

26th Annual

**CASFM**

2015

C o n f e r e n c e

***STORMWATER:  
Back to the Future***



**2015 CASFM CONFERENCE**

Vail, Colorado | September 22 – 25





# 26th Annual 2015 CASFM CONFERENCE Vail, Colorado | September 22 – 25

## STORMWATER: Back to the Future

Welcome back to scenic Vail!

Thank you all - presenters, sponsors, and attendees - for your participation in this conference that make it meaningful and memorable! This is certainly one of the main events of the CASFM organization each year and we appreciate your involvement. We have many great presentations on advancements in stream restoration, technical modeling, water quality and emergency preparedness, and we are excited CASFM provides a platform for industry leaders to share their knowledge on these topics.

Our theme, "Back to the Future," centers around paradigm shifts in stormwater management where, after many years of engineering stormwater infrastructure, we are now trying to return back to natural systems. Our keynote speaker, Andy Reese, returns to CASFM after presenting on a related topic in 2002. Andy, a former CSU graduate, travels from Tennessee for this conference. He co-authored an authoritative and best-selling textbook on Municipal Storm Water Management.

Featured speakers are Glenn Johnson and Carter Hubbard traveling from Nebraska to showcase their \$72 million Antelope Creek restoration project. The project was submitted as a technical paper, but was selected as a project of interest to all attendees. We appreciate their participation in the CASFM conference.

Sarah Houghland is making her debut to the conference committee this year and has devoted many hours to organizing the conference. In addition to her work, the following individuals donated countless hours to CASFM to organize this year's conference:

- Stuart Gardner, Facilities Chairman & Web Master
- Aaron Cook, Registration
- Deb Ohlinger, Vendors & Sponsorships
- John Pflaum, Project Awards
- Doug Trieste, Field Trips Coordinator
- Rich Ommert, Bike Tour Coordinator
- Dave Center, Golf Tournament
- Janae Newman & Blake English, Conference Announcement & Brochure

We hope that you find the conference to be beneficial, educational and worthwhile! Thanks for coming to Vail! We look forward to your participation in the CASFM annual conference.

Sarah Houghland  
Program Chairperson

Robert Krehbiel,  
Conference Chair



Sarah Houghland  
Program Chairperson



Robert Krehbiel,  
Conference Chair



### THANKS TO OUR SPONSORS!

**Gold Level:** Contech, ERO Resources Group, RESPEC Consulting & Services, Oldcastle Precast, Muller Engineering Company, Triton Environmental

**Silver Level:** Anderson Consulting Engineers, Advanced Drainage Systems, BASF Corporation, Blocksom & Company, Bohannon Huston, Inc., Borgert Products, Inc., Briery Associates, Flashfill Services, FLO-2D Software, Inc., Giddy Up, Inc., Hane Geo-Components, Lynker Technologies LLC, Michael Baker International, Oldcastle Stormwater Solutions, Upstream Technologies

**Bronze Level:** AMEC Foster Wheeler, Ayres Associates, Merrick & Company, SEH

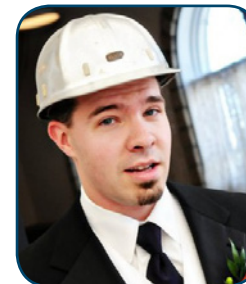
### 2015-2016 OFFICERS AND REGIONAL REPRESENTATIVES



**CHAIR**  
Shea Thomas  
Urban Drainage and  
Flood Control District



**VICE CHAIR**  
Brian Murphy  
CDM Smith



**TREASURER**  
Brad Bettag  
CH2M



**SECRETARY**  
Danny Eisner  
CH2M



**METRO REGION**  
Drew Beck  
Matrix Design Group



**NORTHEAST REGION**  
Brian Varrella  
CDOT Region 4



**NORTHWEST REGION**  
Betsy Suerth  
Garfield County



**SOUTHEAST REGION**  
Keith Curtis  
Pikes Peak Regional Bldg



**SOUTHWEST REGION**  
VACANT



## TABLE OF CONTENTS

Workshops	4
Field Trips	6
Golf Tournament	7
Featured Speakers	8
2015 CASFM Award Finalists	9
Conference Schedule	12
Tuesday, September 22 <sup>nd</sup>	12
Wednesday, September 23 <sup>rd</sup>	12
Thursday, September 24 <sup>th</sup>	15
Friday, September 25 <sup>th</sup>	19
Presentation Abstracts	20
Outgoing CASFM Officers	32
Sponsors	33
Conference Facilities Map	38





## WORKSHOPS

### HEC-RAS 2-D BASICS FOR DUMMIES

Tuesday, September 22<sup>nd</sup>, 2:00 pm

Max Shih & Chris Shrimpton - AECOM

#### What Will You Learn?

This workshop will focus on the basic knowledge and applications of two-dimensional (2-D) flood inundation modeling using the new version of the U.S. Army Corps of Engineers' HEC-RAS 5.0, which has been significantly improved and includes new abilities. One of them is to perform two-dimensional (2-D) hydrodynamic flow routing. Audiences will learn the basic theory of 2-D unsteady flow modeling and its common applications. The class exercises will be practically carried out by creating a 2-D HEC-RAS model and delineating flood inundation extents. Every class exercise will be performed based on working through each key element step-by-step. The subjects that will be covered in this course are:

- 1) Introduction of HEC-RAS 5.0 2-D Flood Hydraulic Routing
- 2) Creating and running your first 2-D HEC-RAS model, step-by-step
- 3) Exporting modeling results
- 4) Delineating flood inundation extents using RAS Mapper
- 5) Identifying common modeling errors and troubleshooting

This workshop is suitable for engineers, technicians, and current HEC-RAS users responsible for flood inundation delineation and unsteady flow modeling.

Note: Please bring your own laptop with the HEC RAS 5.0 beta software installed. Here is the link to the latest version:  
[http://www.hec.usace.army.mil/misc/files/ras/HEC-RAS\\_5.0\\_Beta\\_2014-10-01.exe](http://www.hec.usace.army.mil/misc/files/ras/HEC-RAS_5.0_Beta_2014-10-01.exe)

Please note that power outlets will be available but may be limited in the conference room. An extra computer battery is suggested. If you have issues installing the software, please contact Max Shih at Max.Shih@aecom.com.

### SHORT COURSE ON BIORETENTION PLANNING, DESIGN & MAINTENANCE

Tuesday, September 22<sup>nd</sup>, 2:00 pm

Chris Olson – Colorado State University  
Holly Piza - UDFCD

This workshop will provide an overview to planning, design and long-term maintenance of bioretention (aka - rain garden/porous landscape detention) best management practices with the overall goal of providing participants with relevant information and knowledge to increase the successful application of these facilities. The workshop will include new information on filter media specifications, forebay design and underdrain design that is not currently available in any design criteria manual. The target audiences for this workshop include (but are not limited to); design engineers, design reviewers, landscape architects and municipal planners.

