

**COURSE NUMBER**

FHWA-NHI-132012

COURSE TITLE**Soils and Foundations Workshop**

This course is geared toward practicing design and construction engineers who routinely deal with soil and foundation problems but have little theoretical background in soil mechanics or foundation engineering. The course takes a project-oriented approach whereby the soils input to a bridge project is followed from conception to completion. In each phase of the project, the soil concepts will be developed into specific foundation designs and recommendations. The classroom presentation includes a variety of exercises to verify achievement of learning objectives. Each participant will take away a comprehensive reference manual on soils and foundations and a participant workbook containing a copy of all slides presented and completed exercises.

OUTCOMES

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

- Identifying the minimum level of geotechnical input in various project phases of a highway project
- Recalling the equipment and procedures used to implement a subsurface investigation of soil and rock conditions
- Demonstrating basic skills in visual description of soils native to the host State
- Recalling geotechnical facilities and personnel in the host State
- Recalling the basic soil test procedures and how the results of the various soil tests are applied results to highway projects
- Listing procedures used for both settlement and stability analysis, and recalling design solutions to stability and settlement problems for approach roadway embankments
- Listing procedures used for determining bearing capacity and settlement of shallow foundations such as spread footings
- Identifying the basic skills needed in the design and construction management of driven pile and drilled shaft foundations
- Recalling the driven pile and drilled shaft foundation construction equipment and construction inspection procedures
- Description static load testing and recalling the basic skills needed to interpret static load test results
- Recalling the basic skills needed in the design and construction of earth retaining structures
- Discussing the format and minimum content of an adequate foundation report

TARGET AUDIENCE

Personnel from the following units at the transportation agency could benefit from this workshop: geotechnical, bridge design, roadway design, materials, construction, and maintenance. The personnel who will benefit the most are the first-line supervisors involved in the design of highway structures and embankments. The greatest impact will be achieved by convincing structural, design, and construction engineers to use procedures from this course as a guide for routine geotechnical work. All attendees should be encouraged to attend the entire course, not just sections that are in their specialty. One of the major benefits of this course is to give engineers an appreciation of activities outside their specialties that influence, or are influenced by, the work of the geotechnical engineer.

TRAINING LEVEL: Beginner

FEE: \$550 Per Person

LENGTH: 4.0 DAYS (CEU: 2.4 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Ben Rivers • (404) 562-3926 • benjamin.rivers@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov

**COURSE NUMBER**

FHWA-NHI-132013

COURSE TITLE**Geosynthetics Engineering Workshop (1-Day)**

This course (1-day) provides training on construction with geosynthetics in transportation applications. The course examines the use of geotextiles, geogrids, pavement edge drains, drainage composites, erosion control materials and sediment control materials. Construction of filtration, drainage, temporary and permanent erosion control, sediment control, roadway separation, roadway reinforcement, roadway subgrade improvement, pavement overlays, embankments over soft foundations, mechanically stabilized earth walls, mechanically stabilized earth slopes applications are reviewed. This 1-day construction summary course provides an introduction to geosynthetic installations.

OUTCOMES

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

- Recognize geosynthetic applications for transportation facilities, construction and maintenance
- Identify types of geosynthetics and the functions they perform
- State and review general construction procedures and inspection items for geosynthetic installations
- Locate references on geosynthetic materials and geosynthetic applications

TARGET AUDIENCE

Federal, State and local transportation personnel (bridge, hydraulic, pavement, geotechnical, construction, and maintenance engineers, and construction inspectors and technicians) involved with construction and maintenance of transportation facilities that include earthwork construction.

TRAINING LEVEL: Beginner

FEE: \$220 Per Person

LENGTH: 1.0 DAY (CEU: 0.6 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Jerry DiMaggio • (202) 366-1569 • jerry.dimaggio@fhwa.dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



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COURSE NUMBER

FHWA-NHI-132013A

COURSE TITLE

Geosynthetics Engineering Workshop (3-Day)

This 3-day course, provides training on the appropriate, cost-effective utilization of geosynthetics in transportation applications. The course examines the use of geotextiles, geogrids, pavement edge drains, drainage composites, erosion control materials, sediment control materials, and geomembranes. In addition, instructors also cover applications of filtration, drainage, temporary and permanent erosion control, sediment control, roadway separation, roadway reinforcement, roadway subgrade improvement, pavement overlays, embankments over soft foundations, mechanically stabilized earth walls, mechanically stabilized earth slopes, geomembrane containment ponds, and geomembrane pavement encapsulation.

OUTCOMES

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

- List six geosynthetic applications for transportation facilities, construction and maintenance
- Identify types of geosynthetics, and the functions they perform
- Discuss if geosynthetics are a feasible, cost-effective option for construction or maintenance of transportation works
- State and locate general construction procedures and inspection items for geosynthetic installations
- Locate references on geosynthetic materials and geosynthetic applications
- Prepare basic designs for filtration, drainage, temporary and permanent erosion control, sediment control, roadways, pavement overlays, embankments over soft foundations, mechanically stabilized earth walls, and reinforced earth slope transportation applications
- Select appropriate test methods for material properties and design parameters for specific geosynthetic projects, and differentiate between index and performance tests/properties
- Locate and review appropriate materials and construction specifications for geosynthetic projects
- Discuss the need for site specific monitoring or special inspection schemes

TARGET AUDIENCE

Federal, State and local transportation personnel (bridge, hydraulic, pavement, geotechnical, construction, and maintenance engineers, and construction inspectors and technicians) involved with design and/or construction of transportation facilities that include earthwork. In addition, public agency and private sector construction engineers and project inspectors responsible for installation, construction monitoring and inspection of geosynthetics installations can attend either course. There are no prerequisites, although prior attendance in FHWA-NHI-132012 Soils and Foundations Workshop is recommended.

