

Webinar Information

Log into Webinar

8:30 - 9:00 am CST

Morning Session

9:00 am - 12:45 pm CST

Break

12:45 - 1:15 pm CST

Afternoon Session

1:15 - 4:30 pm CST

Tuition

\$319 for individual registration.

\$289 for two or more registrants from the same company at the same time.

Included with your registration: PDF seminar manual.

How to Register

- Visit us online at www.halfmoonseminars.org
- Call customer service at 715-835-5900

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Culvert Design and Construction

Live, Interactive Webinar - Tuesday, February 20, 2024

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HalfMoon Education Inc.
PO Box 278
Altoona, WI 54720-0278



Learning Objectives

You'll be able to:

Identify types of culverts and their applications.

Discuss the basics of uniform and steady flow, and consider flow resistance and shear stress.

Explore USGS culvert flow types and learn the basics of inlet and outlet control.

Explore culvert design with the HY-8 Culvert Hydraulic Analysis Program.

Learn about culvert inspection, maintenance and repair.

Handle special situations for culverts, including culvert sags and inverted siphons.



HalfMoon Education Live Webinars

Culvert Design and Construction

Live, Interactive Webinar - Tuesday, February 20, 2024



Explore types of culverts and their applications

Learn about culvert maintenance and repair

Review the basics of open channel and culvert flow

Handle special issues, like sediment transport and the use of trash racks

Get tips on culvert design

Discuss the design of culverts with the HY-8 Culvert Analysis Program

Continuing Education Credits

Professional Engineers

6.5 PDHs

Landscape Architects

6.5 HSW CE Hours

6.5 LA CES HSW PDHs

Architects

6.5 HSW CE Hours

6.5 AIA HSW LUs

Floodplain Managers

6.5 ASFPM CECs

AIA
Continuing
Education
Provider



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Agenda

Presented by William Rahmeyer

Introduction to Culvert Design

- Culvert applications
- Types of culverts
- Design considerations
 - Design and check flow
 - Allowable headwater depth
 - Outlet velocity
 - Debris and sediment
- Current design tools and references

Basics in open channel and culvert flow

- Flow regime in culvert and channel flow
- Uniform and steady flow
- Energy, continuity, and momentum equations
- Foude number and critical depth
- Mannings's equation and normal depth
- Weir and orifice flow
- Flow resistance and shear stress
- Flow depths upstream and downstream of a culvert
- Types of flow and flow profiles in a culvert
- Hydraulic jumps
- Introduction to FHWA Hydraulic Toolbox for channel flow

Culvert Design

- USGS culvert flow types
- FHWA design concept of inlet and outlet control
- Basics of inlet control
- Basics of outlet control
- HDS-5 design factors
- Minimum performance concept of design
- The design process
- Calculate culvert flow and headwater for inlet and outlet flow
- Calculate outlet velocity
- Nomographs and the hydraulic elements chart
- Design example

Design of Culverts with HY-8 Culvert Hydraulic Analysis Program

- Software overview and installation
- Type of culverts
- Tailwater and downstream channels
- Inlet configurations, depressions, and culvert embedment
- Energy dissipators
- Software output
- Design example

Culvert Maintenance and Repair

- Inspection and assessment of culverts
- Culvert invert damage
- Repair or replacement
- Types of culvert repair
- Effect of repair or replacement on culvert and channel performance

Special Applications for Culverts

- Culvert sags and inverted siphons
- Adjustments to HY8 for additional energy losses
- Aquatic organism passage
- Sediment transport
- Sediment deposition and erosion
- Trash racks and divertors
- Culverts used with detention basins
- Driveway culverts

Credit Information

This webinar is open to the public and is designed to qualify for 6.5 PDHs for professional engineers, 6.5 HSW continuing education hours for licensed architects, and 6.5 HSW continuing education hours for landscape architects in all states that allow this learning method. Please refer to specific state rules to determine eligibility.