## WORKSHOPS

### FLO-2D WORKSHOP

"Predicting Urban Flooding -

An Integrated Two-Dimensional Flood Routing Model with a Storm Drain Component"

Wednesday, September 23<sup>rd</sup>, 1:30 pm

Jim O'Brien, Ph.D., P.E.;  
Noemi Gonzalez-Ramirez, Ph.D. - FLO-2D

The three-hour FLO-2D workshop will focus on urban storm drain modeling. Modeling details as buildings, walls, street flow, drainage channels, and storm drains are required to accurately flood urban flood hazards. FLO-2D now has a storm drain component that fully integrates the surface water and storm drain system exchange including inlet control, return flow, outfall to channels and basins, manhole cover popping, street cross slope and curb heights. No other combined 2-D flood routing and storm drain model can predict storm drain inlet control and outfall control based on water surface elevation and inlet/outlet geometry. The workshop will be an introduction to the FLO-2D storm drain component using a free 90-day workshop license.

Note: Bring laptops with the FLO-2D model installed. A download link to the complementary FLO-2D license and 90-day activator will be emailed to everyone that is registered for the workshop prior to the start of the workshop. If you have issues installing the software, please contact Karen O'Brien, FLO-2D Technical Support, at karen@flo-2d.com.

#### Workshop Agenda

- 1:30 - 2:00 *Introduction and Overview of the FLO-2D Pro Model.*
- 2:00 - 3:00 *Overview of the FLO-2D storm drain component.*
- 3:00 - 3:30 *Break*
- 3:30 - 4:15 *Setting up a simple integrated surface flooding and storm drain model.*
- 4:15 - 5:00 *Storm drain details and guidelines. Reviewing results.*

Power Point presentations and workshop documents including the FLO-2D Storm Drain Manual will also be provided as part of the FLO-2D license download. CASFM Conference and FLO-2D workshop registration is necessary in order to be able to download the FLO-2D software which can be used freely for 90-days. Please note that power outlets will be available but may be limited in the conference room. If you can bring one, an extra computer battery is suggested.

### CULVERT HYDRAULICS WORKSHOP

Friday, September 25<sup>th</sup>, 9:00 am

John Hunt – Ayres Associates

The Culvert Hydraulics workshop is an interactive flume demonstration, and participants will learn the essential elements of the hydraulic analysis and design of culverts. By the end of the workshop, attendees will have received instruction on factors affecting culvert capacity; inlet control vs. outlet control; and effects of barrel roughness, size, shape, slope, and inlet treatment.





## FIELD TRIPS AND GOLF TOURNAMENT

### SWAN RIVER RESTORATION PROJECT

Friday, September 25th, 9:00 am

Coordinator: Doug Trieste, Flow Technologies

On Friday, a guided field trip along the Swan River near Breckenridge that will highlight the “before” conditions along the Swan River prior to the initiation of the **Swan River Stream Restoration** Design-Build project. When the project is finished (and when the conference is back in the project’s vicinity), CASFM intends to offer a follow-up field trip to show the “after” conditions.

The group will meet in the Centennial Ballroom following the Closing Remarks for a brief presentation by Justin Lederer with Summit County’s Open Space and Trails Department before meeting at the Swan River project site at 11:00 am. If you can not participate in the on-site field visit, you can still attend the presentation to learn about the project. Maps to the project site will be handed out during the presentation on Friday morning.

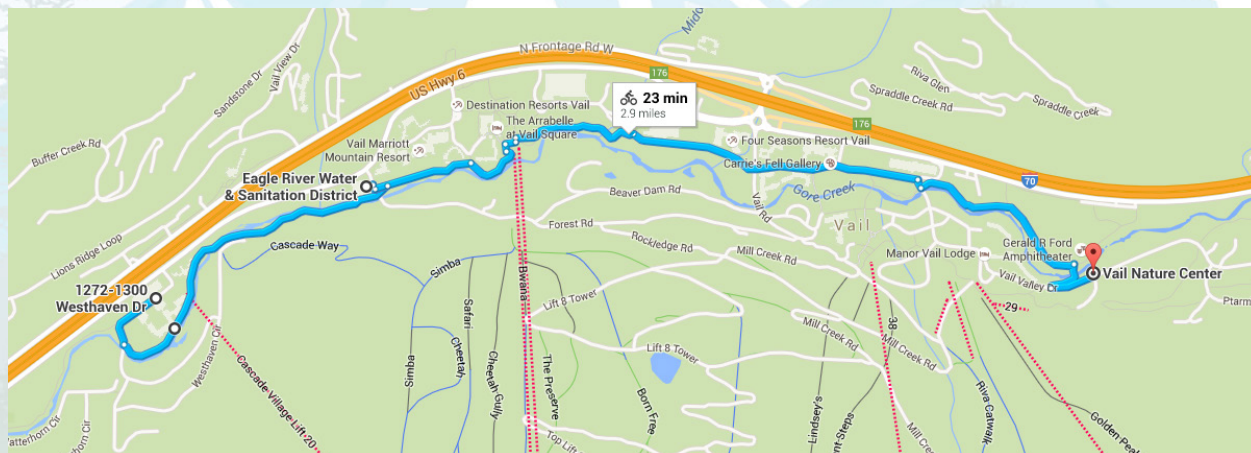
### MOUNTAIN BIKE TOUR – GORE CREEK

Friday, September 25th, 9:00 am

Coordinator: Rich Ommert, RESPEC

Join us on a morning bike tour through Vail to learn more about the causes of water quality impairment on Gore Creek and the current efforts underway to address these issues. We will meet as a group in front of the Vail Cascades Resort and then head east along Gore Creek via a network of bike trails and low-traffic roads. Along the way we’ll stop to look at some key points of interest on the creek and we’ll also have a quick chat with a Town of Vail representative who is familiar with local stormwater management concerns and initiatives.

This will be an out-and-back trip, with approximately 500 ft of elevation gain and loss over the course of 6 miles. Bikers of all abilities are welcome to join. Please be sure to bring water, sun protection, and a small snack with you – we’ll be out from 9am to noon.



Map Link: <https://goo.gl/maps/yIBNX>

### CASFM GOLF TOURNAMENT

Friday, September 25th, 9:30 am

Sponsored by Oldcastle Precast

The elevation changes on the magnificent EagleVail layout will have you talking about your shots long after you hole-out on #18. (Golf View, July 2007)

Created by the Devlin/Von Hagge design team, EagleVail Golf club is full of elevation change and unique play. Elevated tees guarantee gravity-defying drives in the rarefied air, and, at 6836 yards, beginners won’t be intimidated and experienced golfers will be well-challenged.

