridge inspector and define inspection concepts including personal and public safety issues associated with bridge inspections

• List the inspection equipment needs for various types of bridges and site conditions

• Describe, identify, evaluate, and document the various components and deficiencies that can exist on bridge components and elements

• List design characteristics and describe inspection methods and locations for common concrete, steel, and timber structures

• Identify and evaluate the various culvert and waterway deficiencies

• Discuss the need to inspect underwater portions of bridges

• Describe nondestructive evaluation methods for basic bridge materials

• Demonstrate how to field inspect and evaluate common concrete, steel, and timber bridges

Target Audience
Federal, State, and local highway agency employees; and consultants involved in inspecting bridges or in bridge inspection management and leadership positions. A background in bridge engineering is strongly recommended. All participants must successfully complete (score 70% or better) one of the following three prerequisite requirements within two years prior to attending this training: 1) 130054 Engineering Concepts for Bridge Inspectors; 2) 130101 Introduction to Safety Inspection of In-Service Bridges; or 3) 130101a Prerequisite Assessment for Safety Inspection of In-Service Bridges.

**Training Level:** Intermediate

**Fee:** 2019: $2150 Per Person; 2020: $2150 Per Person

**Length:** 10 DAYS (CEU: 6.7 UNITS)

**Class Size:** MINIMUM: 20; MAXIMUM: 30

**NHI Customer Service:** (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130056

Course Title
Safety Inspection of In-Service Bridges for Professional Engineers

In accordance with the National Bridge Inspection Standards (NBIS), a Bridge Inspector must successfully complete an FHWA-approved comprehensive training to become a certified Bridge Inspection Team Leader, or Program Manager. This FHWA-approved course, intended for Professional Engineers (PEs), is based on the “Bridge Inspector’s Reference Manual” (BIRM) and provides training on the safety inspection of in-service highway bridges. It has been streamlined to better suit experienced Professional Engineers, while retaining strong emphasis on bridge inspection, documentation, and coding requirements. The course is a 5-day adaptation of FHWA-NHI 130055 training course and includes one virtual bridge inspection trip (VBI) or bridge inspection field trip; new instruction on critical findings, their identification and response; curriculum on the new AASHTO Element level evaluation; and updated activities that maximize participant engagement throughout the course. This course does not go into depth on stream stability and scour or fracture critical, underwater, or complex bridge inspections. NHI does have other specialty courses in stream stability and scour (FHWA-NHI-135047) fracture critical inspection (FHWA-NHI-130078) and underwater safety inspection (FHWA-NHI-130091).

Participant Prerequisite Requirement: ALL participants must be certified professional engineers (PE) showing evidence of such certification upon arrival at the course, have met one of the three prerequisite requirements for participation in the FHWA-NHI-130056 course* and bring a course completion certificate bearing their name to the first day of the NHI-FHWA-130056 session. The passing score for all prerequisites is 70% or better. Individuals have the option to complete one of the three prerequisite requirements: 1) Engineering Concepts for Bridge Inspectors (FHWA-NHI-130054), five-day instructor-led course; 2) Introduction to Safety Inspection of In-Service Bridges (FHWA-NHI-130101), 14-hour, Web-based training and assessment; and/or 3) Prerequisite Assessment for Safety Inspection of In-Service Bridges (FHWA-NHI-130101a), Web-based assessment.

Host Requirement: The host/sponsoring agency is required to provide transportation for course participants to attend the field trip portion of this course at the host/sponsoring agency’s own expense if the VBI option is not chosen. Please coordinate with the instructor on the timing of the field trip. Additionally, the host must ensure that ALL students have successfully met the prerequisite requirements*, are certified Professional Engineers, and have a valid course completion certificate for one of the three prerequisite options.

*Please note: prerequisite must be completed within within the last 2 years prior to the FHWA-NHI-130056 session start date.

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

- Describe the importance of bridge inspection
- Define the fundamental bridge inspection concepts
- Describe the basic bridge materials
- Identify and discuss mitigation strategies for personal and public safety issues associated with bridge inspections
- List the inspection equipment needs for various types of bridges and site conditions
- Describe the various components of bridge inspection reporting
- Identify, evaluate, and document the various deficiencies that can exist on bridge decks
- List design characteristics of common concrete superstructures
- Describe inspection methods and locations for common concrete superstructures
- Identify and evaluate the various bridge bearing, substructure, and waterway deficiencies
- Discuss the need to inspect underwater portions of bridges
- Describe nondestructive evaluation methods for the three basic bridge materials
- Demonstrate how to field inspect and evaluate a common concrete bridge
- List design characteristics of common steel superstructures
- Describe inspection methods and locations for common steel superstructures
• Identify and evaluate the various culvert deficiencies
• Demonstrate how to field inspect and evaluate a common steel bridge
• List design characteristics of common timber superstructures

TARGET AUDIENCE
The target audience for this course are Federal, State, and local highway agency employees; and consultants with a Professional Engineer (PE) designation that are involved in inspecting bridges or in bridge inspection management and leadership positions. A background in bridge engineering is strongly recommended. All participants must successfully complete (score 70% or better) one of the following three prerequisite requirements within two years prior to attending this training: 1) 130054 Engineering Concepts for Bridge Inspectors; 2) 130101 Introduction to Safety Inspection of In-Service Bridges; or 3) 130101a Prerequisite Assessment for Safety Inspection of In-Service Bridges.

TRAINING LEVEL: Intermediate

FEE: 2019: $1200 Per Person; 2020: $1200 Per Person
LENGTH: 5 DAYS (CEU: 3.4 UNITS)
CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130078

Course Title
Fracture Critical Inspection Techniques for Steel Bridges

The course curriculum for this training reflects current practices, while addressing new and emerging technologies available to bridge inspectors. In addition, the course features exemplary training: hands-on workshops for popular types of nondestructive evaluation (NDE) equipment; and a case study of an inspection plan for a fracture critical bridge.

The first day of the training focuses on the concept of fracture critical members (FCMs), FCM identification, failure mechanics, fatigue in metal, and an overview of NDE methods. Day two includes demonstration sessions and hands-on applications of NDE techniques for dye penetrant, magnetic particle testing, Eddy current testing, and ultrasonic testing.