TRAINING LEVEL: Beginner

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

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**COURSE NUMBER**

FHWA-NHI-132013B

COURSE TITLE**Geosynthetics Engineering Workshop - Hydraulics and Drainage (1.5-Day)**

This 1.5-day provides training on the appropriate, cost-effective utilization of geosynthetics in hydraulic applications for transportation works. The course examines the use of geotextiles, pavement edge drains, drainage composites, erosion control materials, and sediment control materials. Applications of filtration, drainage, temporary and permanent erosion control, and sediment control are addressed. Geomembrane applications of flow barriers, containment ponds and pavement are summarized.

OUTCOMES

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

- List four geosynthetic hydraulic applications for transportation works
- Identify three types of erosion control geosynthetics and the functions they perform
- Discuss feasibility and cost-effectiveness of geosynthetics in drainage and filtration applications
- State and review construction procedures for geosynthetic drainage, filtration, and erosion control installations
- Review design concepts and determine the basic design requirements for geosynthetics in conventional drains and erosion control applications
- Explain difference between temporary and permanent erosion control geosynthetics
- Select appropriate material property and design parameter test methods and prepare specification requirement for hydraulic applications of geosynthetics

TARGET AUDIENCE

Federal, State and local transportation personnel (hydraulic, erosion control, geotechnical, construction, and maintenance engineers, and construction inspectors and technicians) involved with design and/or construction and/or maintenance of transportation facilities that incorporate drainage and/or erosion control features. In addition, public agency and private sector construction engineers and project inspectors responsible for installation, construction monitoring and inspection of geosynthetic drainage and/or erosion control installations can attend either course. There are no prerequisites, although prior attendance of NHI course 132012 - Soils and Foundations Workshop is recommended.

TRAINING LEVEL: Beginner**FEE:** \$270 Per Person**LENGTH:** 1.5 DAYS (CEU: 0.9 UNITS)**CLASS SIZE:** MINIMUM: 20; MAXIMUM: 30**NHI Training Information:** (703) 235-0534 • nhitraining@dot.gov**Subject Matter Contact:** Jerry DiMaggio • (202) 366-1569 • jerry.dimaggio@fhwa.dot.gov**Subject Matter Contact:** Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov**NHI Training Program Manager:** Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov

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COURSE NUMBER

FHWA-NHI-132013C

COURSE TITLE

Geosynthetics Engineering Workshop - Roadways (1.5-Day)

This course (1 1/2 day) provides training on the appropriate, cost-effective utilization of geosynthetics in roadway applications. The course examines the use of geotextiles, geogrids, and pavement edge drains in pavement structures. Applications of filtration, drainage, roadway separation, roadway reinforcement, roadway subgrade improvement, and pavement overlays are addressed.

OUTCOMES

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

- List four geosynthetic pavement applications for transportation works
- Identify four types of geosynthetics used in pavement systems, and identify functions they perform
- Calculate if geosynthetics are a feasible, cost-effective option for construction or maintenance of pavements
- State and review construction procedures for geosynthetic pavement installations
- Review design concepts and determine the basic design requirements for geosynthetics in pavement systems
- Select appropriate material property and design parameter test methods and prepare specification requirement for geosynthetic reinforcement

TARGET AUDIENCE

Federal, State and local transportation personnel (pavement, geotechnical, construction, and maintenance engineers, and construction inspectors and technicians) involved with design and/or construction and/or maintenance of pavement systems. In addition, public agency and private sector construction engineers and project inspectors responsible for installation, construction monitoring and inspection of geosynthetics installations can attend either course. There are no prerequisites, although prior attendance in FHWA-NHI-132012 Soils and Foundations Workshop and FHWA-NHI-132040 Geotechnical Aspects of Pavements are recommended.

TRAINING LEVEL: Beginner

FEE: \$270 Per Person

LENGTH: 1.5 DAYS (CEU: 0.9 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Jerry DiMaggio • (202) 366-1569 • jerry.dimaggio@fhwa.dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



Have questions about training and scheduling?

Contact the NHI Training Team for more information.

**COURSE NUMBER**

FHWA-NHI-132013D

COURSE TITLE**Geosynthetics Engineering Workshop - Reinforcement (1.5-Day)**

This 1.5-day course provides training on the appropriate, cost-effective utilization of geosynthetics in transportation applications. The course examines the use of geotextiles and geogrids as soil reinforcement. Embankments over soft foundations, geosynthetic reinforced MSE walls, reinforced soil slopes, and geosynthetic reinforced load transfer platforms are addressed.

OUTCOMES

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

- List three geosynthetic reinforcement applications for transportation works
- Identify four types of geosynthetic reinforcements, and discuss relative strengths and cost
- State and review construction procedures for geosynthetic reinforcement installations
- Identify primary design references for geosynthetic reinforcement applications for transportation works
- Review design concepts and determine the basic design requirements for embankments over soft foundations, mechanically stabilized earth walls and earth slopes transportation applications
- Select appropriate material property and design parameter test methods and prepare specification requirement for geosynthetic reinforcement

TARGET AUDIENCE

Federal, State and local transportation personnel (bridge, geotechnical, construction engineers, and construction inspectors and technicians) involved with design and/or construction of transportation facilities that incorporate reinforced soil earthworks. In addition, public agency and private sector construction engineers and project inspectors responsible for installation, construction monitoring and inspection of reinforced soil installations can attend either course. There are no prerequisites, although prior attendance in FHWA-NHI-132012 Soils and Foundations Workshop is recommended.