The front nine meanders through the valley floor, crossing the scenic Eagle River several times. After this pleasant warm-up, you are ready for the thrilling back nine that winds up the mountain-side through aspen, lodgepole pine and fir – the only excusable distraction from your golf game comes from the stunning setting!



WHO:	All Conference Participants, Family Members, Sponsors and Exhibitors
WHERE:	EagleVail Golf Club
WHEN:	Friday, September 25, 2015 at 9:30 am
COST:	\$89 Entry Fee per Person payable to CASFM (includes cart, green fees, range balls and prizes)
FORMAT:	Four-Person Scramble







26th Annual  
2015 CASFM CONFERENCE  
Vail, Colorado | September 22 – 25

# STORMWATER: Back to the Future

## KEYNOTE SPEAKER: ANDY REESE

The conference Keynote Speaker this year is Andrew Reese, Vice President at AMEC Foster Wheeler. Andy has over 35 years of experience in a wide variety of stormwater management, water resources, hydraulic and hydrologic engineering research and management roles. With over fifty articles and refereed papers, he is a noted writer and also a popular public speaker having given over twenty key note addresses including the first STORMCON and the first WEFTEC Stormwater Congress. Andy is the co-author of the best-selling Municipal Stormwater Management and has performed research for the Corps of Engineers in hydrology, hydraulics and taught at Vanderbilt University, as well as numerous short courses and lectures.

Andy was CASFM's keynote speaker in 2002 on Stormwater Paradigms, which was one of the most memorable presentations on how the industry has come full circle from engineered systems back to restoring natural systems. Each approach, or stormwater paradigm, seemed to solve an immediate problem, but also seemed to create a more difficult problem in its place. Recently we have arrived full circle; we have gone Back to the Future realizing that natural systems can teach us a few things about stormwater management



## FEATURED SPEAKERS



GLENN JOHNSON



CARTER HUBBARD

This year's Featured Speakers are Glenn Johnson from the Lower Platte South Natural Resources District and Carter Hubbard from Olsson Associates. They will present Antelope Creek Daylighting for Flood Reduction. The \$72 million project in Lincoln, Nebraska, designed by the US Army Corps of Engineers and completed in 2010, reduces average annual flood damages and removed 835 buildings and 1,200 residents from the 100-year floodplain. The Project constructed a new vegetated open channel parallel to a 4,000-foot section of Antelope Creek, buried in conduit in 1918, along with enlargement of the upstream and downstream existing channel.

## 2015 CASFM AWARD HONORABLE MENTION PROJECTS

### POST-FLOOD HYDROLOGIC EVALUATION

Colorado Water Conservation Board (CWCB)  
Colorado Department of Transportation (CDOT)

### THE SUPPLY IRRIGATING DITCH COMPANY DIVERSION STRUCTURE, LYONS, COLORADO

Supply Irrigating Ditch Company  
S2o Design and Engineering

#### Thanks to this year's selection panel:

Pete Dougherty, City of Arvada  
David Hollingsworth, City of Longmont  
John Pflaum, UDFCD  
Alan Searcy, City of Lakewood

## 2015 CASFM AWARD FINALISTS



### JOHNSON HABITAT PARK AT THE SOUTH PLATTE RIVER

Denver, CO City and County of Denver

Urban Drainage and Flood Control District, ICON Engineering, Inc., DHM Design

Johnson-Habitat Park at the South Platte River is a premier outdoor environmental educational center that is used by a non-profit organization to host educational programs. Several iconic classrooms are included on site to provide gathering spaces for the students. Johnson-Habitat represents the culmination of a four-year partnership with The Greenway Foundation, the community, the City, and local and national parks and planning groups. Eight stakeholder groups were consulted throughout the design process. The partnership began in pre-design, and continued through the construction of the site. The project team met with community members, directors of The Greenway Foundation, and environmental educators to ensure a functional and appropriate site design. Community members even helped with the assembly of decorative tile patterns in the summer of 2014 that were incorporated into the outdoor classrooms during construction.

Johnson-Habitat is the outcome of an intensely collaborative process between the design team, the City and County of Denver, the community, and non-profit organizations.

The park is a premier outdoor environmental educational center that serves a local non-profit in their efforts to build awareness and appreciation for Denver's waterways.





## 2015 CASFM AWARD FINALISTS

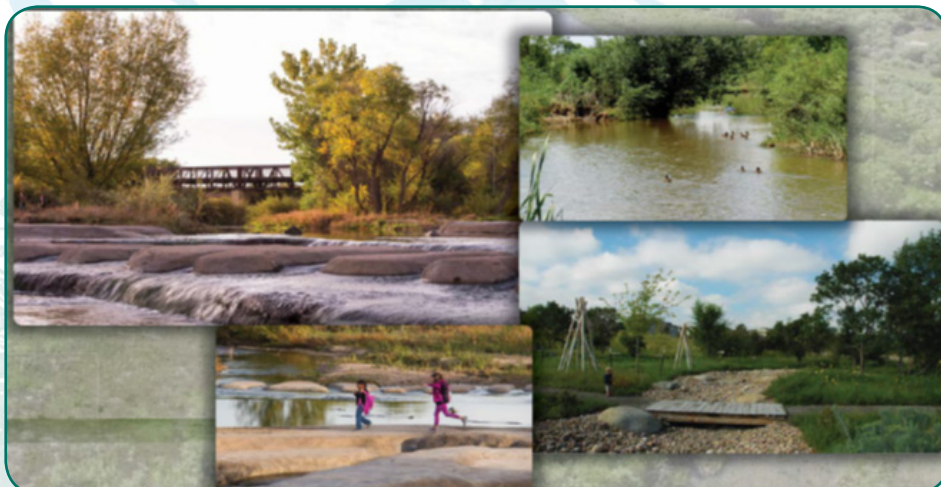
### CHERRY CREEK VALLEY ECOLOGICAL PARK

Arapahoe County Open Space, Southeast Metro Stormwater Authority, Urban Drainage and Flood Control District, Cherry Creek Basin Water Quality Authority, Muller Engineering Company, Valerian

When residents visit the Cherry Creek Valley Ecological Park and walk its trails, they discover a natural riparian area that's home to numerous wildlife and native plant species. The Eco Park was initially designed in 1999 to be a special place where visitors enjoy a natural setting illustrating the different ecosystems working together to create habitat for animals as well as a system of pathways and opportunities for human recreation. Urbanization and the resulting increase in storm runoff took a toll on the area's natural systems, leading to stream erosion, loss of vegetation, degraded water quality, and infrastructure damage. To manage these effects, Southeast Metro Stormwater Authority (SEMSWA), Cherry Creek Basin Water Quality Authority (CCBWQA), Urban Drainage and Flood Control District (UDFCD), Arapahoe County Open Space, and City of Centennial partnered in a project that provided a connected stable stream corridor and expanded recreational and educational amenities in this beautiful ecological park.