Days three and four emphasize inspection procedures and reporting for common FCMs, including problematic details, I-girders, floor beams, trusses, box girders, pin and hanger assemblies, arch ties, eyebars, and cross girders/pier caps.

The course will conclude with a case study detailing the preparation of an inspection plan of a fracture critical bridge. Additionally, the course instructors will tailor discussions of topics based on State needs and requirements.

"This training will help inspectors evaluate bridges more thoroughly and will provide them with additional knowledge in how structures work and what can take place when they don’t work," states Bill Drosehn, district bridge inspection engineer for the Massachusetts DOT.

Note: Hosts are required to provide safety goggles for all course participants as well as a well-ventilated space for conducting the dye penetrant demonstration.

Outcomes
Upon completion of the course, participants will be able to:
• Identify fracture critical members (FCMs)
• Identify problematic details
• Identify areas most susceptible to fatigue and fracture
• Record defects
• Evaluate defects
• Evaluate nondestructive evaluation (NDE) methods
• Evaluate retrofit details

Target Audience
Those who will benefit most from this training are public and private sector bridge inspectors, supervisors, project engineers, and others responsible for field inspection of fracture critical steel bridge members. Prior to taking this course, participants should have completed NHI course 130055, Safety Inspection of In-Service Bridges, or possess equivalent field experience relative to bridges. Participants also should have a thorough understanding of bridge mechanics and bridge safety inspection procedures as required by the National Bridge Inspection Standards.

Training Level: Intermediate

Fee: 2019: $1030 Per Person; 2020: $1030 Per Person
Length: 3.5 Days (CEU: 2.5 Units)
Class Size: Minimum: 20; Maximum: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130081

Course Title
LRFD for Highway Bridge Superstructures - (4-Day ILT)

This updated course describes Load and Resistance Factor Design (LRFD) for steel and concrete highway bridge superstructures. It provides a combination of instructor-led discussions and workshop exercises. The course also includes LRFD theory applied to design examples and illustrates step-by-step LRFD design procedures. The curriculum follows the AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014 (AASHTO LRFD), including the approved 2015 Interims. The training includes the extensive use of student exercises and example problems to demonstrate overall design, detailing, and construction principles addressed in the reference materials. It affords hands-on experience in LRFD design and detailing of highway bridge superstructures. The curriculum materials are comprised of a comprehensive reference manual (FHWA Publication No. FHWA-NHI-15-047), lecture and workshop exercises intended to promote or enhance a working knowledge of AASHTO LRFD, and a participant workbook for lecture notes and exercises.

The curriculum includes the following major topics:
- General superstructure design considerations
- Preliminary design concepts for steel I-girder superstructures
- Steel I-girder design
- Preliminary design concepts for prestressed concrete superstructures
- Prestressed concrete I-girder design
- Spliced prestressed concrete girder bridges

Outcomes
Upon completion of the course, participants will be able to:
- Describe the bridge superstructure design and construction process in accordance with the current AASHTO LRFD specifications.
- Apply the appropriate current AASHTO LRFD specification articles dealing with selection of bridge type, size, and location.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge economics.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge materials.
- Describe the appropriate current AASHTO LRFD specification articles dealing with evolution of bridge design codes.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge loads and load combinations.
- Apply the appropriate current AASHTO LRFD specification articles dealing with structural analysis.
- Apply the appropriate current AASHTO LRFD specification articles dealing with concrete bridge superstructure design.
- Apply the appropriate current AASHTO LRFD specification articles dealing with steel bridge superstructure design.
- Demonstrate the use of the current AASHTO LRFD specification requirements for superstructure design through the completion of step-by-step procedures, participant exercises, and design examples.

Target Audience
This course has been developed for the needs of practicing public and private sector structural engineers with one to ten years of experience. The primary audience is Agency and consultant structural designers. Pre-training Competencies: Individuals attending this course should have a minimum BSCE degree and should complete the Web-based Training Course NHI-130081P prior to the first day of class. They should also have a working knowledge of the current AASHTO LRFD and should have relevant design experience using this specification on at least one bridge superstructure.
TRAINING LEVEL: Intermediate

FEE: 2019: $1125 Per Person; 2020: $1125 Per Person

LENGTH: 4 DAYS (CEU: 2.5 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130081A

Course Title
LRFD for Highway Bridge Superstructures (2-day Steel ILT)

This updated course describes Load and Resistance Factor Design (LRFD) for steel highway bridge superstructures. It provides a combination of instructor-led discussions and workshop exercises. The course also includes LRFD theory applied to design examples and illustrates step-by-step LRFD design procedures. The curriculum follows the AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014 (AASHTO LRFD), including the approved 2015 Interims.

The training includes the extensive use of student exercises and example problems to demonstrate overall design, detailing, and construction principles addressed in the reference materials. It affords hands-on experience in LRFD design and detailing of steel highway bridge superstructures.

The curriculum materials are comprised of a comprehensive reference manual (FHWA Publication No. FHWA-NHI-15-047), lecture and workshop exercises intended to promote or enhance a working knowledge of AASHTO LRFD, and a participant workbook for lecture notes and exercises.

The curriculum material includes the following major topics:
* General superstructure design considerations
* Preliminary design concepts for steel I-girder superstructures
* Steel I-girder design

Outcomes

Upon completion of the course, participants will be able to:
- Describe the bridge superstructure design and construction process in accordance with the current AASHTO LRFD specifications.
- Apply the appropriate current AASHTO LRFD specification articles dealing with selection of bridge type, size, and location.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge economics.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge materials.
- Describe the appropriate current AASHTO LRFD specification articles dealing with evolution of bridge design codes.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge loads and load combinations.
- Apply the appropriate current AASHTO LRFD specification articles dealing with structural analysis.
- Apply the appropriate current AASHTO LRFD specification articles dealing with steel bridge superstructure design.
- Demonstrate the use of the current AASHTO LRFD specification requirements for superstructure design through the completion of step-by-step procedures, participant exercises, and design examples.