HalfMoon Education is an approved continuing education sponsor for engineers in Florida (Provider License No: CEA362), Indiana (License No. CE21700059), Maryland, New Jersey (Approval No. 24GP00000700) and North Carolina (S-0130). HalfMoon Education is deemed an approved continuing education sponsor for New York engineers and architects via its registration with the American Institute of Architects Continuing Education System (Regulations of the Commissioner §68.14(i)(2) and §69.6(i)(2)). Other states do not preapprove continuing education providers or courses.

The American Institute of Architects Continuing Education System has approved this course for 6.5 HSW LUs (Sponsor No. J885). Only full participation is reportable to the AIA/CES.

The Landscape Architecture Continuing Education System has approved this course for 6.5 HSW PDHs. Only full participation is reportable to the LA CES.

This Association of State Floodplain Managers has approved this course for 6.5 CECs for floodplain managers.

Attendance will be monitored, and attendance certificates will be available after the webinar for those who attend the entire course and score a minimum 80% on the quiz that follows the course (multiple attempts allowed).

On-Demand Credits

The preceding credit information only applies to the live presentation. This course in an on-demand format may not be eligible for the same credits as the live presentation; please consult your licensing board(s) to ensure that a structured, asynchronous learning format is appropriate. The following pre-approvals may be available for the on-demand format upon request:

6.5 HSW LUs (AIA), 6.5 HSW PDHs (LA CES), 6.5 ASFPM CECs

Faculty

William Rahmeyer

Emeritus Professor of Civil and Environmental Engineering at Utah State University

For 31 years Mr. Rahmeyer was on the faculty at USU, and for 10 years he was on the research faculty at Colorado State University. Mr. Rahmeyer is the past department head of Civil and Environmental Engineering at USU as well as the senior professor of the Hydraulics and Fluid Mechanics program of the Utah Water Research Laboratory. He also served at USU as the Director of the Hydro Composite Modeling Program. He was also the division head of Water Engineering, the interim division head of both the Structures Division and the Transportation Division, he also served as the Undergraduate Curriculum Division Head. He is currently a part time senior associate for Ayres and Associates in Fort Collins, Colorado, where his primary role is to conduct national workshops in hydraulics, culvert flow, and urban drainage for the National Hydraulic Institute of FWA. Mr. Rahmeyer is a Fellow and lifetime member in the American Society of Civil Engineers. He has been a member of several professional societies, and he served on committees for the American Society of Engineering Educators (ASEE), the American Society of Civil Engineers (ASCE), the International Association of Hydraulic Research (IAHR), the Association of State Dam Safety Officers (ASDSO), the Instrument Society of America (ISA), the American Water Works Association (AWWA), the International Erosion Control Association (IECA), and the American Society of Heating, Refrigerating and Air-Condition Engineers Association (ASHRAE). He has regularly attended and presented at the annual conferences of ASDSO, ASEE, ASCE, IAHR, ASCE National Department Heads, and the Transportation Research Board (TRB). In the past, he has been a member of the United States Committee on Large Dams (USCOLD) and the International Committee on Large Dams (ICOLD). Over the last several years, Mr. Rahmeyer has created and presented a workshop on open channel flow for Half Moon Education and finished serving on the Bluestone Dam UASCE IEPA and on several 100% DDR review panels for the USACE. He has been on the board of directors for the Utah Floodplain and Storm Water Management Association since 1986. Mr. Rahmeyer was a member the 2008 Bettelle “Final Independent Peer Review Report for U.S. Army Corps of Engineers on the Vegetation Policy for Local Flood Damage Reduction Systems” which reviewed many of the guidelines and policies for management of levees, floodwalls, embankment dams, and appurtenant structures. Some of his recent awards include the ASHRAE Technical/ Symposium Paper Award, the ASHRAE Crosby Field Award for Research, and the South Pacific Division Regional Project Delivery Team Award from the U.S. Army Corps of Engineers. He has received the Idaho Transportation Department 2012 Excellence in Transportation Award and the 2011 ACEC of Idaho Engineering Excellence Grand Award for the I-84 New York Canal modeling and modification. Mr. Rahmeyer further received an honorable mention at the 2012 National AECE award ceremonies for his work with the I-84 New York Canal.

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