The Eco Park is a 75 acre open space located along a 5,100-foot reach of Cherry Creek upstream of Cherry Creek Reservoir in Centennial, Colorado. The Eco Park is located within the Cherry Creek watershed and has a contributing basin area of approximately 350 square miles that generates a 100-year flow rate of approximately 47,000 cfs. The project's stream restoration improvements included a series of riffle structures and sculpted concrete structures to raise/restore and stabilize the actively eroding channel. Secondary channels were also created along with over a mile of bio-engineered bank protection, overbank grading, stabilization of tributaries that enter Cherry Creek, an extensive planting plan, and much more. All stream restoration improvements preserved/enhanced drainage and wildlife benefits/improved ecological function; projected and enhanced water quality; and maintained the natural qualities of the corridor. Educational and recreational amenities within the project site were improved as well. A one mile long crusher fines trail loop, including a new trail crossing over Cherry Creek, was constructed. A series of smaller informal crusher fines trails, a stepping stone crossing, and a new boardwalk were constructed to provide park users with more access to the creek/nearby elementary school/adjacent riparian areas. Signage, picnic tables, benches, and two outdoor classrooms were also created along with a children's "Creekside Quest" playscape area.

The project was initiated late 2009. Preliminary and Final Design Phases were completed from winter 2010 to summer 2012, with construction starting in fall 2012. Heavy construction was completed in the summer 2013 with a supplemental planting phase taking place in the spring 2014. The overall project cost was \$5,025,000. In the end, this project is evidence that preserving drainageways within urban settings and complementing them with educational and recreational facilities provides value to both the public and surrounding environment.



## 2015 CASFM AWARD FINALISTS

### ROARING FORK RIVER RESTORATION AT BASALT, CO

Town of Basalt

Matrix Design Group, Inc., DHM Design

The river restoration project relocated 341 citizens living in the floodway, and transformed a highly degraded section of the Roaring Fork River corridor into a vastly improved riparian environment with public access to the river in appropriate locations, fishery enhancements, riparian edge treatments, opportunities for ecological interpretation, and floodplain connection within the center of Basalt.

The project represented a collaborative and comprehensive approach to achieving a number of long standing social, environmental, and economic and community goals detailed in the Town's River Stewardship Master Plan, including a riverfront park, relocating residents out of a flood hazard area, and transforming a prominent downtown corner location.

A critical component of the project involved relocation of the Mobile Home Park residents. The Town decided the best use of this floodplain land was for a river front park in the low land area, and development in elevated areas. The development opportunity was the critical financial catalyst to fund restoration of the Roaring Fork River to a more natural and scenic condition, and enhance the fishery expected of a Gold Medal stream by removing the levee and unnatural material buried in the bank.



#### PROJECT COMPONENTS

- River restoration by the removal of a levee
- Creation of a spawning channel and trout habitat
- Establishment of riparian zones along the bank
- Creation of wetlands
- Channel stabilization using bank armorment and deflectors
- Site elevation to remove developable land out of the floodplain
- Sanitary sewer main enlargement and protection under the river

#### PROJECT FACTS

**Project Budget: \$7,500,000**

#### Project Schedule

- Master Plan (2002)
- Engineering (2011-2013)
- 404 & CLOMR Permitting (2013)
- Financing Plan (2013)
- Bond Issue (2013)
- Relocations (2013-2014)
- Construction (2013-2015)







## CONFERENCE SCHEDULE

### TUESDAY, SEPTEMBER 22<sup>nd</sup>, 2015

- 8:00 am—5:00 pm **CERTIFIED FLOODPLAIN MANAGER TRAINING SESSION**  
Location: Rocky Mountain Ballroom  
Jamie Prochno, Kevin Houck—Colorado Water Conservation Board  
Craig Jacobson—ICON  
Chris Tagert – Michael Baker International
- 2:00 pm—5:00 pm **HEC-RAS 2-D BASICS FOR DUMMIES**  
Location: Centennial A/B/C  
Max Shih & Chris Shrimpton – AECOM
- 2:00 pm—5:00 pm **SHORT COURSE ON BIORETENTION PLANNING, DESIGN & MAINTENANCE**  
Location: Centennial E/F  
Chris Olson – Colorado State University  
Holly Piza – UDFCD
- 5:00 pm—8:00 pm **DINNER ON YOUR OWN**

- 8:00 pm—9:00 pm **ICE BREAKER SOCIAL HOUR**  
Location: Creekside Deck  
Sponsored by Triton Environmental



### WEDNESDAY, SEPTEMBER 23<sup>rd</sup>, 2015

- 7:00 am—10:00 am **CERTIFIED FLOODPLAIN MANAGER EXAM**  
Location: Rocky Mountain Ballroom  
Jamie Prochno—CWCB
- 8:00 am—9:00 am **REGISTRATION AND BREAKFAST**  
Location: Downstairs Lobby  
Aaron Cook—CH2M
- 9:00 am—9:30 am **WELCOME AND INTRODUCTION**  
Location: Centennial Ballroom  
Brian Varrella, CASFM Chair—CDOT Region 4
- 9:30 am—10:00 am **REVISITING THE '65 SOUTH PLATTE RIVER FLOOD 50 YEARS LATER**  
Location: Centennial Ballroom  
Dave Bennetts – UDFCD
- 10:00 am—11:30 am **KEYNOTE ADDRESS: STORMWATER – BACK TO THE FUTURE**  
Location: Centennial Ballroom  
Andy Reese - AMEC
- 11:30 am—1:30 pm **LUNCH**  
Location: Rocky Mountain Garden Tent  
Introduction of 2015/2016 Officers and Committee Chairs
- 11:30 am—1:30 pm **BOARD MEETING**  
Location: Blue Spruce Room

