

Culvert Design for Peak Flow and Aquatic Organism Passage

Purpose and Background

Have you been asked to design a culvert? Maybe a new installation, but more likely a replacement for an existing culvert? Perhaps it's been a long time since you've done that and you feel that sense of panic creeping into your office. Or even if you're comfortable with culvert design, what about "aquatic organism passage" that keeps popping up in your State or agency? And how can that be incorporated with the latest software?

The purpose of this seminar is to increase your ability to confidently design culverts given the many policies either in place or being considered in your jurisdiction

The two day seminar will begin with a review of peak discharge methods and open channel flow. We will then discuss culvert basics and the unique world of culvert hydraulics. You will be asked to complete two workshops, each developed to illustrate common issues encountered when designing a culvert. A discussion of energy dissipation will follow with a workshop featuring the broken back culvert feature found in HY-8. The second day will conclude with a detailed discussion of aquatic organism passage including the basics, popular design procedures, and a workshop on the topic.

Upon completing the short course, participants will have a solid understanding of the policies and procedures involved in culvert design, and will be able to design a culvert including determining peak discharge and any Aquatic Organism Passage requirements.

Seminar Instructor

ROLLIN HOTCHKISS, PH.D., P.E., D.WRE, F.ASCE is a professor of civil and environmental engineering at Brigham Young University and holds the Ira A. Fulton College of Engineering and Technology professorship in leadership. Dr. Hotchkiss has authored more than 150 papers and reports dealing with topics ranging from determining peak flows in watersheds to turbulence in natural channels and culverts. His current research areas include designing culverts that allow upstream fish passage and using high quality datasets to compare current methods for predicting sediment transport in rivers. He has taught short courses in culvert design in more than 25 states to hundreds of practicing engineers and is the author or co-author of the most recent Federal Highway Administration design manuals on fish passage through culverts. Dr. Hotchkiss currently serves as the President of ASCE's Environmental and Water Resources Institute.

Summary Outline

Day One

- Introduction
- Overview and review of discharge methods
- Review of solved example problem
- Open channel flow
- Open channel flow
- Solution and discussion
- Culvert definitions and types
- Types of culvert flow
- Inlet vs. outlet control and design
- Conventional culvert design using HY-8

Day Two

- Pipe culvert design
- Solution and discussion
- Box culvert design
- Solution and discussion
- Energy Dissipation
- Broken back culvert design
- Solution and discussion
- Basics of Aquatic Organism Passage
- Overview of popular design procedures
- Step by step design procedures
- AOP design

Seminar Benefits

- Practice designing culverts for peak flow using national and local guidelines and policies
- Learn about the requirements for designing a culvert for aquatic organism passage
- Quickly evaluate alternative culvert designs to optimize for short- and long-term costs
- Use state-of-the-art computer programs in the short course and on the job
- Learn how to better interact with other design units in your organization
- Practice designing a culvert for aquatic organism passage
- Increase your net worth to your employer

Learning Outcomes

- Review methods of determining peak discharge for culvert design
- Understand the principles of open channel flow
- Design a standard culvert
- Design a culvert to reduce outlet velocity
- Design a culvert considering aquatic organism passage

Who Should Attend?

Engineers and scientists charged with the design of culverts for new installations, replacements, or rehabilitation for aquatic organism passage, or those who review and approve such designs.

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