Target Audience

This course has been developed for the needs of practicing public and private sector structural engineers with one to ten years of experience. The primary audience is Agency and consultant structural designers. Pre-training Competencies: Individuals attending this course should have a minimum BSCE degree and should complete the Web Based Training Course NHI-130081P prior to the first day of class. They should also have a working knowledge of the current AASHTO LRFD and should have relevant design experience using this specification on at least one bridge superstructure.
**TRAINING LEVEL:** Intermediate

**FEE:** 2019: $850 Per Person; 2020: $850 Per Person

**LENGTH:** 2 DAYS (CEU: 1.3 UNITS)

**CLASS SIZE:** MINIMUM: 20; MAXIMUM: 40

**NHI Customer Service:** (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130081B

Course Title
LRFD for Highway Bridge Superstructures (2-day Concrete ILT)

This updated course describes Load and Resistance Factor Design (LRFD) for concrete highway bridge superstructures. It provides a combination of instructor-led discussions and workshop exercises. The course also includes LRFD theory applied to design examples and illustrates step-by-step LRFD design procedures. The curriculum follows the AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014 (AASHTO LRFD), including the approved 2015 Interims.

The training includes the extensive use of student exercises and example problems to demonstrate overall design, detailing, and construction principles addressed in the reference materials. It affords hands-on experience in LRFD design and detailing of concrete highway bridge superstructures.

The curriculum materials are comprised of a comprehensive reference manual (FHWA Publication No. FHWA-NHI-15-047), lecture and workshop exercises intended to promote or enhance a working knowledge of AASHTO LRFD, and a participant workbook for lecture notes and exercises.

The curriculum material includes the following major topics:
* General superstructure design considerations
* Preliminary design concepts for prestressed concrete superstructures
* Prestressed concrete I-girder design
* Spliced prestressed concrete girder bridges

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

- Describe the bridge superstructure design and construction process in accordance with the current AASHTO LRFD specifications.
- Apply the appropriate current AASHTO LRFD specification articles dealing with selection of bridge type, size, and location.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge economics.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge materials.
- Describe the appropriate current AASHTO LRFD specification articles dealing with evolution of bridge design codes.
- Apply the appropriate current AASHTO LRFD specification articles dealing with bridge loads and load combinations.
- Apply the appropriate current AASHTO LRFD specification articles dealing with structural analysis.
- Apply the appropriate current AASHTO LRFD specification articles dealing with concrete bridge superstructure design.
- Demonstrate the use of the current AASHTO LRFD specification requirements for superstructure design through the completion of step-by-step procedures, participant exercises, and design examples.

Target Audience
This course has been developed for the needs of practicing public and private sector structural engineers with one to ten years of experience. The primary audience is Agency and consultant structural designers. Pre-training Competencies: Individuals attending this course should have a minimum BSCE degree and should complete the Web Based Training Course NHI-130081P prior to the first day of class. They should also have a working knowledge of the current AASHTO LRFD and should have relevant design experience using this specification on at least one bridge superstructure.
TRAINING LEVEL: Intermediate

FEE: 2019: $850 Per Person; 2020: $850 Per Person

LENGTH: 2 DAYS (CEU: 1.3 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 40

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130087

COURSE TITLE
Inspection and Maintenance of Ancillary Highway Structures
This course provides training in the inspection and maintenance of ancillary structures, such as structural supports for highway signs, luminaries, and traffic signals. Its goal is to provide agencies with information to aid in establishing and conducting an inspection program in accordance with the FHWA “Guidelines for the Installation, Inspection, Maintenance, and Repair of Structural Supports for Highway Signs, Luminaries, and Traffic Signals.”

OUTCOMES
Upon completion of the course, participants will be able to:
• List and identify common visible weld defects
• Identify appropriate nondestructive testing techniques
• Identify factors that lead to corrosion and explain mitigation methods used in ancillary structures
• Define the severity of observed defects in accordance with the FHWA guidelines
• Identify defects in base/anchor rod installations
• List key issues in construction inspection of ancillary structures
• Identify repair techniques and discuss their use

TARGET AUDIENCE
Structural engineers, material engineers, traffic engineers, field inspectors, construction supervisors, maintenance personnel, and other technical personnel involved in the installation, inspection, maintenance, and repair of ancillary highway structures. This course is not a design course; however, the information should be helpful to those working in design and specification of ancillary structures.

TRAINING LEVEL: Basic

FEE: 2019: $775 Per Person; 2020: $775 Per Person
LENGTH: 2 DAYS (CEU: 1.1 UNITS)
CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130091

COURSE TITLE
Underwater Bridge Inspection

The latest changes to the National Bridge Inspection Standards (NBIS), which became effective January 13, 2005, require FHWA-approved bridge inspection training for all divers conducting underwater inspections. One method of meeting this requirement is the completion of an FHWA-approved underwater diver bridge inspection training course. Satisfactory completion of this 4-day course will fulfill the NBIS requirement.

This course provides an overview of diving operations that will be useful to agency personnel responsible for managing underwater bridge inspections.

Course topics include: methods of underwater inspection, underwater material deterioration mechanisms and inspection techniques, scour inspection techniques, underwater element-level rating, and underwater bridge inspection training. A final examination based on course content will be administered to participants.

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

• Explain the need and benefits of inspecting the underwater portions of bridge structures
• Describe typical underwater defects and deterioration, and identify conditions contributing to rates of deterioration
• Identify the types of inspection equipment available, and the advantages and limitations of each
• Identify procedures for planning and performing thorough and safe underwater bridge inspections
• Assign component and element level condition ratings for underwater components in accordance with NBIS and agency requirements

TARGET AUDIENCE
The course is intended for trained divers who require a knowledge base of underwater bridge inspection and evaluation techniques in order to meet the educational requirements of the NBIS for underwater bridge inspection training. The course would also be of interest to non-diver bridge inspectors, and FHWA, state, and local agency structural engineers.

TRAINING LEVEL: Basic

FEE: 2019: $1000 Per Person; 2020: $1000 Per Person
LENGTH: 4 DAYS (CEU: 2.4 UNITS)
CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130091B

Course Title
Underwater Bridge Repair, Rehabilitation, and Countermeasures

Underwater Bridge Repair, Rehabilitation, and Countermeasures is a two-day course that will provide training to design engineers, construction inspectors, resident engineers and inspection divers in techniques for selecting and executing repairs to below water bridge elements. The primary goal of this course is to enable design engineers to select, design, and specify appropriate and durable repairs to below water bridge elements. A secondary goal of this course is to train staff in effective construction inspection of below water repairs. This course may be presented as a follow-up to NHI Course No. 130091A, Underwater Bridge Inspections.