Wednesday, September 23rd, 2015

	Disaster Recovery	Stormwater Management	Stream Restoration	Technical Workshop
1:30	Flood Rebuild Advocacy in Lyons, Colorado	Predicting the Influence of Redevelopment on Stormwater Quality and Quantity in Denver	Creating Resiliency in Colorado Streams: Restoration and Floodplain Reconnection	FLO-2D: Predicting Urban Flooding - An Integrated Two-Dimensional Flood Routing Model with a Storm Drain Component
2:00	Disaster Response & Recovery Toolkit for Local Officials	City of Aurora’s Online Stormwater Master Plan	Upper Colorado River Irrigation and Restoration Assessment Phase 1: K.B. Ditch to Blue River	
2:30	Colorado’s Flood of Mitigation Funding	City of Aurora Stormwater Master Plan CIP Prioritization	Greencrest Channel Stabilization	
3:00	-----break-----			
3:30	After the Waldo Canyon Wildfire - The Williams Canyon Project	Planning for Variability & Uncertainty: Climate Change and the Urban Drainage System	Clear Creek Channel Restoration	FLO-2D: Predicting Urban Flooding - An Integrated Two-Dimensional Flood Routing Model with a Storm Drain Component
4:00	Post-Fire Runoff Parameter Recovery & Highway Protection after the Waldo Canyon Fire	The Benefits of Using A Drone in Municipal Storm Water Management Operations	Why are the Articulating Concrete Blocks Deteriorating?	
4:30	Lessons Learned from the 2013 Floods	When Tunneling Isn’t Boring, Something Has Gone Wrong	Manitou Incline - The Most Extreme Trail Project You’ll See	

1:30 pm—5:00 pm **FLO-2D WORKSHOP: PREDICTING URBAN FLOODING - AN INTEGRATED TWO-DIMENSIONAL FLOOD ROUTING MODEL WITH A STORM DRAIN COMPONENT**

Location: Creekside Room

Jim O'Brien, Ph.D., P.E.;  
Noemi Gonzalez- Ramirez, Ph.D. - FLO-2D

1:30 pm—2:00 pm **CONCURRENT TECHNICAL SESSIONS:**

**DR1 FLOOD REBUILD ADVOCACY IN LYONS, COLORADO**

Location: Centennial A/B/C

Jonathan M. Diller – Lyons Emergency Assistance Fund

**SM1 PREDICTING THE INFLUENCE OF REDEVELOPMENT ON STORMWATER QUALITY AND QUANTITY IN DENVER NEIGHBORHOODS**

Location: Centennial E/F

Lisa Cherry – Colorado School of Mines

**SR1 CREATING RESILIENCY IN COLORADO STREAMS: RESTORATION AND FLOODPLAIN RECONNECTION**

Location: Rocky Mountain

Brian Murphy – CDM Smith

2:00 pm—2:30 pm **CONCURRENT TECHNICAL SESSIONS:**

**DR2 DISASTER RESPONSE AND RECOVERY TOOLKIT FOR LOCAL OFFICIALS**

Location: Centennial A/B/C

Brian Varrella – CDOT Region 4

Julie Baxter – Risk Prepared

Teresa Patterson – UDFCD

**SM2 CITY OF AURORA'S ONLINE STORMWATER MASTER PLAN**

Location: Centennial E/F

Gregory Murphy - Calibre Engineering, Inc.

Jon Villenes – Aurora Water

**SR2 UPPER COLORADO RIVER IRRIGATION AND RESTORATION ASSESSMENT PHASE 1: K.B. DITCH TO BLUE RIVER**

Location: Rocky Mountain

Chris Romeyn, John Sikora – AECOM

Paul Bruchez - Reeder Creek Ranch





STORMWATER:  
Back to the Future

2:30 pm—3:00 pm	CONCURRENT TECHNICAL SESSIONS:
DR3	<b>COLORADO’S FLOOD OF MITIGATION FUNDING</b> Location: Centennial A/B/C Jeffrey Brislawn – AMEC Foster Wheeler
SM3	<b>CITY OF AURORA STORMWATER MASTER PLAN CIP PRIORITIZATION</b> Location: Centennial E/F Julia Traylor – Wright Water Engineers, Inc.
SR3	<b>GREENCREST CHANNEL STABILIZATION</b> Location: Rocky Mountain Richard Mulledy – Matrix Design Group, Inc.
3:00 pm—3:30 pm	BREAK Location: Vendor Area
3:30 pm—4:00 pm	CONCURRENT TECHNICAL SESSIONS:
DR4	<b>AFTER THE WALDO CANYON WILDFIRE – THE WILLIAMS CANYON PROJECT</b> Location: Centennial A/B/C Ian Paton, Hayes Lenhart, Eliot Wong – Wright Water Engineers, Inc.
SM4	<b>PLANNING FOR VARIABILITY &amp; UNCERTAINTY: CLIMATE CHANGE AND THE URBAN DRAINAGE SYSTEM</b> Location: Centennial E/F Andrew Earles – Wright Water Engineers, Inc. Ken McKenzie - UDFCD
SR4	<b>CLEAR CREEK RESTORATION</b> Location: Rocky Mountain Josh Hollon - Atkins
4:00 pm—4:30 pm	CONCURRENT TECHNICAL SESSIONS:
DR5	<b>POST-FIRE RUNOFF PARAMETER RECOVERY &amp; HIGHWAY PROTECTION AFTER THE WALDO CANYON FIRE</b> Location: Centennial A/B/C Richard Ommert – RESPEC CDOT Region 2
SM5	<b>THE BENEFITS OF USING A DRONE IN MUNICIPAL STORM WATER MANAGEMENT OPERATIONS</b> Location: Centennial E/F Kevin Lewis – City & County of Denver
SR5	<b>WHY ARE THE ARTICULATING CONCRETE BLOCKS DETERIORATING?</b> Location: Rocky Mountain Kevin Gingery – City of Loveland Paul Clopper - Ayres

4:30 pm—5:00 pm	CONCURRENT TECHNICAL SESSIONS:
DR6	<b>DAM INSPECTIONS: LESSONS LEARNED FROM THE 2013 FLOODS</b> Location: Centennial A/B/C Kallie Bauer – Colorado Division of Water Resources, Dam Safety Rach
SM6	<b>WHEN TUNNELING ISN’T BORING, SOMETHING HAS GONE WRONG</b> Location: Centennial E/F Dave Skoudas- UDFCD Brendan Tippetts - BT Construction, Inc.
SR6	<b>MANITOU INCLINE – THE MOST EXTREME TRAIL PROJECT YOU’LL EVER SEE</b> Location: Rocky Mountain Don Jacobs – Enginuity Engineering Solutions Jesse Clark – Stream Design Sarah Bryarly – City of Colorado Springs

5:00 pm—6:30 pm	HAPPY HOUR Location: Vendor Foyer Sponsored by ERO Resources Corporation	
6:30 pm	DINNER ON YOUR OWN	

