

Credit Information

Open Channel Hydraulics and Design

This webinar offers 6.5 PDHs to professional engineers licensed in all states.

HalfMoon Education is an approved continuing education sponsor for engineers in Florida (Provider No. 0004647), Indiana (License No. CE21700059), Maryland, New Jersey (Approval No. 24GP00000700), North Carolina (S-0130), and North Dakota. HalfMoon Education is deemed an approved continuing education sponsor for New York engineers via its registration with the American Institute of Architects Continuing Education System (Regulations of the Commissioner §68.14(i)(2)). Other states do not preapprove continuing education providers or courses.

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

Completion certificates will be awarded to participants who complete this event, respond to prompts, and earn a passing score (80%) on the quiz that follows the presentation (multiple attempts allowed).

Stormwater Basins and Underground Systems

This webinar offers 6.5 PDHs to professional engineers and 6.5 HSW continuing education hours to architects licensed in all states.

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This course has been approved by the American Institute of Architects Continuing Education System for 6.5 HSW|LU (Sponsor No. J885) and the Landscape Architect Continuing Education System for 6.5 HSW PDHs. Only full participation is reportable to the AIA/CES and LA CES.

The International Code Council has approved this event for .65 CEUs in the specialty area of Sitework (Preferred Provider No. 1232).

Completion certificates will be awarded to participants who complete this event, respond to prompts, and earn a passing score (80%) on the quiz that follows the presentation (multiple attempts allowed).

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February Water Management Webinars

Open Channel Hydraulics and Design

- Friday, February 19, 2021 | 8:30 am - 4:30 pm CST

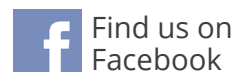
Stormwater Basins and Underground Systems

- Tuesday, February 23, 2021 | 9:00 am - 4:30 pm CST

**To register, view detailed presenter biographies,
and see other learning opportunities, please visit:**

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Friday, February 19, 2021 | 8:30 am - 4:30 pm CST

Credits: Professional Engineers: 6.5 PDHs
Floodplain Managers: 6.5 ASFPD CECs

Stormwater Basins and Underground Systems

Tuesday, February 23, 2021 | 9:00 am - 4:30 pm CST

Credits: Professional Engineers: 6.5 PDHs
Floodplain Managers: ASFPD Credit Pending
Architects: 6.5 HSW CE Hours AIA: 6.5 LU|HSW
Landscape Architects: 6.5 HSW CE Hours LA CES: 6.5 HSW PDHs
International Code Council: .65 CEUs (Sitework)

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Open Channel Hydraulics and Design

Friday, February 19, 2021 | 8:30 am - 4:30 pm CST (incl. a 60-min. break)

Tuition: \$289 per registrant, \$199 per registrant for three or more

Credits: Professional Engineers: 6.5 PDHs
Floodplain Managers: 6.5 ASFPM CECs

Understanding Open Channel Flow

Basic concepts of open channel flows	Uniform and normal flow
Steady and unsteady flow	Reynold’s number
Laminar and turbulent flow	Definitions
Gradually varied flow definition	Hydraulic radius
Continuity principle	Energy Principle
Examples of open channel flow	

Design Fundamentals of Open Channel Flow

Application example of the energy equation	
Channel shapes and properties	Manning’s Equation for normal depth
Compound channels	Specific energy diagram
Critical and normal depth	Calculating Froude number
Flow regimes of super and subcritical flow	Conservation of linear momentum

Flow Resistance in Open Channels

Flow shear	Rigid and alluvial (natural) boundaries
When Manning’s n is not constant	Cowan’s equation for additive resistance
Bed Forms	Vegetated surfaces
Iterative solution of normal depths using Manning’s equation	
HEC-RAS	Sediment and its effect on resistance

Principles of Open Channel Flow Design

Classification of water surface profiles	Upstream and downstream control
Synthesis of composite profiles	Rapidly varied flow
Hydraulic jumps	
Calculating flow depths in open channels (review)	
Floods and storm runoff	
Fluvial geomorphology and channel response	

Stable Channel Design

Example of solving an open channel problem with diverging flows
Sedimentation, erosion, and deposition
Channel bank and bed protection
Hydraulic structures used in open channel flow
Culverts, flumes, weirs, and gates
Principles of open channel design
Example of designing a trapezoidal channel

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Credits: Professional Engineers: 6.5 PDHs
Floodplain Managers: ASFPM Credit Pending Architects: 6.5 HSW CE Hours
AIA: 6.5 LU | HSW Landscape Architects: 6.5 HSW CE Hours
LA CES: 6.5 HSW PDHs International Code Council: .65 CEUs (Sitework)

Stormwater Management System Objectives and Design Considerations

Regulatory requirements associated with stormwater water quality and quantity

- Clean Water Act
- Federal, state and local requirements

Complying with stormwater regulations

Preparing a Stormwater Quality Management Plan (SWQMP)