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

• Determine whether below water repairs can be completed “in the wet”, or require a cofferdam (or similar).
• Describe typical environmental constraints to performing repairs below water.
• Describe three methods of achieving a dry construction site within a body of water.
• List three attributes of good concrete repair mix designs.
• Describe the differences between flexible and rigid concrete forming systems.
• Describe underwater concrete placement techniques.
• Write installation procedures for pile jackets.
• Describe three methods for repair of pier scour.
• Describe the benefits of cathodic protection for bridge substructures.
• Describe four stages of underwater repair activities for underwater construction inspection.

Target Audience
The course is intended for design engineers, construction inspectors, resident engineers and inspection divers who may be engaged in the design, specifications or inspection of repairs to bridge elements located in and below water. The course may be of interest to contract administrators responsible for bridge repair or rehabilitation projects. It is expected that participants will have a working knowledge of bridge terminology, construction materials, and traditional repair techniques. Participants may also have backgrounds in bridge maintenance, repair, or construction. The audience will include persons with a range of education and technical backgrounds.

Training Level: Basic

Fee: 2019: $750 Per Person; 2020: $750 Per Person
Length: 2 DAYS (CEU: 1.4 UNITS)
Class Size: Minimum: 20; Maximum: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130092

COURSE TITLE
Fundamentals of LRFR and Applications of LRFR for Bridge Superstructures

This course provides novice and experienced bridge engineers with the fundamental knowledge necessary to apply the most recent AASHTO LRFR Specifications to bridge ratings. This course introduces participants to applications of LRFR specifications that can be used to enhance bridge safety and to identify and discuss the steps to ensure successful transition to this new state-of-the-art methodology.

Load Rating of Concrete and Steel Superstructure Bridges will provide participants with in-depth training in evaluating reinforced and prestressed concrete bridges and steel bridges using LRFR methodology. This course will illustrate the use of the current AASHTO evaluation specifications and state-of-the-art evaluation methods with step-by-step examples.

OUTCOMES
Upon completion of the course, participants will be able to:
• Describe the purpose of performing a load rating
• Identify the benefits of the LRFR methodology
• Demonstrate the LRFR process and the general load rating equations
• Explain legal loads and their use in load rating
• Determine distribution factors for load rating
• State the LRFR limit states
• Select evaluation factors for rating
• Describe the process for load posting and importance of load posting
• Describe the procedure for checking overload permits
• Demonstrate the application of LRFR requirements by completing load rating exercises
• Identify material deteriorations that affect load capacity of bridge components
• Calculate the flexural resistances of a prestressed concrete girder for load rating
• Calculate the shear resistance of a prestressed concrete girder for load rating
• Apply the load rating procedures for concrete slab bridges
• Calculate the flexural and shear resistance of a steel I-girder bridge for load rating
• Evaluate fatigue for load rating a steel girder bridge
• Apply LRFR requirements by completing load rating exercises

TARGET AUDIENCE
Bridge engineers with 0-20 years of experience.

TRAINING LEVEL: Basic

FEE: 2019: $1350 Per Person; 2020: $1350 Per Person

LENGTH: 4 DAYS (CEU: 2.4 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 40

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130092A

Course Title
Load and Resistance Factor Rating for Highway Bridges
This course provides novice and experienced bridge engineers with the fundamental knowledge necessary to apply the most recent AASHTO Load and Resistance Factor Rating (LRFR) Specifications to bridge load rating.

Outcomes
Upon completion of the course, participants will be able to:
• Describe the purpose of performing a load rating
• Identify the benefits of the LRFR methodology
• Demonstrate the LRFR process and the general load rating equations
• Explain legal loads and their use in load rating
• Determine distribution factors for load rating
• State the LRFR limit states
• Select evaluation factors for rating
• Describe the process for load posting and importance of load posting
• Describe the procedure for checking overload permits
• Demonstrate the application of LRFR requirements by completing load rating exercises

Target Audience
Bridge engineers with 0-20 years of experience.

Training Level: Basic

Fee: 2019: $975 Per Person; 2020: $975 Per Person

Length: 2 DAYS (CEU: 1.2 UNITS)

Class Size: Minimum: 20; Maximum: 40

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130092B

COURSE TITLE
Applications of LRFR for Bridge Superstructures

This course provides novice and experienced bridge engineers with the fundamental knowledge necessary to apply the most recent AASHTO LRFR Specifications to bridge ratings. This course introduces participants to applications of LRFR specifications that can be used to enhance bridge safety and to identify and discuss the steps to ensure successful transition to this new state-of-the-art methodology.

This 2-day course (130092B) is the second half of the 4-day 130092 course.

OUTCOMES
Upon completion of the course, participants will be able to:
• Demonstrate the application of LRFR requirements by completing load rating exercises
• Identify material deteriorations that affect load capacity of bridge components
• Calculate the flexural resistances of a prestressed concrete girder for load rating
• Calculate the shear resistance of a prestressed concrete girder for load rating
• Apply the load rating procedures for concrete slab bridges
• Calculate the flexural and shear resistance of a steel I-girder bridge for load rating
• Evaluate fatigue for load rating a steel girder bridge
• Apply LRFR requirements by completing load rating exercises

TARGET AUDIENCE
Bridge engineers with 0-20 years of experience.

TRAINING LEVEL: Basic

FEE: 2019: $975 Per Person; 2020: $975 Per Person

LENGTH: 2 DAYS (CEU: 1.1 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 40

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130093

Course Title
LRFD Seismic Analysis and Design of Bridges

This course is a comprehensive and practical training course that addresses the requirements and recommendations of the seismic provisions in both the AASHTO LRFD Bridge Design Specifications and the AASHTO Guide Specifications for LRFD Seismic Bridge Design. The course reviews the fundamental principles of seismic design including engineering seismology, seismic and geotechnical hazards, and methods for modeling and analyzing bridges subject to earthquake ground motions. The course also discusses seismic capacity design methods of piers, foundations, superstructures and connections. Additionally, the course presents the principles and pros and cons of common seismic isolation techniques, typical isolation hardware, and construction and testing requirements consistent with the recently updated AASHTO Guide Specifications for Seismic Isolation Design. Lastly, the final lesson of the course addresses screening, evaluation, and selection of retrofit strategies and measures following closely to the philosophy and process described in the FHWA Seismic Retrofitting Manual for Highway Structures.