TRAINING LEVEL: Beginner

FEE: \$270 Per Person

LENGTH: 1.5 DAYS (CEU: 0.9 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

Subject Matter Contact: Jerry DiMaggio • (202) 366-1569 • jerry.dimaggio@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov

**COURSE NUMBER**

FHWA-NHI-132014

COURSE TITLE**Drilled Shafts**

Drilled shafts are an alternate type of deep foundation that may be more cost effective and perform better than other types of deep foundations in bridge piers at river crossings and in retrofit operations, high-mast lighting, earth retaining structures, single-column piers, and similar applications. This course provides participants with specific technical guidance on all aspects of designing, installing, and monitoring the construction of drilled shafts. The lessons address the following topics: applications, advantages, and disadvantages of drilled shafts for transportation structure foundations; general requirements for subsurface investigations; construction methods; construction case histories; construction specifications; principles of designing drilled shafts for axial and lateral loading; expansive soils, downdrag, and similar effects; load testing; inspection; integrity testing; repair and retrofit of defective shafts; and cost estimation. The participants will receive a comprehensive reference manual on drilled shaft construction and design used by engineers who perform detailed designs of drilled shafts, write construction specifications, and evaluate the performance of contractors through a comprehensive inspection program.

OUTCOMES

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

- Describe the various drilling rigs and tools that are available to construct drilled shafts under varied subsurface soil and rock conditions
- Recognize the basic features of drilling aids, such as casings and drilling slurries, and the reasons for certain fundamental requirements for these aids
- Design drilled shafts for axial loading in simple soil and rock profiles
- Demonstrate a general understanding of the elements of designing drilled shafts for lateral loads
- Demonstrate an understanding of the need for load tests and available methods for performing the tests
- Formulate the basic elements of construction specifications for drilled shafts
- Estimate costs for drilled shafts

TARGET AUDIENCE

The target audience for this course includes geotechnical engineers, bridge designers, and resident engineers. The course embraces both construction and design, and it is important that all participants attend all lessons, not just those in their immediate areas of interest. A key issue is how the details of construction affect the way in which a drilled shaft should be designed and how the intent of the design affects inspection. Participants are expected to have a degree in engineering for which they have passed an undergraduate course in soil mechanics and/or have successfully completed NHI course FHWA-NHI-132012 Soils and Foundations Workshop. This course is intended for field or laboratory personnel with a background in engineering.

TRAINING LEVEL: Intermediate

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Justice Maswoswe • (410) 962-2460 • justice.maswoswe@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132021

COURSE TITLE

Driven Pile Foundations - Design and Construction

This course covers the practical application of driven pile technology, with an emphasis on data interpretation and decisionmaking issues common to real-life construction projects. The course addresses subsurface investigation, pile selection, economic analysis, static design analysis (single pile and pile group behavior under compression, tension and lateral loading, pile settlement, negative skin friction) specifications and contracting documents, construction monitoring (pile inspection, dynamic driving formulas, wave equation analysis, dynamic testing), static methods of pile load testing, driven pile installation equipment, and accessories. The course also covers design procedures for subsurface conditions; the computer program for calculating static pile capacity; design procedures for downdrag, scour, squeeze, and heave; plugging of open pile sections; group design for lateral and uplift loads; and the economics of pile selection. Instructional methods include workshops, participant exercises, and sample problems to transfer the necessary knowledge and skills to plan and design driven pile foundation projects and to implement QA/QC procedures during construction.

OUTCOMES

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

- Implement a systematic plan for the design and construction of driven pile foundations
- Select appropriate subsurface exploration procedures and laboratory tests to provide design soil parameters for pile foundation design
- Choose the appropriate pile type in a given soil profile based on the advantages and disadvantages of common driven pile types
- Use appropriate methods of pile foundation design in application subsurface conditions
- Calculate single and group capacities of driven piles to resist compression, tension, and lateral loads
- Use time-dependent soil strength changes in pile foundation design and construction control
- Identify the project influence and significance of pile driveability, pile refusal, and minimum and estimated pile toe elevations
- Calculate allowable design and allowable driving stresses for common pile types
- Explain the key differences between allowable stress design and load and resistance factor design methods
- Define key components of driven pile specifications
- Identify the format and minimum content in an adequate foundation report for driven pile foundations
- Use dynamic formulas, wave equation analyses, dynamic pile testing and static load testing correctly and effectively
- Identify pile hammer types, their operational characteristics, and key pile hammer and pile hammer accessory inspection issues
- Select pile toe accessories, pile splicing methods, and pile installation aids applicable to the pile type and subsurface conditions
- Explain appropriate methods of pile installation inspection

TARGET AUDIENCE

The target audience includes geotechnical specialists, bridge engineers, construction engineers, and consultant review specialists. This course is suitable for attendance by entry-level and experienced engineers and advanced-level technicians. Attendees should have a basic knowledge of subsurface investigation methods and the general aspects of foundation design and construction.



TRAINING LEVEL: Intermediate

FEE: \$550 Per Person

LENGTH: 4.0 DAYS (CEU: 2.4 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Justice Maswoswe • (410) 962-2460 • justice.maswoswe@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



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COURSE NUMBER

FHWA-NHI-132022

COURSE TITLE

Driven Pile Foundations - Construction Monitoring

This course provides information on current methods of driven pile technology with emphasis on data interpretation and decisionmaking issues common to driven pile installation and monitoring. The course covers the following areas: specifications, contracting issues, pile installation, monitoring, and inspection. Application and interpretation of the wave equation and dynamic and static pile-load-testing methods are highlighted with an emphasis on the practical issues related to pile monitoring and acceptance on typical construction projects. Construction material includes pile capacity verification by formula; wave equation; dynamic test or static test; performance and interpretation of compression, tension, and lateral load test; new load testing devices; the Osterberg Cell and Statnamic; operation and inspection of pile hammers, including new hydraulic hammers; and troubleshooting of pile hammer operation and pile installation problems. (Refer to course FHWA-NHI-132021 Driven Pile Foundations - Design and Construction for additional background information.) The goal of this course is to transfer the necessary knowledge and skills to plan driven pile foundation projects and to implement QA/QC procedures during construction.

