

RIVER ENGINEERING FOR HIGHWAY ENCROACHMENTS COURSE

The Colorado Association of Stormwater and Floodplain Managers (CASFM) is pleased to offer a National Highway Institute course as a continuing education opportunity for all CASFM members.

- Date & Time:** August 12, 13, and 14th from 8:30am until 4:30pm each day
- Food:** Morning and afternoon refreshments.
Lunch is on your own, (ie. sack lunch or restaurants near by)
- Location:** Holiday Inn Northglenn
10 East 120th Avenue
(Southeast Corner of I-25 and 120th Avenue)
- Room:** Cripple Creek/Wolf Creek (Holiday Inn Northglenn lower level)
- Course Instructors:** See Attached Descriptions
- Course Outline:** See Attached Description
- Registration:** Registration for the course is limited to the first 30 people who contact Kevin Gingery by phone or e-mail with their desire to attend the course and return a check for the registration amount as soon as possible thereafter. No registrations will be accepted by fax. No refunds will be made within 10 days before the course. Substitutions before the course begins are welcome.
- Registration Fee:** \$ 365.00 per person (CASFM Members)
\$ 450.00 per person (Non-CASFM Member)
- Checks Payable To:** CASFM
- Mail Checks To:** Kevin Gingery
City of Loveland
Service Center
200 N. Wilson Avenue
Loveland, CO 80537
- Questions:** Contact Kevin Gingery
970-962-3571
gingek@ci.loveland.co.us

COURSE INSTRUCTORS

Dr. P.F. Lagasse is a senior vice president with Ayres Associates in Fort Collins, Colorado. Prior to entering private practice in 1981, Dr. Lagasse gained 20 years of engineering experience with the U.S. Army Corps of Engineers and academic assignments at the U.S. Military Academy, West Point, New York. Since 1989, Dr. Lagasse has been principal instructor for FHWA projects to develop and present training courses on stream stability and scour at highway bridges. As part of these projects, he is senior author of HEC-20, "Stream Stability at Highway Structures" and HEC-23, "Bridge Scour and Stream Instability Countermeasures." He is also a technical contributor to HEC-18, "Scour at Bridges." He prepared the Instructor Guide and Participant Workbook that support the National Highway Institute Training Course on Stream Stability and Scour at Bridges and managed, scheduled, and participated in the presentation of this course more than 180 times to state DOTs. In cooperation with FHWA reviewers, he recently completed extensive revisions of this course and developed NHI's new countermeasure design course.

Dr. Larry Arneson is a Senior Hydraulics Engineer with the Federal Highway Administration's Western Resource Center. Dr. Arneson has more than 20 years of hydrologic and hydraulic engineering experience for transportation related projects and has had extensive involvement with research in the areas of scour and stream stability. Areas of expertise include bridge scour, stream stability, sediment transport, and computer modeling. He has contributed to the development of HEC-18, "Scour at Bridges," HEC-20, "Stream Stability at Highway Structures," and HEC-23, "Bridge Scour and Stream Instability Countermeasures." Dr. Arneson has contributed extensively to the planning and development of the National Highway Institute's courses and training materials that teach the content of the above referenced publications. He has been involved in numerous presentations of the course materials. Dr. Arneson is one of FHWA's senior policy experts on the national bridges scour assessment program.

Dr. L.W. Zevenbergen is a hydraulic engineer and Manager of River Engineering with Ayres Associates in Fort Collins, Colorado. Dr. Zevenbergen has more than 15 years of experience in hydrology, hydraulics and sediment transport and is a licensed engineer in three states. His areas of expertise include bridge hydraulic design and scour analysis, stream stability, sediment transport, and One- and Two-Dimensional hydraulic computer modeling. He is a contributor to HEC-18, "Scour at Bridges," HEC-20, "Stream Stability at Highway Bridges," HEC-23, "Bridge Scour and Stream Instability Countermeasures," and HDS-6, "River Engineering for Highway Encroachments." He is a National Highway Institute certified instructor and, in addition to teaching courses related to scour and river engineering, teaches the NHI HEC-RAS (River Analysis System) course. Dr. Zevenbergen has extensive involvement in developing and applying methods for hydraulic and scour analysis of tidal bridges and is currently working on HEC-25, "Tidal Hydrology, Hydraulics and Scour at Highway Bridges."

Course Title: River Engineering for Highway Encroachments

Course Number: 135010 (3 days – CEU: 1.8 Units)

Description: This course provides training in the application of open-channel flow, fluvial geomorphology, sediment transport, and river mechanics to the planning, location, design, construction, maintenance, and operation of highways. Material for this course comes from Hydraulic Design Series 6 (HDS 6) and includes detailed coverage of sediment transport equations and computations. Additional topics include: stream gaging, sediment measurement, bank protection, and river training works. Case histories provide practical examples of problems that occur at highway crossings and encroachments of streams and rivers, and a computer-generated 360 degree virtual tour site visit is used for a comprehensive workshop. Example problems will be worked by the course participants.

Objectives: Upon completion of the course, participants will be able to:

- Apply open channel flow equations and concepts in the design and evaluation of highway hydraulics structures
- Determine resistance to flow and sediment transport at highway crossings
- Evaluate the interrelationships between fluvial (river) geomorphology and hydraulic design
- Determine the stability or potential instability of rivers at highway encroachments and crossings
- Determine countermeasures for river channel instability
- Design riprap to control river bank erosion
- Integrate river mechanics equations, concepts and principles into the design, maintenance, evaluation and inspection of highways in the river environment

Target Audience: Engineers who are responsible for the evaluation of stream stability and the design of highway hydraulic structures. The course is designed for graduate engineers (BS) who have been trained in basic hydraulics of rigid-boundary, open channel flow.