Outcomes
Upon completion of the course, participants will be able to:
• Identify geotechnical hazards and their impact on structural design
• Discuss what Earthquake Resisting Elements (ERE) are and explain why some are preferred and why some are not
• List three Describe the essential parts of the capacity design process
• Describe strategies for protecting bridge superstructures and methods for accommodating lateral displacements
• List the steps of foundation seismic design
• Describe the seismic analysis and design process in accordance with the AASHTO LRFD Bridge Design Specifications (LS) and AASHTO Seismic Guide Specifications (GS).
• Develop design response spectrum
• Describe common processes embedded in both the LS and GS and explain the key differences between the Force-Based (LS) and Displacement-Based (GS) Methods.
• Describe the key difference between the LS and GS seismic design methods
• List basic purposes, component and testing requirements for a seismic isolation system
• Describe common retrofitting measures for bridge superstructures, columns and foundations

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, hands-on student exercises, and demonstrations.

Training Level: Intermediate

Fee: 2019: $1325 Per Person; 2020: $1325 Per Person
Length: 5 DAYS (CEU: 3 UNITS)
Class Size: Minimum: 20; Maximum: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
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: 2019: $925 Per Person; 2020: $925 Per Person

LENGTH: 3 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130096

Course Title
Cable-Stayed Bridge Seminar

The National Highway Institute’s (NHI) one-day Cable-Stayed Signature Bridge Seminar is intended to provide participants with an introduction to planning, design, and construction of long-span, cable-stayed bridges. The seminar provides an overview of the features of cable-stayed bridges; their construction and maintenance considerations; and analyses needed to design these highly redundant structures including special aerodynamic studies.

This seminar will engage participants through Instructor-led presentations, discussions, Q&A, group activities, and walkthrough examples. Participants will review a case study to help them understand how the curriculum can be applied to making basic design decisions. Major topics covered include: bridge configurations, construction methodology, component details, analysis, aerodynamics, design methodology, construction engineering, and maintenance and inspection. As part of the seminar, participants will receive a copy of FHWA Design Guidelines for the Arch and Cable-Supported Signature Bridges.

As a result of the seminar, participants will become familiar with the features of, construction and maintenance considerations; and analyses needed to design cable-stayed bridges.

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

• Describe the benefits of the cable-stayed bridge as a structure type over other alternatives
• Identify possible span and cable arrangements
• Compare steel, concrete or composite superstructure types
• Select possible pylon shape
• Define the general approaches for erecting steel and concrete cable-stayed bridges
• Define the roles and responsibilities of the owner, contractor and construction engineer
• Identify the needs for aerodynamics studies, testing and evaluation, and discuss practical solutions to mitigate wind effects

Target Audience
The primary target audience includes bridge engineers with 10 to 30 years of experience.

Training Level: Basic

Fee: 2019: $650 Per Person; 2020: $650 Per Person

Length: 1 DAYS (CEU: .6 UNITS)

Class Size: Minimum: 20; Maximum: 30

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

FHWA-NHI-130099A

Course Title

Bridge Inspection Nondestructive Evaluation Seminar (BINS)

The FHWA Office of Infrastructure R&D, in cooperation with the FHWA Office of Bridge Technology and the FHWA Resource Center, has identified a need for training in select nondestructive evaluation (NDE) methods that can be used to assess existing conditions on highway bridge structures during routine inspections. These NDE methods can also be used to supplement visual inspections of highway bridge structures.

The Bridge Inspector Nondestructive Evaluation Seminar (BINS) is a two-day course which provides bridge inspectors and managers the ability to learn about the latest in commercially available nondestructive tools and systems for use on bridges. The seminar is presented through a series of slides, instructional videos, and video demonstrations showing basic operation of the equipment. The training has been fully developed in conjunction with the FHWA's NDE Validation Center and is delivered by qualified instructors experienced in using NDE equipment on bridges.

This seminar is designed to provide bridge inspection staff the opportunity to view efficient and effective inspection tools and techniques with the ultimate goal of achieving safer bridges through more reliable bridge inspections. The following NDE methods are discussed: Eddy Current, Ultrasonic Testing, Infrared Thermography, Impact Echo, Ultrasonic Surface Waves, Ground Penetrating Radar, Acoustic Emission, Magnetic Particle, Radiographic, Pulse Velocity, Pulse Echo, Pachometers, Physical Sounding Methods, and Electrical Methods. Additionally, other commonly used equipment will be briefly introduced with basic information provided about attributes in an easy to use reference table and select extra information in the appendix.

Outcomes

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

• Summarize the National Bridge Inspection Program (NBIP) expectations as they relate to NDE
• Compare the various stress wave NDE methods as used in steel bridge inspection
• Demonstrate understanding of stress wave and electromagnetic methods by choosing applicable NDE methods for specific defects
• Summarize how NDE was used to assist decision makers in the repair of the Sherman Minton Bridge
• Restate the theories, applications, advantages and limitations of various NDE testing methods
• Compare the theories and applications of various acoustic stress wave testing methods for concrete and timber inspections
• Demonstrate an understanding of electromagnetic and electric NDE methods in bridge inspection programs
• Summarize feasible methods used to evaluate the deck on the Arlington Memorial Bridge (AMB)

Target Audience

The primary target audience for the Bridge Inspection Non-Destructive Evaluation Seminar (BINS) course is federal, state, and local highway bridge inspectors, bridge management staff, and consultants. Individuals involved in material testing, as well as transportation structure design and construction, will find the information useful to ensure quality. Prior to taking this course, participants should have a broad basic knowledge of physics and engineering principles, a knowledge of the basic bridge inspection fundamentals, a background in bridge engineering or completion of NHI course FHWA-NHI-130054 Engineering Concepts for Bridge Inspectors (strongly recommended), and experience with bridge inspection.
**Training Level:** Basic

**Fee:** 2019: $760 Per Person; 2020: $760 Per Person

**Length:** 2 Days (CEU: 1.3 Units)

**Class Size:** Minimum: 20; Maximum: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130102

Course Title
Engineering for Structural Stability in Bridge Construction (2.5 Day)

The objective of this course is to train participants on the behavior of steel and concrete girder bridges during construction and teach them to identify vulnerabilities and engineering methods to investigate the structure's strength and stability at each critical stage. This is done within the practical context of engineering, development, verification, and/or review of erection plans.