OUTCOMES

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

- Discuss the appropriate pile type in a given soil profile based on the advantages and disadvantages of common driven pile types
- Explain the importance and appropriate methods of pile installation inspection
- Identify pile hammer types, their operational characteristics, and key pile hammer and pile hammer accessory inspection issues
- Define key components of driven pile specifications
- Identify the project influence and significance of pile drivability, pile refusal, and minimum and estimated pile toe elevations
- Use dynamic formulas, wave equation analyses, dynamic pile testing and static load testing correctly and effectively
- Identify pile toe accessories, pile splicing methods, and pile installation aids applicable to the pile type and subsurface conditions

TARGET AUDIENCE

The target audience for this course includes geotechnical specialists, bridge engineers, construction engineers, consultant review specialists, and advanced-level technicians involved in and responsible for specifying and monitoring construction of driven pile foundations. Basic knowledge of subsurface investigation methods is desirable.

TRAINING LEVEL: Intermediate

FEE: \$320 Per Person

LENGTH: 2.0 DAYS (CEU: 1.2 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Justice Maswoswe • (410) 962-2460 • justice.maswoswe@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132031

COURSE TITLE

Subsurface Investigations

This course is designed to help participants understand the importance of a properly planned, reviewed, and executed subsurface investigation program to the design and construction of transportation facilities and to provide them with the skills to do this work. The course presents the latest methods and procedures in the planning, executing, and interpreting the various subsurface investigation methods and for developing appropriate parameters for soil and rock design and construction for engineering applications. Topics include the geotechnical specialist's role in subsurface investigations; exploration methodologies; types of exploratory equipment and their suitability for various subsurface conditions; the use of in situ testing and geophysical surveys for subsurface characterizations; the handling, transportation, and storage of soil and rock samples; and laboratory testing techniques and interpretation of data. In addition, the course covers contracting for soil and rock investigations, correlation of soil and rock properties, and preparation of clear and concise geotechnical reports. Classroom instruction includes participant exercises and example problems to reinforce course outcomes.

OUTCOMES

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

- Recognize the importance of performing an adequate subsurface investigation
- Plan and execute a subsurface exploration program for a typical surface transportation project
- Use existing information in planning the investigation program
- Apply appropriate in situ testing procedures based upon the expected subsurface conditions and obtain high-quality soil and rock samples for laboratory testing
- Assign appropriate laboratory testing procedures for determining soil and rock design parameters
- Interpret the results of laboratory tests and determine soil and rock parameters to be used in design
- Summarize the results of a subsurface investigation in a concise geotechnical report

TARGET AUDIENCE

The target audience for this course includes FHWA, State, and local transportation agency employees; college and university faculty; and consultant engineers who are or will be involved in the planning, execution, review, and interpretation of subsurface investigations. An undergraduate degree in geology, engineering geology, civil engineering, or equivalent engineering experience in the highway/transportation field is desirable.

TRAINING LEVEL: Intermediate

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Ben Rivers • (404) 562-3926 • benjamin.rivers@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



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COURSE NUMBER

FHWA-NHI-132033

COURSE TITLE

Soil Slope and Embankment Design and Construction

This course covers important aspects associated with the design and construction of soil slopes and embankments. It is intended to provide transportation earthwork professionals with knowledge to recognize potential problems with soil slope/embankment stability and deformation in transportation projects. Participants will develop the skills necessary to design and evaluate soil slopes and embankments and learn about the implications for construction and inspections. The course embraces both design and construction. It is important for all participants to attend all lessons, not just those in their immediate areas of interest.

Participants will receive a comprehensive reference manual, used by practicing highway and geotechnical engineers covering investigation, design, construction, and mitigation of soil slopes and embankments. The participant workbook contains copies of visual aids and student exercises that closely follow the PowerPoint slide presentations. The participant exercises promote interaction in the classroom and illustrate the basic principles and analyses.

OUTCOMES

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

- Recognize potential failure modes or deformation types for soil slopes and embankments
- Identify the potential failure modes for soil slopes and the type of analysis required to evaluate stability of the slope
- Determine the stability of a slope using slope stability charts
- Recognize the major design consideration for embankments constructed using earth fill, rock fill, and lightweight fill
- List the steps necessary for designing an embankment over compressible foundation soil
- List the common causes/triggering mechanisms for landslides/slope instabilities
- List appropriate stabilization methods

TARGET AUDIENCE

The target audience for this course includes FHWA, State, and local highway agency employees; college and university faculty; and consultant engineers/geologists who are involved in the analysis, design, construction, maintenance, and remediation of soil slopes and embankments on surface transportation facilities. An undergraduate degree in civil engineering or equivalent engineering experience in the highway/transportation field is desirable.

TRAINING LEVEL: Intermediate

FEE: \$355 Per Person

LENGTH: 2.5 DAYS (CEU: 1.5 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Peter Osborn • (410) 962-0702 • peter.osborn@fhwa.dot.gov

Subject Matter Contact: Jerry DiMaggio • (202) 366-1569 • jerry.dimaggio@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132034

COURSE TITLE

Ground Improvement Techniques

This course covers important design and construction aspects associated with ground improvement techniques including Vertical Drains, Lightweight Fills, Vibro-Compaction, Dynamic Compaction, Stone Columns, Deep Soil Mixing, Column Supported Embankments, MSE Walls and Reinforced Soil Slopes, Soil Nailing, and Grouting. The goal of the course is to help participants determine the applicability and preliminary cost analysis for techniques that could be employed to improve the ground to permit construction of geotechnical facilities for transportation applications.

Participants will develop an appreciation for exploring and characterizing subsurface soil and rock in the laboratory, as well as the requisite design parameters necessary to develop a preliminary design and cost estimate. Instructors will discuss and summarize the advantages and limitations of each method. The course is designed to elicit maximum input from participants particularly regarding their understanding of application criteria, the impact of geotechnical features on the long-term performance, and contracting methods.

OUTCOMES

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

- Locate criteria to determine the applicability of each ground improvement method for a specific project and soil condition under consideration
- Describe advantages, disadvantages, and limitations for each ground improvement method discussed
- Prepare conceptual and basic designs, and be able to check contractor-submitted designs
- Discuss appropriate QA/QC methods for each type of ground improvement method
- Summarize key elements of a preferred contracting method for each technique
- Develop a preliminary cost estimate based on a preliminary design

TARGET AUDIENCE

The target audience for this course includes FHWA, State, and local highway agency employees; college and university faculty; and consultant engineers who are or will be involved in planning, designing, and/or constructing ground improvement systems for transportation features involving earthwork, bridges, and earth retaining structures. An undergraduate degree in geology, engineering geology, civil engineering, or equivalent engineering experience in the highway/transportation field is desirable.

