

**COURSE NUMBER**

FHWA-NHI-135065

COURSE TITLE**Introduction to Highway Hydraulics**

This course is based on Hydraulic Design Series No. 4 (HDS-4), "Introduction to Highway Hydraulics." The objective of the course is to provide a broad overview of basic highway drainage concepts. Fundamental hydraulic concepts are discussed, followed by open-channel flow principles and design applications of open-channel flow in highway drainage, including the design of stable channels, and pavement drainage. Closed-conduit concepts and applications in highway drainage include the application of culvert and storm drainage design. The presentation concludes with an introduction to concepts and design of energy dissipators. Detailed design criteria are drawn from other Hydraulic Design Series manuals and Hydraulic Engineering Circulars (HECs), providing a broad overview of all components of highway drainage design with an emphasis on practical applications. A portable hydraulic flume is set up in the classroom for the participants to observe numerous hydraulic principles. The participants take velocity and discharge measurements from the flume while in various setups and use the information to make design calculations.

OUTCOMES

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

- Calculate design discharge using the rational method or regression equation procedures
- Apply the continuity and energy equation to solve practical design problems
- Use the Weir equation to calculate the flow overtopping a roadway embankment
- Use Manning's equation to calculate velocity or flow depth in simple or compound channels and recognize when this equation cannot be appropriately applied
- Evaluate channel flow conditions (subcritical, critical, or supercritical) using the Froude number
- Design a stable channel using basic hydraulic concepts and Hydraulic Engineering Circular HEC-15
- Apply basic pavement drainage concepts in calculation procedures described in HEC-22
- Design a simple culvert crossing using the procedures in HDS-5
- Design a simple storm drain and calculate the Hydraulic Grade Line (HGL) using the energy equation and HEC-22
- Describe which energy dissipators are useful for culvert or storm drain applications based on HEC-14

TARGET AUDIENCE

Entry-level engineers or engineering technicians who are performing highway drainage calculations on transportation facilities. It will also be useful as a refresher course on hydraulic fundamentals for experienced personnel.

TRAINING LEVEL: Basic

FEE: 2021: \$390 Per Person; 2022: N/A

LENGTH: 3 DAYS (CEU: 1.8 UNITS)

CLASS SIZE: MINIMUM: 20; MAXIMUM: 30

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