Starting with basic structural stability principles, course participants are introduced to stability analysis methods and how they should be applied to properly engineer a bridge erection plan. The role of both permanent and temporary bracing in achieving structural stability is covered, and methods for bracing design presented. Behavior and design considerations for construction phases are provided through presentation of case studies, demonstrations, design examples, and guided walk-throughs. The impacts of construction practices, means, and methods are explored and demonstrated.

During bridge erection, the member support conditions, loads, stresses, strength, and stability are affected by the erection practices such as lifting, installation of bracing, bearing conditions, temporary supports, and placing sequence. Deck placing equipment, overhang brackets and staging can also have significant effects on girder stability. Thus, this course presents information on construction practices as it relates to these considerations.

Engineering criteria for use in evaluating bridges during erection are presented. Loading criteria and load factors for analysis are provided along with discussion of their applicability. Equations for checking member conditions during erection are included. Participants learn how loads during construction differ from final design conditions and appropriate methods to compute and apply those loads. The required contents of erection engineering plans, procedures, and submittals are presented in the course. Check lists are included to assist both the erection engineer and submittal reviewer.

The extended Course 130102A (3.5 days) provides an additional 8 hours of hands-on practicum where participants are given opportunity to apply advanced stability analysis on real-world examples, using software executed on laptop computers. This provides a valuable “capstone” experience to solidify their understanding, relate curriculum to practice, apply the concepts presented, and engage in self-discovery.

Outcomes

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

- Explain the fundamentals of stability theory and how they affect bridge strength and performance during construction
- Describe the differences between local, girder, and system (global) stability limit states
- Recognize the potential for stability-related failures that have occurred in past bridges and how to effectively avoid similar results
- Select loads, load combinations, and factors that are appropriate for the construction plan verification
- Explain common techniques for evaluating the stability of bridge member and components
- Choose an appropriate advanced stability analysis for a critical construction stage where stability is in question
- Describe the role of bracing and shoring and how to use for providing stability
- Assess procedures and details for a construction plan that will be safe and economical

Target Audience

This course has been developed for the needs of practicing public and private sector structural engineers with zero to approximately twenty years of experience. The primary audience is Host Agency and consultant bridge structural engineers and project managers, particularly those who prepare and/or review erection plans and procedures. The course will also be of benefit to bridge contractors and erectors as well as those Agency staff overseeing bridge erection.
TRAINING LEVEL: Basic

FEE: 2019: $1145 Per Person; 2020: $1145 Per Person

LENGTH: 2.5 DAYS (CEU: 1.7 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
Course Number
FHWA-NHI-130102A

Course Title
Engineering for Structural Stability in Bridge Construction (3.5 day)

The objective of this course is to train participants on the behavior of steel and concrete girder bridges during construction and teach them to identify vulnerabilities and engineering methods to investigate the structure’s strength and stability at each critical stage. This is done within the practical context of engineering, development, verification, and/or review of erection plans.

Starting with basic structural stability principles, course participants are introduced to stability analysis methods and how they should be applied to properly engineer a bridge erection plan. The role of both permanent and temporary bracing in achieving structural stability is covered, and methods for bracing design presented. Behavior and design considerations for construction phases are provided through presentation of case studies, demonstrations, design examples, and guided walk-throughs. The impacts of construction practices, means, and methods are explored and demonstrated.

During bridge erection, the member support conditions, loads, stresses, strength, and stability are affected by the erection practices such as lifting, installation of bracing, bearing conditions, temporary supports, and placing sequence. Deck placing equipment, overhang brackets and staging can also have significant effects on girder stability. Thus, this course presents information on construction practices as it relates to these considerations.

Engineering criteria for use in evaluating bridges during erection are presented. Loading criteria and load factors for analysis are provided along with discussion of their applicability. Equations for checking member conditions during erection are included. Participants learn how loads during construction differ from final design conditions and appropriate methods to compute and apply those loads. The required contents of erection engineering plans, procedures, and submittals are presented in the course. Check lists are included to assist both the erection engineer and submittal reviewer.

This extended Course 130102A (3.5 days) provides an additional 8 hours of hands-on practicum where participants are given opportunity to apply advanced stability analysis on real-world examples, using software executed on laptop computers. This provides a valuable “capstone” experience to solidify their understanding, relate curriculum to practice, apply the concepts presented, and engage in self-discovery.

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

• Explain the fundamentals of stability theory and how they affect bridge strength and performance during construction
• Describe the differences between local, girder, and system (global) stability limit states
• Employ lessons learned from past stability-related failures to avoid similar results
• Explain common techniques for evaluating the stability of bridge members and components
• Choose an appropriate advanced stability analysis for a critical construction stage where stability is in question
• Describe the role of bracing and shoring and how to use them to provide stability
• Select loads, load combinations, and factors that are appropriate for the construction plan verification
• Assess procedures and details for a construction plan that will be safe and economical
• Employ stability evaluation techniques to conduct an erection analysis for steel girder and concrete splice girder bridges (3 ½ day course)

Target Audience
This course has been developed for the needs of practicing public and private sector structural engineers with zero to approximately twenty years of experience. The primary audience is Host Agency and consultant bridge structural engineers and project managers, particularly those who prepare and/or review erection plans and procedures. The course will also be of benefit to bridge contractors and erectors as well as those Agency staff overseeing bridge erection.
TRAINING LEVEL: Basic

FEE: 2019: $1425 Per Person; 2020: $1425 Per Person

LENGTH: 3.5 DAYS (CEU: 2.4 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130108

COURSE TITLE
Bridge Maintenance (ILT)

Replacing the original Bridge Maintenance course (FHWA-NHI-134029), this entirely new Instructor-led Training (ILT) course will provide participants with knowledge regarding common deficiencies that occur in bridges, common defects in bridge elements, preventive maintenance techniques, and protective systems intended to prevent deterioration and deficiencies in bridges. With this knowledge, this course will enable participants to investigate proper bridge maintenance procedures using bridge maintenance resources and apply these practices on-the-job.

WEB-BASED TRAINING (WBT) PREREQUISITE: It is strongly recommended that participants take and complete FHWA-NHI-130107A Fundamentals of Bridge Maintenance WBT prerequisite prior to taking this 4-day ILT. This prerequisite WBT is being offered free of charge to participants.