TRAINING LEVEL: Intermediate

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Silas Nichols • (202) 366-1554 • silas.nichols@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov

**COURSE NUMBER**

FHWA-NHI-132035

COURSE TITLE**Rock Slopes**

This course presents geological investigation techniques, shear strength theories for determining rock strength, and design methods for rock slopes with different failure mechanisms. Other topics include rock blasting, rock slope stabilization methods, and contracting issues. Classroom instruction includes the discussion of sample problems and case histories involving rock slope analyses and designs.

Participants will receive a comprehensive reference manual (FHWA-NHI-99-007) and the accompanying exercises (FHWA-NHI-99-036). The reference manual covers investigation, design, and construction of rock slopes for highway/geotechnical engineers. It is geared towards practicing engineers who are involved with rock slope design and stabilization, but may not have the complete theoretical background. The exercises (FHWA-NHI-99-036) are designed to promote interaction in the classroom and to illustrate the basic principles and analyses. Solutions are included with each exercise.

OUTCOMES

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

- Describe the basic principles of rock slope design
- Plan and execute a geological investigation, including geologic mapping
- Perform appropriate in situ and laboratory strength tests
- Determine rational design parameters by proper evaluation of in situ and laboratory test data along with appropriate rock strength correlations
- Identify the failure mechanisms associated with rock slopes and apply appropriate design methodologies
- Design effective rockfall protection and slope stabilization measures
- Design a monitoring program for cut slopes

TARGET AUDIENCE

The target audience for this course includes FHWA, State, and local highway agency employees; college and university faculty; and consultant engineers/geologists who are or will be involved in the design, excavation, and stabilization of rock slopes. An undergraduate degree in geology, engineering geology, civil engineering, or equivalent engineering experience in the highway/transportation field is desirable.

TRAINING LEVEL: Intermediate

FEE: \$320 Per Person

LENGTH: 2.0 DAYS (CEU: 1.2 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Barry Siel • (720) 963-3208 • barry.siel@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132036

COURSE TITLE

Earth Retaining Structures

The goal of this course is to provide agencies with state-of-the-practice design tools and construction techniques to expand implementation of safe and cost-effective earth retention technologies. This course addresses the selection, design, construction, and performance of earth retaining structures used for support of fills and excavations or cut slopes. Instructors cover factors that affect wall selection, including contracting approaches with an emphasis on required bidding documents for each approach. Class discussions will include design procedures and case histories, demonstrating the selection, design, and performance of various earth retaining structures. Detailed information on subsurface investigation, soil and rock property design parameter selection, lateral earth pressures for wall system design, and load and resistance factor design (LRFD) for retaining walls are provided.

OUTCOMES

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

- Describe potential applications for Earth Retaining Structures (ERS)
- Select a technically appropriate and cost-effective ERS
- Select appropriate material properties, soil design parameters, and earth pressure diagrams
- Perform design analysis and prepare conceptual designs
- Review contractor submitted documents
- Discuss contracting methods
- Describe construction and inspection activities for ERS

TARGET AUDIENCE

The primary audience for this course is agency and consultant bridge/structures, geotechnical, and roadway design engineers; engineering geologists; and consultant review specialists. In addition, management, specification, and contracting specialists and construction engineers involved in design and contracting aspects of retaining structures are encouraged to attend. Attendees should have a basic knowledge of soil mechanics and structural engineering, including some understanding of LRFD concepts.

TRAINING LEVEL: Intermediate

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



If you're interested in this course, you may also want to take advantage of another NHI structures course.

FHWA-NHI-130082B LRFD for Highway Bridge Substructures and Earth Retaining Structures.



COURSE NUMBER

FHWA-NHI-132037

COURSE TITLE

Shallow Foundations

This course provides transportation earthwork professionals with the necessary skills to design shallow foundations for transportation applications and to consider the construction and inspection implications of the design. The participants will receive a comprehensive reference manual on investigation, design, and construction of shallow foundations used by highway and geotechnical engineers that will be referred to during the course, so participants will become familiar with its contents. The exercises book is an interactive teaching tool for the course, enabling participants to be actively involved in the learning experience.

OUTCOMES

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

- Recognize potential failure modes or deformation types for soil slopes and embankments
- Develop the ability to judge when shallow foundations should be considered
- List the failure modes of shallow foundations
- Determine the bearing capacity of shallow foundations on soils and rocks
- Calculate vertical stress distribution below shallow foundations
- Determine the primary consolidation settlement of shallow foundations on cohesive soils
- Determine the settlement of shallow foundations on cohesionless soils
- Identify problematic soils that may be encountered
- List soil and ground improvement techniques that may be used to improve the performance of shallow foundations
- Describe procedures for construction inspection and performance monitoring of shallow foundations

TARGET AUDIENCE

The target audience for this course includes FHWA, State, and local highway agency employees; college and university faculty; and consultant engineers and geologists who are involved in the analysis, design, construction, maintenance, and remediation of soil slopes and embankments on surface transportation facilities. An undergraduate degree in civil engineering or equivalent engineering experience in the highway/transportation field is desirable. The course will be most beneficial to geotechnical engineers, engineering geologists, foundation designers, project engineers, and highway/bridge engineers who are involved in the design and construction of foundations for surface transportation projects.