- Stormwater goals
- Design considerations

Stormwater Basin/Underground System Design

Site consideration and assessment

Selection criteria

- Site considerations
- Watershed and topographical considerations
- Stormwater contents
- Community and environmental factors

Choosing Basin Types

Detention basins

- Stormwater routing, sediment handling, outlet
- Pre-treatment
- Maintenance and operations

Retention ponds

- Stormwater routing, sediment handling, soils and vegetation
- Pre-treatment
- Maintenance and operations

Forebay Infiltration basins

- Stormwater routing, sediment and chemical handlings, soils and vegetation
- Pre-treatment
- Maintenance and operations

Choosing an Underground Storage System

Detention/infiltration systems

- Type of storage – chambers, stone, custom design
- Pre-treatment
- Stormwater routing, infiltration, sizing, design criteria

Sustainable Best Practices in Stormwater Detention/Retention

Green infrastructure practices

Naturalizing detention/retention basins

Small detention areas vs. large detention area

Rain gardens

Underground storage and water reuse options

Faculty

Open Channel Hydraulics and Design

Dr. William J. Rahmeyer is an emeritus professor of Civil and Environmental Engineering at Utah State University (USU). In 2017, he retired from USU after 33 years with USU and before that, 10 years with Colorado State University. Dr. Rahmeyer has conducted research, published, and taught courses in hydraulics, fluid mechanics, open channel flow, hydraulic structures, and sediment transport for over 40 years. While at USU he served as the department head of Civil and Environmental Engineering and had a joint appointment as the senior professor of the Hydraulics and Fluid Mechanics program of the Utah Water Research Laboratory at USU. He is currently part time with Ayres and Associates where he teaches National Hydraulic Institute workshops in hydraulics and storm water design to State Department of Transportation agencies. Dr. Rahmeyer is a fellow in the American Society of Civil Engineers. His professional engineering license is in the State of Colorado. 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 International Committee on Large Dams (ICOLD).

Stormwater Basins and Underground Systems

B. Scott Southall *Principal at Earthcycle Design*

Mr. Southall, RLA, LEED AP BD+C, ASLA, AICP, is a principal with Earthcycle Design, LLC, a landscape architecture, urban planning and community resilience design firm, based in Lexington, Kentucky. He is a professional landscape architect in Kentucky and Ohio, a LEED accredited professional BD+C with the US Green Building Council (USGBC), and a certified planner with the American Planning Association. Mr. Southall has over 25 years of professional experience in planning, design and project management. He has applied his sustainability design experience on a multitude of projects ranging in magnitude and complexity including: urban and site design for institute and community facilities with an emphasis on education and public outreach pertaining to green infrastructure (GI), low impact development (LID) and sustainable sites. Mr. Southall has presented on an assortment of sustainable practices and topics at statewide, regional and national conferences. In 2008, he shared the State of Kentucky Governor’s Award for Environmental Leadership. In 2009, he received an Environmental Commission Award from Lexington-Fayette Urban County Government for his environmental outreach and sustainable design efforts in Lexington. Mr. Southall graduated from the University of Kentucky with a bachelor of science degree in Landscape Architecture. Currently, he serves as one of 12 Sustainable Champions for American Planning Association (APA), serves on the steering committee of Empower Lexington (a climate action plan to reduce CO2), and serves as treasurer for LFUCG’s Environmental Commission. In March 2017, Mr. Southall completed a three-day Climate Reality Leadership Corps training to become a climate reality leader and served as mentor in October, 2017. He is a past chapter president and trustee of Kentucky ASLA, past Board of Directors member for Southeast Stormwater Association (SeSWA), and Market Leadership Advisory Board (MLAB) member for USGBC Kentucky. Mr. Southall is a member of American Society of Landscape Architects and the American Planning Association.

Denise O’Meara, RLA, LEED AP, ASLA *Landscape Architect at Earthcycle Design*

Ms. O’Meara, RLA, LEED AP, ASLA, has extensive project experience in a variety of sectors, including general master planning, strategic planning, parks and recreational design for municipal and state government entities, K-12 and post-secondary educational institution and hospital master planning and site design, nature-based learning and play environments, and sustainable stormwater management. She brought the concept of sustainable building and site design through LEED accreditation early on to her firm. As a teacher and mentor, she has sought to give clients and up-and-coming designers a knowledge base and affinity for designing in a manner responsive to natural systems. Ms. O’Meara has a deep understanding that conservation of green space is a requirement for stormwater management, which is made possible through sustainable planning for livability within our population centers. She has written educational and informative articles and guides about the processes of land protection, and she has researched and put into practice those BMPs and conservation tools which promote sustainability and resiliency.