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

• Identify key steps involved in the development and implementation efforts of a cost-effective preservation strategy for a group of bridges.
• Identify maintenance and/or repair needs and select the best remedial strategy.
• Discuss properties and preservation options involving common bridge materials such as concrete, steel and timber.
• Describe the step-by-step tasks required to accomplish proven preservation procedures on the various bridge elements.
• Identify critical members and avoid procedures that might result in damage such as field welding repairs on fracture critical tension members.
• Recognize problems that warrant specialized expertise, for example, soliciting the involvement of a qualified structural engineer when repairing structural damage.
• Apply effective management techniques (such as planning, scheduling, monitoring and reporting) during daily bridge maintenance operations.

TARGET AUDIENCE
This course is primarily for members of State and Local Departments of Transportation, as well as those contractors that perform work on behalf of these agencies. This training is primarily geared for individuals involved in on-site bridge maintenance and preservation activities and those that supervise and manage these activities. This training is appropriate for those with intermediate to advanced experience in bridge maintenance and repair activities. This training is also suitable for those with intermediate/advanced knowledge of general maintenance and repair activities that have successfully completed the prerequisite, FHWA-NHI-130107A Fundamentals of Bridge Maintenance WBT course. Those that are not involved in on-site bridge maintenance activities, such as designers and construction personnel, may also benefit from this training.

TRAINING LEVEL: Intermediate

FEE: 2019: $1050 Per Person; 2020: $1050 Per Person

LENGTH: 4 DAYS (CEU: 2.3 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130110

COURSE TITLE
Tunnel Safety Inspection

This 5-day, Instructor-led Training (ILT) is highly interactive and builds upon participants’ prior knowledge of tunnel and/or bridge inspection. This course covers the entire breadth of knowledge necessary to manage or execute a successful tunnel inspection based on the National Tunnel Inspection Standards (NTIS), Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual and Specifications for the National Tunnel Inventory (SNTI). However, it does not replace the need for specialized experts to assist in inspections. There are nine instructional modules. Once participants display achievement of the learning outcomes of one module, the class will progress to the next module. During the course, the instructor will lead participants through a series of case studies giving them an opportunity to practice and apply their knowledge in real-life tunnel inspection situations. The capstone case study will be a virtual tunnel inspection that takes place in a computer-simulated, 3D environment. Using this tool, participants will be able to perform a tunnel inspection and demonstrate their achievement of all learning outcomes.

*Participant Prerequisite Requirement: ALL participants should successfully complete one of the following three prerequisite requirements:
-130054 Engineering Concepts for Bridge Inspectors; or
-130101 Introduction to Safety Inspection of In-Service Bridges; or
-130101A Prerequisite Assessment for Safety Inspection of In-Service Bridges.

Prior to taking this course, it is strongly recommended that participants complete 130055 Safety Inspection of In-Service Bridges, 130056 Safety Inspection of In-Service Bridges for Professional Engineers, or possess equivalent field experience.

It is not required, but strongly recommended that participants possess some design or safety inspection experience of in-service tunnels or bridges.

Host Requirements: Hosts must provide a training room large enough to accommodate at least 30 participants as well as the 15 NHI virtual tunnel laptops (provided by NHI Instructors) that will be used for the virtual tunnel exercises. Additionally, the host must ensure that ALL students have successfully met the prerequisite requirement* and have a valid course completion certificate for one of the three prerequisite options.

OUTCOMES
Upon completion of the course, participants will be able to:
• Articulate the importance and purpose of tunnel inspection
• Apply the fundamentals of tunnel inspection
• Demonstrate the inspection and evaluation of tunnel structural, civil, mechanical, electrical, signage and lighting, and fire/life safety/security elements
• Use tunnel inspection references

TARGET AUDIENCE
The target audience for the Tunnel Safety Inspection ILT course is primarily members of Federal, State, local (Authority or Commission) and Tribal highway agency employees, who are involved with tunnel design, inspection and maintenance, as well as consultants involved in inspecting tunnels or in tunnel inspection management and leadership positions.
Training Level: Basic  
Fee: 2019: $1450 Per Person; 2020: $1450 Per Person  
Length: 5 DAYS (CEU: 3.2 UNITS)  
Class Size: Minimum: 20; Maximum: 30  

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130122

COURSE TITLE
Design and Evaluation of Bridges for Fatigue and Fracture

FHWA is offering a special incentive to promote this newly released, high-priority training. For a limited time and subject to availability, DOT’s who host the course can receive 15 seats at no cost. However to meet the 20-participant minimum at least 5 additional seats must be purchased at regular price, either by DOT or by outside participants. We request that course be advertised to the local consultant community to maximize participation. DOTs can only take advantage of this incentive once.

This two-day training course presents relevant issues related to fatigue and fracture in steel bridges, including analysis, design, evaluation, repair, and retrofit. It is based on the AASHTO LRFD Bridge Design Specifications, Eighth Edition, as well as the AASHTO Manual for Bridge Evaluation, Second Edition, with Interim Revisions through 2016. Participant Exercises, Guided Walk Throughs, and videos are included throughout the training to aid bridge engineers with the implementation of the presented information.

This course consists of three modules. The first module serves as a general introduction to the class. The second module covers fundamentals, and it includes four lessons - Introduction to Fatigue and Fracture, Crack Growth in Steel Structures, Theory, and Characterizing Fatigue and Fracture in Bridge Members. The third module covers application, and it includes five lessons - Analysis for Fatigue, AASHTO Design Approach for Fatigue, AASHTO Design Approach for Fracture, AASHTO Evaluation Approach, and Retrofit and Repair.

The curriculum materials include a comprehensive Reference Manual in CD format (FHWA Publication No. FHWA-NHI-16-016), lecture and workshop exercises intended to promote or enhance a working knowledge of AASHTO LRFD, and a participant workbook for lecture notes and exercises.

Individuals attending this course should have a minimum BSCE degree. They should also have a working knowledge of the current AASHTO LRFD Bridge Design Specifications and should have relevant design experience using this specification on at least one steel bridge superstructure.

There are no NHI prerequisites for this course. However, select topics of this course are also addressed in NHI Courses 130078 (Fracture Critical Inspection Techniques for Steel Bridges), 130081 (LRFD for Highway Bridge Superstructures), and 130095 (LRFD and Analysis of Curved Steel Highway Bridges).