TRAINING LEVEL: Intermediate

FEE: \$320 Per Person

LENGTH: 2.0 DAYS (CEU: 1.2 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Jerry DiMaggio • (202) 366-1569 • jerry.dimaggio@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132040

COURSE TITLE

Geotechnical Aspects of Pavements

This course covers the latest methods and procedures to address the geotechnical issues in pavement design, construction, and performance for new construction, reconstruction, and rehabilitation (e.g., road widening) pavement projects. The course content includes geotechnical exploration and characterization of in-place and constructed subgrades; designing and constructing pavement subgrades and unbound materials for paved and unpaved roads, with emphasis on the current AASHTO 1993 design guidelines and on the mechanistic-empirical design approach, including the three levels of design inputs; the overall geotechnical and drainage aspects of bases, subbases, and subgrades (for a safe, cost-effective, and durable pavement); and construction and inspection of pavement projects.

The goal of the course is to have each participant recognize the importance of the geotechnical aspects relevant to the design, construction, and performance of a pavement system. Participants will develop an appreciation for adequate subsurface exploration and laboratory characterization of subgrade soils as well as the requisite design parameters for unbound base layers and drainage features in relation to pavement design. The course is designed to elicit maximum input from participants, particularly regarding an understanding of the impact of geotechnical features on the long-term performance of pavement systems.

OUTCOMES

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

- Explain the geotechnical parameters of interest in pavement design and their effect on the performance of different types of pavements
- Explain the influence of climate, moisture, and drainage on pavement performance
- Identify and explain the impact of unsuitable subgrades on pavement performance
- Determine the geotechnical inputs needed for design of pavements
- Evaluate and select appropriate remediation measures for pavement subgrades
- Explain the geotechnical aspects of construction specifications and inspection requirements
- Identify subgrade problems during construction and develop recommended solutions

TARGET AUDIENCE

Many groups within an agency are involved with different aspects of definition, design use, and construction verification of pavement geomaterials. These groups include pavement design engineers, geotechnical engineers, specification writers, and construction engineers who are or will be involved in the design, evaluation, and construction (or reconstruction or rehabilitation) of pavements. This course was developed as a forum for these various personnel to work together to enhance current procedures for building and maintaining more cost-efficient pavement structures.

TRAINING LEVEL: Beginner

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Jerry DiMaggio • (202) 366-1569 • jerry.dimaggio@fhwa.dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



Special room set up and materials are required. Check the NHI Web site for more details.

**COURSE NUMBER**

FHWA-NHI-132041

COURSE TITLE**Geotechnical Instrumentation**

The course is designed to provide participants with the necessary knowledge and skills to plan, select, and implement instrumentation programs in geotechnical features for construction monitoring and performance verification. The course will discuss measurement tools, including recommendations for a systematic and complete approach to planning monitoring programs. The course presents recommendations for selecting proper instrumentation for various types of construction. Tasks covered include calibration, maintenance and installation of instrumentation, collection of data, processing and presentation of collected data, interpretation of processed data, and reporting of results.

OUTCOMES

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

- Recognize effective uses of geotechnical instrumentation in transportation projects
- Identify benefits of instrumentation
- Identify typical instrumentation programs for common transportation structures
- Recognize the need to follow a systematic approach when planning, selecting, and executing an instrumentation program and identify the components of a systematic approach
- Recognize role of instrumentation and how it is used for answering key geotechnical questions
- Identify available instruments and where to find additional information and assistance
- Plan an instrumentation program in a systematic way
- Examine practical methods to collect and use data from instrumentation
- Perform an evaluation of the need for and potential benefits of geotechnical instrumentation on a project

TARGET AUDIENCE

The target audience for this course includes FHWA, State, and local highway agency employees; college and university faculty; and consultant engineers and geologists who are or will be involved in the design, evaluation, and construction of pavements. An undergraduate degree in civil engineering, geology or equivalent engineering experience in the highway/transportation field is desirable.

TRAINING LEVEL: Intermediate**FEE:** \$320 Per Person**LENGTH:** 2.0 DAYS (CEU: 1.2 UNITS)**CLASS SIZE:** MINIMUM: 20; MAXIMUM: 30**NHI Training Information:** (703) 235-0534 • nhitraining@dot.gov**Subject Matter Contact:** Silas Nichols • (202) 366-1554 • silas.nichols@fhwa.dot.gov**NHI Training Program Manager:** Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132042

COURSE TITLE

Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes

Mechanically stabilized earth walls (MSEWs) and reinforced soil slopes (RSS) are two modern methods of earth-fill construction that are extremely cost effective and aesthetically pleasing. The basic concept behind these related methods is to combine soil, reinforcing materials made of steel or polymers, and appropriate facing to produce a composite material with improved engineering properties. Both MSEWs and RSS structures provide substantial savings in construction time and costs when compared with other conventional types of earth retaining systems.

The goal of the course is to educate agencies about state-of-the-practice design tools and construction practices to promote implementation of mechanically stabilized earth technology in cost effective earth retention structures. This course would be of most benefit to persons who are involved in the design and construction of earth retention structures for surface transportation projects.

The host agency/Local Coordinator is required to provide about 25 lbs. of dry sand (about 1/2 bag of play sand from a home improvement store, or concrete sand) for use in the demonstrations.

OUTCOMES

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

- Recognize potential applications for MSEWs and RSS structures in transportation facilities
- Prepare conceptual and basic (i.e., for simple geometry) designs, and be able to check contractor-submitted designs for walls and slopes
- Examine and select appropriate material properties and parameters used in design
- Calculate the cost of conceptual MSEWs and RSS structures and determine if construction is a cost-effective option
- Select appropriate specification/contracting method(s) and prepare detailed specifications for materials and methods of construction
- Define and communicate major components of construction inspection of MSEWs and RSS structures to confirm compliance with design

TARGET AUDIENCE

The primary audience for this course is agency and consultant bridge/structures, geotechnical, and roadway design engineers; engineering geologists; and consultant review specialists. In addition, management, specification and contracting specialists, and construction engineers interested in design and contracting aspects of MSEWs and RSS structures are encouraged to attend. Attendees should have a basic knowledge of soil mechanics and structural engineering. (Note that NHI offers a 1-day course, FHWA-NHI-132043 Construction of MSEW and RSS.

