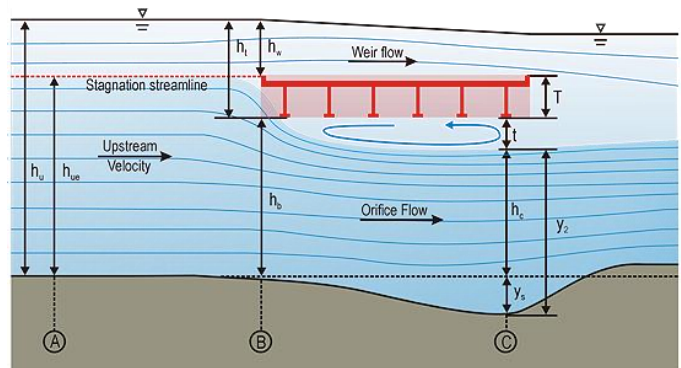


Presents a four day workshop on:

Hydraulic Design of Bridges Using HEC-RAS



**April 30, May 2, 7, and 9, 2019
(Tuesday and Thursday over two weeks)**

**Gonzaga University Campus
PACCAR Building, Room 210
Spokane, WA**

ASCE Inland Empire Section is pleased to present a four day workshop on the use of the hydraulic modeling tools in HEC-RAS. The hands-on workshop will cover the application of HEC-RAS (1D) to complete the hydraulic design of a bridge. It will cover topics such as flow determination, gradually varied flow, calibration and verification of existing water surface profiles, incorporating uncertainty in Manning's rough coefficients, modeling bridge hydraulics, setting ineffective flow areas, sizing the bridge opening, troubleshooting model warnings and notes, meeting FEMA no rise requirements, and analysis of bridge scour. The class will also include a basic introduction to HEC-RAS 2D (not at bridges) and provide a discussion on the applicability of 2D vs 1D modeling and an example 2D application. The guiding principles both 1D and 2D HEC-RAS models will be discussed throughout the workshop.

This workshop will take place on Tuesdays and Thursdays over two weeks. It will cover:

- Review of Open Channel Flow and Hydraulic Design of Bridges
- Intro to Course Project, Existing Conditions Model, Calibration and Verification
- Proposed Conditions Model, Bridge Modeling Approaches, Final Bridge Design
- Bridge Scour Analysis, Intro to HEC-RAS 2D

The instructor for the workshop is:

- Dr. Sue Niezgoda, PhD, PE, Gonzaga University

This course qualifies for 12 PDH continuing education hours.

Agenda:

Session 1

Tuesday, April 30, 2019

6:00 to 9:00 pm

Review of Open Channel Flow and Hydraulic Design of Bridges

Topics

- Objectives of Course
- Review of Open Channel Hydraulics (Manning's Equation, Energy, Momentum)
- Manning's n Uncertainty
- Hydraulic Design of Bridges
- HEC-RAS and Bridge Design

Session 2

Thursday, May 2, 2019

6:00 to 9:00 pm

Introduction to Course Project, Existing Conditions Model

Topics

- Intro to Bridge Design Project
- Existing Conditions HEC-RAS Geometry (Cross Section Locations, Manning's n, Reach Lengths) - Geometry File from AutoCAD
- Flow Determination and Boundary Conditions
- Existing Conditions Model Calibration and Sensitivity
- HEC-RAS Troubleshooting, Addressing Warnings and Notes
- Homework: Finalize Existing Conditions Model

Session 3

Tuesday, May 7, 2019

6:00 to 9:00 pm

Proposed Conditions Model, Final Bridge Design

Topics

- Bridge Hydraulics, Ineffective Flow Areas
- Bridge Modeling Approach
- Adding a Bridge to HEC-RAS
- Proposed Conditions Model, Initial Bridge Design, Checking Requirements
- Homework: Finalize Proposed Conditions Model and Bridge Design

Session 4

Thursday, May 9, 2019

6:00 to 9:00 pm

Bridge Scour Analysis, Intro to HEC-RAS 2D

Topics

- Discussion of Student Final Bridge Design and Requirements
- Bridge Scour, Types and Evaluation
- Calculating Bridge Scour using HEC-RAS
- Intro to HEC-RAS 2D and Suggested Applications
- Course Wrap-Up

Instructor Bio

Dr. Sue Niezgoda, PE, is an Associate Professor of Civil Engineering at Gonzaga University and a registered licensed engineer. She has an emphasis in water resources engineering and teaches and conducts research in the areas of hydrology, hydraulic engineering, stream restoration, sediment transport, hydrologic and hydraulic modeling, and uncertainty and risk assessment. Dr. Niezgoda is currently working on research project related to monitoring the effectiveness of beaver dam analogs to reduce downstream sediment loads and restoring depositional river valleys to a Stage 0 anastomosing channel network. She has also published a body of knowledge for the practice of stream restoration that can be used as a foundation for a national certification. Dr. Niezgoda is an active member of the ASCE EWRI Hydraulics and Waterways Council River Restoration Technical Committee and River Restoration Northwest, a nonprofit organization aimed at advancing the science and standards of practice of river restoration through an interdisciplinary process-based approach.

Registration

Cost: \$350.00 (includes all four evening workshop meetings and light refreshments)

Education Credit:

1.2 CEUs (12 PDHs) for attendance of this course.

Deadline Notice:

Space is limited to 25. To ensure participation, enroll early.

Early Registration will close on April 23, 2019.

If space available, late registration after this date will be \$400.

Registration:

Go to <https://ascetechnicalseminar.eventbrite.com> to register and provide payment

For more Information:

Contact: Alan Gay
(509) 328-5139 (telephone)
alan.gay@stantec.com