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

• Explain the fundamentals of fatigue and fracture on steel highway structures
• Identify the various analysis methods for determining fatigue and fracture considerations on steel highway structures
• Explain the various AASHTO methodologies as it pertains to fatigue and fracture design
• Identify the AASHTO methodology for fatigue and fracture evaluation
• Describe the various strategies for repair and retrofit of steel highway structures

TARGET AUDIENCE
The primary audience for this course includes State DOT Bridge and Structures Engineers and Practitioners responsible for steel bridge design and evaluation. The target audience includes engineers at all levels, including designers, consultants, reviewers, maintenance and management engineers, and load raters.
**Training Level:** Intermediate

**Fee:** 2019: $825 Per Person; 2020: $825 Per Person

**Length:** 2 DAYS (CEU: 1.3 UNITS)

**Class Size:** MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130125

COURSE TITLE
Tunnel Safety Inspection Refresher ILT

This 2.5-day, Instructor-led Training (ILT) is highly interactive and builds upon participants’ prior knowledge of bridge and/or tunnel inspection. This course covers the entire breadth of knowledge necessary to manage or execute a successful tunnel inspection. However, it does not replace the need for specialized experts to assist in inspections. There are seven course modules. During the course, the instructor will lead participants through a series of case studies giving them an opportunity to practice and apply their knowledge in real-life tunnel inspection situations. The capstone case study comprises of a tunnel inspection exercise that takes place at the end of the course.

All participants must successfully complete the following prerequisite requirements prior to taking the FHWA-NHI-130125 course:
*130110 Tunnel Safety Inspection Training Course
*130124 Tunnel Safety Inspection Refresher Web-based Training

It is not required, but strongly recommended that participants possess some design or safety inspection experience of in-service bridges or tunnels.

OUTCOMES
Upon completion of the course, participants will be able to:
• Explain the importance and purpose of tunnel inspection
• Apply the fundamentals of tunnel inspection
• Demonstrate the inspection and evaluation of tunnel structural, civil, mechanical, electrical, signage, lighting, and fire/life safety/security elements
• Use tunnel inspection references

TARGET AUDIENCE
The target audience for the Tunnel Safety Inspection ILT course is primarily members of Federal, State, local (Authority or Commission) and Tribal highway agency employees, who are involved with tunnel design, inspection, and maintenance, as well as consultants involved in inspecting tunnels or in tunnel inspection management and leadership positions.

TRAINING LEVEL: Basic

FEE: 2019: $1000 Per Person; 2020: $1000 Per Person
LENGTH: 2.5 DAYS (CEU: 1.7 UNITS)
CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
COURSE NUMBER
FHWA-NHI-130126

COURSE TITLE
Strut-and-Tie Modeling (STM) for Concrete Structures

FHWA is offering a special incentive to promote this newly released, high-priority training. For a limited time and subject to availability, DOT’s who host the course can receive 15 seats at no cost. However, to meet the 20-participant minimum at least 5 additional seats must be purchased at regular price, either by DOT or by outside participants. We request that course be advertised to the local consultant community to maximize participation. DOTs can only take advantage of this incentive once.

The American Association of State Highway and Transportation Officials (AASHTO) recently adopted a new strut-and-tie modeling (STM) specification and is now strongly encouraging special analysis using such methods as STM. In response to the numerous requests for STM training from the bridge engineering community, as well as in response to this new STM specification, there is a strong need for developing training to address the uncertainties and produce a primary source of reference material for STM applications for bridge engineers.

STM provides engineers with a simplistic analysis and design tool for deep concrete bridge elements and disturbed regions that would otherwise require a rigorous refined analysis. STM has long been established as a reasonable analysis tool for disturbed regions and deep beams. However, this modeling tool has had difficulty being integrated into our bridge design state-of-practice, which has resulted in inappropriate use of the simplistic elastic beam theory design for deep beams and disturbed regions. In some cases, it has resulted in poor in-service performance. This training course serves as a significant step in providing the knowledge transfer necessary for STM to be used more frequently and more effectively.

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

• Describe the fundamentals of STM, including its definition, theory, and historical background
• Explain the application of STM in bridge design, including identification of B-regions and D-regions and specific applications to bridge superstructures and substructures
• Describe the required procedures for STM model development and design
• Explain element-level considerations in STM, including struts, ties, and nodal zones
• Summarize serviceability considerations in STM, including crack control, shear stress check, and sizing of members to minimize diagonal cracking
• Explain the STM provisions presented in AASHTO LRFD
• Apply STM fundamentals and procedures through a comprehensive design example

TARGET AUDIENCE
The primary audience includes state DOT bridge and structures engineers and practicing bridge engineers who are responsible for concrete bridge design and evaluation. The target audience includes engineers of all levels, including designers, consultants, reviewers, maintenance engineers, management engineers, and load rating engineers. Pre-training Competencies: Individuals attending this course should have a Bachelor of Science degree in civil engineering. They should have a working knowledge of AASHTO LRFD, and they should have relevant design experience using the current AASHTO LRFD on at least one concrete bridge project.

TRAINING LEVEL: Basic

FEE: 2019: $970 Per Person; 2020: $970 Per Person
LENGTH: 1.5 DAYS (CEU: 1.1 UNITS)
CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Customer Service: (877) 558-6873 • nhicustomerservice@dot.gov
NHI STORE PROVIDES RESOURCES AND REFERENCE MATERIALS

Created based on customer feedback, the NHI Store is an online resource that enables users to order course materials through the NHI Web site. These materials can be used to plan a workshop, support train-the-trainer programs, or gather highway-related reference materials. The NHI Store offers both electronic downloads and hard copy versions.

To search for and purchase NHI course training materials, please visit www.nhi.fhwa.dot.gov. Easy directions are provided for ordering and payment; special instructions are provided for FHWA employees.

If you are unable to find the training materials you need, please contact us at nhitraining@dot.gov.

The following pages list all materials available for purchase at the time this catalog was published. For the most up-to-date listing, visit the NHI Store at www.nhi.fhwa.dot.gov. Credit card payment is accepted.

LEGEND

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<td>130054</td>
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Division of FHWA Office of Technical Services

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MAIN CONTACTS

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