TRAINING LEVEL: Intermediate

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Rich Barrows • (360) 619-7704 • rich.barrows@fhwa.dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132043

COURSE TITLE

Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes

Mechanically stabilized earth walls (MSEWs) and reinforced soil slopes (RSS) are two modern methods of earth-fill construction that are extremely cost effective and aesthetically pleasing. The basic concept behind these related methods is to combine soil, reinforcing materials made of steel or polymers, and appropriate facing to produce a composite material with improved engineering properties. Both MSEWs and RSS structures provide substantial savings in construction time and costs when compared with other conventional types of earth retaining systems.

The goal of this course is to educate agencies about current construction practices for implementing mechanically stabilized earth technology into cost-effective earth retention structures. This course is most beneficial to persons who are involved in the construction of earth retention structures for surface transportation projects.

The host agency/Local Coordinator is required to provide about 25 lbs. of dry sand (about 1/2 bag of play sand from a home improvement store, or concrete sand) for use in the demonstrations.

OUTCOMES

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

- Recognize potential applications for MSEWs and RSS structures in transportation facilities
- Recognize differences between available systems and their components
- Understand the intent of specification/contracting method(s)
- Define and communicate major components of construction inspection of MSEWs and RSS structures to confirm compliance with design

TARGET AUDIENCE

The primary audience for this course is agency and consultant construction engineers, inspectors, and technicians. In addition, management; specification and contracting specialists; bridge/structures, geotechnical, and roadway design engineers; and engineering geologists interested in construction aspects of MSEWs and RSS structures are encouraged to attend. Attendees should have a basic knowledge of soil mechanics and structural engineering. (Note that NHI offers a 3-day course, FHWA-NHI-132042 Design of MSEWs and RSSs and a 3-day course, FHWA-NHI-132080 Inspection of MSEWs and RSSs.)

TRAINING LEVEL: Intermediate

FEE: \$220 Per Person

LENGTH: 1.0 DAY (CEU: 0.6 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Rich Barrows • (360) 619-7704 • rich.barrows@fhwa.dot.gov

Subject Matter Contact: Daniel Alzamora • (720) 963-3214 • daniel.alzamora@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



Special arrangements are required for this course by the Host/Local Coordinator. Check the NHI Web site for details.



COURSE NUMBER

FHWA-NHI-132069

COURSE TITLE

Driven Pile Foundation Inspection

This course provides Federal, State, and local inspectors with practical knowledge and standard industry practices for inspecting pile-driving operations at transportation construction sites.

To establish a national standard for transportation personnel, NHI developed the course based on a number of Federal and State sources: the course materials from the Florida department of transportation's Pile Driving Inspector's Qualification test, AASHTO's 2000 Bridge Construction Specifications, and the NHI courses Driven Pile Foundations - Design and Construction (FHWA-NHI-132021) and Driven Pile Foundations - Construction Monitoring (FHWA-NHI-132022). However, the local specifications, inspection reports, and plan sheets available from the hosting agency also will be discussed. The course includes a 3-hour qualification examination.

OUTCOMES

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

- Explain the inspector's role, duties, and responsibilities
- Describe the pile-driving system components
- Recognize key inspection elements of the contract documents
- Identify proper communication and coordination with the engineer and contractor
- Identify the key elements of a pile installation plan
- Recognize and identify pile-driving system components and tools
- Verify tip elevations, cutoff elevations, pile penetration, and length driven for vertical and battered piles
- Perform inspection of pile-driving operations and verify compliance with construction tolerances
- Recognize when to stop driving based upon provided driving criteria, minimum tip or penetration, and refusal guidelines.
- Verify pile condition, labeling, and marking for compliance
- Recognize and explain the difference between test piles and production piles and the various types of pile testing
- Identify "driving" irregularities
- Identify and document pay quantities
- Interpret and apply applicable AASHTO specifications relating to foundation acceptance
- List potential problems and safety issues

TARGET AUDIENCE

The target audience for this course includes those who inspect pile-driving operations during construction of foundations and major structures. In addition, project management and construction engineers in charge of pile-driving construction inspections are encouraged to attend. Attendees should have completed courses in basic courses in reading construction plans as well as construction math and high school algebra.

TRAINING LEVEL: Intermediate

FEE: \$355 Per Person

LENGTH: 2.5 DAYS (CEU: 1.5 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Justice Maswoswe • (410) 962-2460 • justice.maswoswe@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132070

COURSE TITLE

Drilled Shaft Foundation Inspection

Drilled Shaft Foundation Inspection is a stand-alone course developed to provide a basis for local, regional, or national qualification of drilled shaft foundation inspectors. The goal of this course is to provide inspectors with practical knowledge and standard industry practices for the inspection of drilled shaft foundation construction. A 2-hour qualification exam is administered on the third day of the course.

The course follows recommended FHWA specifications and practices for drilled shaft construction but may be modified to follow local agency specifications and practices.

All participants should be advised by the Local Coordinator/session host that they are encouraged to complete the FHWA Drilled Shaft Construction online tutorial. This will enhance the overall learning process and enhance performance on the end of course comprehensive exam. The tutorial is located at: <http://www.fhwa.dot.gov/infrastructure/tccc/tutorial/index.htm>

OUTCOMES

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

- Identify and understand the role and duties of the inspector
- Recognize key inspection elements of the contract documents
- Identify proper communication and coordination with the engineer and contractor
- Interpret and verify contractor compliance with items in the drilled shaft installation plan
- Recognize and identify drilled shaft construction equipment and tools
- Perform visual field verification of soil/rock material for comparison to supplied soil boring data/logs
- Calculate percent recovery and rock quality designation (RQD)
- Recognize and identify the various types of drilled shaft construction
- Perform inspection of drilled shaft excavations for compliance with plans, construction tolerances, and cleanliness
- Verify reinforcing cage construction compliance including side spacers and SCL requirements
- Determine concrete volumes for theoretical shafts and develop concrete curves
- Identify shaft "concreting" irregularities
- Perform calculations for volume, area, circumference, and elevation
- Locate, explain, and apply applicable FHWA, AASHTO, and State DOT specifications relating to compliance

TARGET AUDIENCE

The target audience for this course includes agency and consultant personnel who inspect foundations or major structures. In addition, project management and construction engineers in charge of drilled shaft construction inspection are encouraged to attend.