THURSDAY, SEPTEMBER 24<sup>th</sup>, 2015

7:30 am—8:30 am	BREAKFAST Location: Centennial Ballroom Sponsored by Contech	
8:30 am—10:00 am	2015 CASFM AWARD FINALISTS Location: Centennial Ballroom <b>Johnson-Habitat Park at the South Platte River, Denver, CO</b> City and County of Denver, Urban Drainage and Flood Control District, ICON Engineering, Inc., DHM Design <b>Roaring Fork River Restoration at Basalt, CO</b> Town of Basalt, Matrix Design Group, Inc., DHM Design <b>Cherry Creek Valley Ecological Park</b> Arapahoe County Open Space, Southeast Metro Stormwater Authority, Urban Drainage and Flood Control District, Cherry Creek Basin Water Quality Authority, Muller Engineering Company, Valerian	
10:00 am—10:30 am	BREAK Location: Vendor Foyer	
10:30 am—11:30 am	FEATURED SPEAKERS: ANTELOPE CREEK DAYLIGHTING FOR FLOOD REDUCTION AND COMMUNITY BALLROOM Location: Centennial Ballroom Glenn Johnson – Lower Platte South Natural Resources District Carter Hubbard – Olsson Associates	
11:30 am—1:00 pm	GENERAL MEMBERSHIP LUNCH MEETING Location: Rocky Mountain Garden Tent	
1:00 pm—1:30 pm	COMMITTEE MEETINGS	





26th Annual  
2015 CASFM CONFERENCE  
Vail, Colorado | September 22 – 25

STORMWATER:  
Back to the Future

Thursday, September 24th, 2015			
	Water Quality	Floodplain Management	Technical Modeling
1:30	The Supply Irrigating Ditch Company Diversion Structure	Update on Colorado Erosion Hazard Mapping Project	Post-Flood Hydrologic Evaluation
2:00	City & County of Denver – Stormwater Quality Prioritization and BMP Opportunity Analysis	How do you define Floodplain Management?	Hydrologic Modeling of a “Recovering” Burn Area: Lessons Learned for System Improvements
2:30	Beneficial Stormwater Use and Water Quality Enhancement in Denver: Technical, Economic, and Legal Feasibility	Lessons Learned from CRS Cycle Verification under the 2013 Manual	Establishing Calibrated Guidelines for 2-D Rainfall Modeling within the UDFCD
3:00	-----break-----		
3:30	Permeable Pavement Applications in Colorado—Lessons Learned	RiskMAP Flood Risk Project - Riverine Erosion Hazard Study	US34 East Flood Recovery 2D Analysis
4:00	Streetside Water Quality Treatment—An Application of the City & County of Denver’s Green Infrastructure Manual	Climate Science in Floodplain Management	HEC-RAS 5.0: A Review of Data Requirements, Development Techniques, & Modeling Results on Westerly Creek
4:30	Actual Field Measured Sheet Flow Infiltration Shows How Well MDCIA Works!		Rapid Screening Method for Bridge Vulnerability to Scour Failure

1:30 pm—2:00 pm CONCURRENT TECHNICAL SESSIONS:

**WQ1 THE SUPPLY IRRIGATING DITCH COMPANY DIVERSION STRUCTURE**

Location: Centennial A/B/C  
Nathan Werner, Scott Shipley - s2o Design and Engineering

**FM1 UPDATE ON COLORADO EROSION HAZARD MAPPING PROJECT**

Location: Centennial E/F  
Jamie Prochno - Colorado Water Conservation Board

**TM1 POST-FLOOD HYDROLOGIC EVALUATION**

Location: Rocky Mountain  
Kevin Houck - Colorado Water Conservation Board  
Steven Humphrey - Muller Engineering Company

2:00 pm—2:30 pm CONCURRENT TECHNICAL SESSIONS:

**WQ2 CITY & COUNTY OF DENVER – STORMWATER QUALITY PRIORITIZATION AND BMP OPPORTUNITY ANALYSIS**

Location: Centennial A/B/C  
Drew Beck – Matrix Design Group  
Sarah Anderson – Denver Water Quality

**FM2 HOW DO YOU DEFINE FLOODPLAIN MANAGEMENT?**

Location: Centennial E/F  
David Mallory, Bill DeGroot – UDFCD

**TM2 HYDROLOGIC MODELING OF A “RECOVERING” BURN AREA: LESSONS LEARNED FOR SYSTEM IMPROVEMENTS**

Location: Rocky Mountain  
Baxter Vieux – Vieux & Associates, Inc.  
Kevin Stewart – UDFCD

2:30 pm—3:00 pm CONCURRENT TECHNICAL SESSIONS:

**WQ3 BENEFICIAL STORMWATER USE AND WATER QUALITY ENHANCEMENT IN DENVER: TECHNIAL, ECONOMIC AND LEGAL FEASIBILITY**

Location: Centennial A/B/C  
John McCray, Darren Mollendor – Colorado School of Mines  
Kevin Lewis – City and County of Denver

**FM3 LESSON LEARNED FROM CRS CYCLE VISIT UNDER THE 2013 MANUAL**

Location: Centennial E/F  
Kimberley Pirri, Joe Roerkohl – AECOM

**TM3 ESTABLISHING CALIBRATED GUIDELINES FOR 2-D RAINFALL MODELING WITHIN THE UDFCD**

Location: Rocky Mountain  
Don Jacobs, Timothy Fry – Enguinity Engineering Solutions  
Shea Thomas - UDFCD

3:00 pm—3:30 pm BREAK

Location: Vendor Foyer

3:30 pm—4:00 pm CONCURRENT TECHNICAL SESSIONS:

**WQ4 PERMEABLE PAVEMENT APPLICATIONS IN COLORADO – LESSONS LEARNED**

Location: Centennial A/B/C  
Chris Olson – Colorado State University  
Holly Piza - UDFCD

**FM4 RISKMAP FLOOD RISK PROJECT – RIVERINE EROSION HAZARD STUDY**

Location: Centennial E/F  
John Loranger – AMEC Foster Wheeler  
Luke Swan – Otak  
Thuy Patton – CWCB

**TM4 US 34 EAST FLOOD RECOVERY 2D ANALYSIS**

Location: Rocky Mountain  
George Cotton – Tsiouvaras Simmons Holderness

4:00 pm—4:30 pm CONCURRENT TECHNICAL SESSIONS:

**WQ5 STREETSIDE WATER QUALITY TREATMENT – AN APPLICATION OF THE CITY AND COUNTY OF DENVER’S GREEN INFRASTRUCTURE MANUAL**

Location: Centennial A/B/C  
Craig Wilkening, Kayla Ranney – SEH, Inc.  
Billy Gregg – Studio CPG

