

**COURSE NUMBER**

FHWA-NHI-135041

COURSE TITLE**One-Dimensional Modeling of River Encroachments with HEC-RAS**

The host is responsible for providing a minimum of one computer for each pair of participants. The computers shall have the following minimum specifications:

Intel Based Pentium processor higher (Pentium III or higher is recommended), Microsoft Windows 95, 98, ME with 212 MB of RAM (1 GB recommended) or Window NT 4.0, 2000, Vista, XP, 7, or 8 with 1 GB of RAM (1 GB recommended), including the .NET framework, a hard drive with at least 60 megabytes of free space (100 MB or more is recommended), CD-ROM drive, and 1024 x 768 color video display.

The course focuses on the use and application of HEC-RAS software, developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers. Modeling principles and techniques will be presented using the latest version of HEC-RAS.

HEC-RAS, River Analysis System, solves the conservation of energy equation for one-dimensional steady flow analysis to determine water surface elevations for a given discharge. The Standard Step solution scheme is used combined with Manning's equation to compute cross section conveyance which allows for the construction of backwater and forewater profiles under subcritical, supercritical, and mixed flow regimes. HEC-RAS is capable of simulating structures in natural waterways and constructed channels. Specifically, it has built-in functionality to simulate a variety of bridge types, culverts, roadway approaches/embankments, and roadway encroachments.

Prior to the beginning of the course, participants are strongly encouraged to enroll in the Web-based training entitled, 135091 Basic Hydraulic Principles Review. Mastery of the concepts covered in this WBT is important to successful completion of the Instructor-led training.

OUTCOMES

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

- Manage HEC-RAS files.
- Navigate the HEC-RAS windows.
- Describe the types of hydraulic modeling situations for which one-dimensional application of HEC-RAS is appropriate.
- Describe one-dimensional hydraulic modeling principles used in HEC-RAS including conservation of energy, mass, and momentum.
- Build input data files for use with HEC-RAS for steady state applications with and without roadway encroachments including bridges, culverts, and multiple openings.
- Develop one-dimensional water surface elevations and velocity estimates using the HEC-RAS computer program.
- View and manipulate the output from the HEC-RAS computer program.
- Evaluate hydraulic conditions using HEC-RAS modeling program through various transportation related hydraulic structures including weirs, culverts, and bridges.
- Identify and troubleshoot modeling problems, including those indicated by errors, warnings, and notes.

TARGET AUDIENCE

Federal, State, and local hydraulic engineers who have responsibility for the design and analysis of river systems and stream crossings. Participants should have experience in using the Windows environment and knowledge of the fundamentals of open channel flow, including basic understanding of HEC-2 or WSPRO.

TRAINING LEVEL: Intermediate

FEE: 2021: \$395 Per Person; 2022: N/A

LENGTH: 3 DAYS (CEU: 1.7 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

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