Purpose and Background

One of the impacts of development is increased runoff from hard surfaces, such as parking lots, buildings and sidewalks. Many localities now require that the developer limit the peak runoff to pre-development levels, and some require the runoff volume be reduced to pre-development levels as well. The most economical way to accomplish this task is often through use of storm water detention ponds. Resource agencies are also pushing municipalities and transportation agencies to use more storm water ponds to improve water quality.

Storm water ponds can be designed to provide numerous functions, including reducing peak discharges and improving water quality. Improperly designed, they can be ineffective and even be a hazard to the public. This seminar will provide the student with the information needed to design an appropriately-sized storm water pond that will provide numerous benefits and limit liabilities.

It includes instruction in several different hydrologic methods to determine peak flows and flow volumes. It also provides guidance regarding locations of storm water ponds, whether they should be designed as “wet” ponds or “dry” ponds and some general design parameters. It provides information on routing hydrographs through a storm water pond. It also covers the impact that various outlet configurations have on the routing and the hydraulic analysis associated with various outlet structures. This course will provide step-by-step instructions from the beginning of the design process (rainfall), through the end of the design process (pond discharge). Because this is a design course, participants should bring a calculator.

The methods presented will be calculated by hand. Computer software will be discussed briefly, but the intent of this course is to develop an understanding of the principles used in computer methods. It is not intended to provide instruction on how to use any particular computer method.

Continued development means more hard surfaces. Without controls, it also means more floods and lower water quality, both within the development and in other areas. There is also additional emphasis being placed on the impacts of storm water discharges on receiving streams. Properly designed storm water ponds can limit the impacts of development and improve water quality.

Seminar Instructor

MARK PETERSON, P.E. is currently a special-projects engineer with Advanced Engineering and Environmental Services in Helena, Montana. He has been practicing engineering for 38 years and is registered in Montana, Wyoming, North Dakota, South Dakota and Minnesota. He has worked in state government in highway design and subdivision review. He has also worked as a consultant for over 20 years. He has taught courses in storm drainage for municipalities and regulatory agencies and currently teaches courses for ASCE in detention pond design, pipe material selection, storm sewer design, practical hydrology and storm water treatment. He has also been published in the ASCE Journal of Hydraulic Engineering. Mark earned his BS and MS degrees from Montana State University.
Summary Outline

- Rainfall data
- Time of concentration
- Rainfall runoff modeling - using the Rational Method to generate an inflow hydrograph
- Outlet capacity design and analysis - why assuming a constant outflow is a very bad assumption
- Inlet grates as detention pond outlets
- Detention pond volumes - frustums, contours, average end areas
- Routing a hydrograph through a detention pond
- Wet vs. Dry ponds – Routing differences
- Impacts of ponds on water quality
- Underground detention facilities
- Hazards of Detention Ponds and when not to use them
- Risks
- Software

Seminar Benefits

- Understand the interaction between numerous variables in rainfall/runoff models
- Learn how to create a design storm from rainfall information
- Learn several methods of developing a runoff hydrograph
- Calculate the capacity of different types of outlet structures, including the impacts of pipes from these structures
- Examine the maintenance and operational advantages and disadvantages of different types of outlet configurations
- Learn how to properly route a hydrograph through a detention pond
- Understand why detention ponds have limited impact on water quality

Learning Outcomes

- Use the Rational Method to develop an inflow hydrograph, including selection of appropriate rainfall intensity values and runoff coefficients
- Determine the capacity of various pond outlet configurations, including those with weirs and orifices
- Determine how an inflow hydrograph is routed through a storm water pond
- Determine appropriate volume for a storm water pond

Who Should Attend?

This course is for anyone involved with the design of storm water ponds. This includes design engineers, regulatory officials and architects. The course is technical in nature but the equations used are not complicated.

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