**FM5 CLIMATE SCIENCE IN FLOODPLAIN MANAGEMENT**

Location: Centennial E/F  
Kristina Murphy - Independent

**TM5 HEC-RAS 5.0: A REVIEW OF DATA REQUIREMENTS, DEVELOPMENT TECHNIQUES, AND MODELING RESULTS ON WESTERLY CREEK**

Location: Rocky Mountain  
Frans Lambrechtsen, Aaron Cook, Alan Turner – CH2M  
Lanae Raymond - SEMSWA





# 26th Annual 2015 CASFM CONFERENCE

Vail, Colorado | September 22 – 25

## STORMWATER: Back to the Future

4:30 pm—5:00 pm CONCURRENT TECHNICAL SESSIONS:

### WQ6 ACTUAL FIELD MEASURED SHEET FLOW INFILTRATION SHOWS HOW WELL MDCIA WORKS!

Location: Centennial A/B/C  
Jim Wulliman – Muller Engineering Company  
Tom Repp – Douglas County

### TM6 RAPID SCREENING METHOD FOR BRIDGE VULNERABILITY TO SCOUR FAILURE

Location: Rocky Mountain  
Noelle Beegle – Alfred Benesch and Company  
Lisa Lauver – Stantec

5:00 pm—6:30 pm HAPPY HOUR

Location: Vendor Foyer  
Sponsored by RESPEC



7:00 pm—9:00 pm

### CASFM ASSOCIATION DINNER AND AWARDS

Location: Centennial Ballroom  
Sponsored by Muller Engineering Company



2015 CASFM Project Awards Presentation: John Pflaum  
Prize Drawings: Stuart Gardner—CDOT

9:00 pm—midnight

### ENTERTAINMENT – Robby Wagner

Robby's a popular comedian who will bring his brand of comedy combined with motivational speaking to CASFM with his "Sweatiquette" comedy and game show (with prizes)!  
Location: Centennial Ballroom

## FRIDAY, SEPTEMBER 25th, 2015

7:30 am—8:30 am

### CONTINENTAL BREAKFAST

Location: Vendor Foyer

8:30 am—9:00 am

### CLOSING REMARKS

Location: Centennial Ballroom  
Shea Thomas - CASFM Chair,  
Urban Drainage and Flood Control District

9:00 am—12:00 am

### WORKSHOP: CULVERT HYDRAULICS

Location: Rocky Mountain  
John Hunt - Ayres Associates

9:00 am—12:00 pm

### FIELD TRIPS:

#### SWAN RIVER RESTORATION PROJECT

Location: Centennial Ballroom

Coordinated by Doug Trieste — Flow Technologies

\* The field trip will meet in the Centennial Ballroom at 9:00 am for a presentation before heading to the site.

\* Directions to the site will be provided at the Friday morning presentation.

#### MOUNTAIN BIKE TOUR

Coordinated by Rich Ommert—RESPEC

\* Meet at Vail Cascade Resort and Spa entrance for the start of the Mountain Bike Tour

9:30 am—3:00 pm

### GOLF TOURNAMENT—EagleVail Golf Club Sponsored by Oldcastle Precast



Coordinated by Dave Center—AECOM  
(See page 7 for details!)

### THANK YOU to OUR 2015 MODERATORS!

1. Disaster Recovery –  
Brad Anderson, Anderson Consulting
2. Stormwater Management –  
Craig Jacobson, ICON
3. Stream Restoration –  
Dave Bennetts, UDFCD
4. Water Quality –  
Betsy Suerth, Garfield County
5. Floodplain Management –  
Monica Bortolini, Leonard Rice Engineers
6. Technical Modeling –  
Brian Murphy, CDM Smith

## SAVE THE DATE FOR NEXT YEAR'S CONFERENCE:

CRESTED BUTTE MOUNTAIN RESORT - SEPTEMBER 13 - 16, 2016





## PRESENTATION ABSTRACTS

### DISASTER RECOVERY TRACK

Wednesday, September 23rd | Location: Centennial D

#### DR1 1:30 pm FLOOD REBUILD ADVOCACY IN LYONS, COLORADO

Jonathan M. Diller – Lyons Emergency Assistance Fund  
[jonathan@jmdiller.com](mailto:jonathan@jmdiller.com)

The Lyons Emergency Assistance Fund, a local nonprofit organization, provided a grant to fund a Flood Rebuild Advocate. The advocate was to provide services to displaced residents who were still in the process of obtaining permits to rebuild or restore their homes, to deal with construction practices to optimize insurance rates, or any other assistance in working with issues to the rebuilding or restoration of their homes. This presentation will discuss the types of issues addressed by the rebuild advocate and how the process worked.

#### DR2 2:00 pm

##### DISASTER RESPONSE AND RECOVERY TOOLKIT FOR LOCAL OFFICIALS

Brian Varrella – CDOT Region 4; Julie Baxter – Risk Prepared; Teresa Patterson – UDFCD  
[brian.varrella@state.co.us](mailto:brian.varrella@state.co.us); [JulieBaxter@RiskPrepared.com](mailto:JulieBaxter@RiskPrepared.com); [tpatterson@udfd.org](mailto:tpatterson@udfd.org)

Communities in Colorado found themselves in the throes of disaster during the September 2013 flooding events, and many realized that every hour counts during response and recovery. CASFM has partnered with State, Federal and local partners to participate in the Flood Technical Assistance Partnership (FTAP) since 2012, and now the same group is preparing a Disaster Response Toolkit for Colorado communities based on the 2013 experiences of CASFM members. This presentation will demonstrate how this resource can help communities be more prepared to respond to future disasters and be used to enhance the resiliency of any Colorado community.

#### DR3 2:30 pm

##### COLORADO'S FLOOD OF MITIGATION FUNDING

Jeffrey Brislawn – AMEC Foster Wheeler;  
[jeff.brislawn@amecfw.com](mailto:jeff.brislawn@amecfw.com)

A silver lining of the 2013 flood disaster in Colorado was the availability of unprecedented amounts of FEMA Hazard Mitigation Grant Program (HMGP) funding. This presentation highlights how Colorado's communities took advantage of this funding for a variety of flood mitigation efforts including flood-prone property buyouts, flood warning systems and stormwater drainage improvements. This presentation will share the lessons learned scoping and applying for flood mitigation project funding and best practices in completing a successful mitigation grant application.