This course is designed to be most beneficial to foundation inspectors who are responsible for inspecting drilled shafts during construction.

TRAINING LEVEL: Intermediate

FEE: \$355 Per Person

LENGTH: 2.5 DAYS (CEU: 1.5 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Justice Maswoswe • (410) 962-2460 • justice.maswoswe@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov

**COURSE NUMBER**

FHWA-NHI-132078

COURSE TITLE**Micropile Design and Construction**

The primary goal of this course is to provide the target audience with guidance on when and where it is appropriate to use micropiles, and educate engineers about the state of the practice in the design and construction of micropiles. The course covers stepwise procedures for the design of micropiles for structural support and for slope stability applications. Construction, inspection and integrity-testing aspects and issues are discussed as well. Classroom presentations include exercises that will lead participants through the technical and cost feasibility aspects of structural support and slope stability design with micropiles. Each participant will receive a workbook and reference manual containing detailed micropile design examples for various applications.

FHWA-NHI-132012 Soils and Foundations course is a recommended prerequisite.

OUTCOMES

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

- Briefly describe the history and current status of the micropile industry
- Identify potential micropile applications
- Explain construction constraints, techniques, and performance
- Assess feasibility of micropiles for a given application
- Prepare conceptual and basic designs, and evaluate contractor-submitted designs
- Select appropriate specification/contracting method(s) and prepare contract documents
- Describe construction monitoring and inspection requirements

TARGET AUDIENCE

This course is directed toward practicing geotechnical, foundation, construction and bridge/structural engineers who have knowledge and experience in the design and construction of driven piles and drilled shaft foundations. Engineers involved with the design and construction of structure foundations will all benefit from this training, which builds upon the basic concepts presented in NHI courses FHWA-NHI-132012, FHWA-NHI-132014, and FHWA-NHI-132021.

TRAINING LEVEL: Intermediate

FEE: \$320 Per Person

LENGTH: 2.0 DAYS (CEU: 1.2 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Barry Siel • (720) 963-3208 • barry.siel@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov

**COURSE NUMBER**

FHWA-NHI-132079

COURSE TITLE**Subsurface Investigation Qualification**

This course is part of a series to develop a training and qualification/certification program for geotechnical inspectors and field personnel. The course follows FHWA guidelines and practices for subsurface investigations. Topics addressed in the course include exploration equipment and methods, safety, borehole sealing, drilling and sampling requirements and criteria, proper visual classification and description of soils and rocks, common drilling errors, and dealing with difficult subsurface site conditions. A 2-hour qualification exam is administered at the end of the course.

OUTCOMES

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

- Explain the investigation specialist's general role and duties, as well as the importance of coordination and communication with the field personnel and engineers
- Explain the purpose of geotechnical subsurface investigations and why adequate, consistent, and quality investigations are essential
- Identify the major components of the typical subsurface investigation plan
- Identify common drilling rigs, uses, and components
- Explain the importance of accurate borehole logging and documentation
- Describe the importance of accurate groundwater investigations
- Discuss safety issues involving operation of a drill rig

TARGET AUDIENCE

The target audience for this course includes drillers, drilling inspectors, engineers, geologists, and technicians involved in field data collection and quality assurance of subsurface investigations.

TRAINING LEVEL: Intermediate**FEE:** \$420 Per Person**LENGTH:** 3.0 DAYS (CEU: 1.8 UNITS)**CLASS SIZE:** MINIMUM: 20; MAXIMUM: 30**NHI Training Information:** (703) 235-0534 • nhitraining@dot.gov**Subject Matter Contact:** Ben Rivers • (404) 562-3926 • benjamin.rivers@fhwa.dot.gov**NHI Training Program Manager:** Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



COURSE NUMBER

FHWA-NHI-132080

COURSE TITLE

Inspection of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes

This course is part of a series to develop a training and qualification/certification program for geotechnical field inspectors. Topics addressed in the course include the types and durability of mechanically stabilized earth walls (MSEWs) and reinforced soil slopes (RSS); construction methods and sequences; alignment control; methods of fill and compaction control; plans, specifications, and the geotechnical report; shop drawings; and safety. A 2-hour qualification exam is administered at the end of the course.

The host/Local Coordinator is requested to provide about 50lbs. of sand (about 1 bag of play sand from a home improvement store, or concrete sand) for use in the demonstrations. About 25lbs. needs to be dry and the other half moist.

OUTCOMES

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

- Identify the basic MSEW and RSS types and design philosophy
- Explain the role and duties of the MSEW and RSS inspector
- Identify current practices for constructing MSE structures
- Define key inspection elements for MSEWs and RSS contract documents to assure compliance
- Explain the logical steps to ensure proper communication with engineers and field personnel

TARGET AUDIENCE

The target audience for this course includes inspectors (novice to senior level), engineers, geologists, and technicians involved in field data collection and quality assurance for MSEWs and RSS structures. In addition, managers; specification and contracting specialists; bridge/structure, geotechnical and roadway design engineers; and engineering geologists interested in construction aspects of MSEWs and RSS structures are encouraged to attend.

TRAINING LEVEL: Intermediate

FEE: \$420 Per Person

LENGTH: 3.0 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

NHI Training Information: (703) 235-0534 • nhitraining@dot.gov

Subject Matter Contact: Rich Barrows • (360) 619-7704 • rich.barrows@fhwa.dot.gov

NHI Training Program Manager: Louisa Ward • (703) 235-0523 • louisa.ward@dot.gov



Special arrangements are required for this course by the Host/Local Coordinator. Check the NHI Web site for details.