

**COURSE NUMBER**

FHWA-NHI-130126

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

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:** 2022: \$970 Per Person; 2023: \$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