#### DR4 3:30 pm

##### AFTER THE WALDO CANYON WILDFIRE – THE WILLIAMS CANYON PROJECT

Ian Paton, Hayes Lenhart, Eliot Wong – Wright Water Engineers, Inc.  
[ipaton@wrightwater.com](mailto:ipaton@wrightwater.com); [hlenhart@wrightwater.com](mailto:hlenhart@wrightwater.com); [ewong@wrightwater.com](mailto:ewong@wrightwater.com)

Williams Canyon was among the watersheds burned by the Waldo Canyon wildfire. In 2013, flooding from the basin resulted in heavy damage to numerous homes, businesses and vehicles in Manitou Springs. The Williams Canyon project was completed in spring 2015 and involved re-constructing approximately 1,500 feet of channel, in two phases, in the steep, narrow mouth of the canyon as well as through a residential neighborhood. Completion of the project was achieved through a cooperative effort between City officials, community members, the design team and the contractor.

#### DR5 4:00 pm

##### POST-FIRE RUNOFF PARAMETER RECOVERY & HIGHWAY PROTECTION AFTER THE WALDO CANYON FIRE

Richard Ommert – RESPEC; CDOT Region 2  
[richard.ommert@respec.com](mailto:richard.ommert@respec.com)

This presentation will discuss the recovery of runoff parameters and compare values estimated right after the Waldo Canyon fire to the values 3-years after the fire. We will discuss the initial improvements made by various agencies right after the fire and the assessment of these improvements 3-years later. We will discuss what appears to be working well within the burn scar.

#### DR6 4:30 pm

##### DAM INSPECTIONS: LESSONS LEARNED FROM THE 2013 FLOODS

Bill McCormick, Kallie Bauer – Dam Safety Branch, Colorado Division of Water Resources  
[kallie.bauer@state.co.us](mailto:kallie.bauer@state.co.us)

In early 2013 the Biggert-Waters Act instituted new Community Rating System (CRS) regulations that included credits and demerits for including dam failure inundation mapping limits for communities potentially impacted by high and significant hazard dams. This presented an opportunity for coordination between the Colorado Dam safety Branch and members of the flood plain management communities, where little coordination had previously taken place. This presentation revisits the reasons for the FTAP coordination before these recent flooding events, and discusses the real-world lessons learned from the Sept 2013 and Spring 2015 flooding response experiences and their potential application for the future of dam safety and flood plain management professional coordinations and collaborations.





## STORMWATER MANAGEMENT TRACK

Wednesday, September 23rd | Location: Centennial E/F

### SM1 1:30 pm PREDICTING THE INFLUENCE OF REDEVELOPMENT ON STORMWATER QUALITY AND QUANTITY IN DENVER NEIGHBORHOODS

Lisa Cherry – Colorado School of Mines  
[lcherry@mines.edu](mailto:lcherry@mines.edu)

A prediction of the spatial distribution of infill re-development, with corresponding increase in impervious area, on a neighborhood scale over the next 10, 15, and 20 years using existing urban planning models, as well as other methods devised to specifically account for in-fill. Methods to estimate changes in water quality will be investigated, using the redevelopment predictions, to determine future stormwater runoff quality and quantity effluent. The results can be used by watershed managers and regional planners as a decision support tool to evaluate the impacts of in-fill redevelopment on water resources.

### SM2 2:00 pm CITY OF AURORA'S ONLINE STORMWATER MASTER PLAN

Gregory Murphy – Calibre Engineering, Inc., Jon Villines - Aurora Water  
[gvm@calibre.us.com](mailto:gvm@calibre.us.com) ; [jvilline@auroragov.org](mailto:jvilline@auroragov.org)

The Aurora Storm Water Master Plan, being delivered by the consulting team as a website, will be centered around an online map engine that will leverage City GIS data and other online databases, dovetail with UDFCD GIS data, and assemble information from over 25 individual basin-wide OSPs and MDPs. When complete the site will give Aurora staff the ability to view, print, and modify individual or multiple projects, and implement changes to costs and prioritization in real time. This presentation will provide a progress demonstration of the product and discuss some of the challenges faced by the team.

### SM3 2:30 pm CITY OF AURORA STORMWATER MASTER PLAN CIP PRIORITIZATION

Julia Traylor – Wright Water Engineers, Inc.  
[jtraylor@wrightwater.com](mailto:jtraylor@wrightwater.com)

Wright Water Engineers, Inc. and Calibre Engineering have worked with the City of Aurora to establish criteria for prioritization for the City's stormwater master plan capital improvement projects. Questions were created to assess the City's greatest needs and to prioritize projects required for the health, safety, and welfare of the City's residents. Additionally, the Aurora Stormwater CIP prioritization methodology used new software in order to allow the prioritization process to be a collaborative effort from selected stakeholders to reach optimal decisions.

### SM4 3:30 pm

#### PLANNING FOR VARIABILITY & UNCERTAINTY: CLIMATE CHANGE AND THE URBAN DRAINAGE SYSTEM

Andrew Earles – Wright Water Engineers, Inc., Ken McKenzie - UDFCD  
[aearles@wrightwater.com](mailto:aearles@wrightwater.com); [kmckenzie@udfcd.org](mailto:kmckenzie@udfcd.org)

Climate change is a topic frequently in the news and has been the subject of extensive Federal research. With the potential changes in temperature, rainfall, runoff, ET and other hydrologic variables, it is reasonable to ask how these changes may affect the urban drainage system. To address this question, UDFCD and WWE have reviewed climate change projections for Colorado and the Front Range to identify potential vulnerabilities and to inventory and assess UDFCD policies, criteria and programs that provide resiliency for future climate and hydrologic variability.

### SM5 4:00 pm

#### THE BENEFITS OF USING A DRONE IN MUNICIPAL STORM WATER MANAGEMENT OPERATIONS

Kevin Lewis – City & County of Denver  
[Donald.Lewis@denvergov.org](mailto:Donald.Lewis@denvergov.org)

The City & County of Denver has discovered many benefits of having a drone (or 'flying camera') to support it's storm water management and flood control operations. The mobility and agility of the aircraft, combined with the stunning photographic quality offered by the on-board camera, has improved the quality and efficiency of many important storm water management functions.

### SM6 4:30 pm

#### WHEN TUNNELING ISN'T BORING, SOMETHING HAS GONE WRONG

Dave Skoudas, Brendan Tippets - UDFCD  
[dskuodas@udfcd.org](mailto:dskuodas@udfcd.org) / [brenden.tippets@btconstruction.com](mailto:brenden.tippets@btconstruction.com)

When designing and building stormwater and sanitary on grade tunnels, risk is unavoidable. This presentation will discuss lessons learned from five (5) tunneling projects, including the risks identified ahead of time and how they were planned for, and problems that were not planned for but happened. For instance, what happens when the ground is unable to support the weight of your tunneling machine and pipe and your profile starts to dip half way through the tunnel drive? How about unexpectedly running into the buried remnants of a demolished house, furnishings and all?





**STREAM RESTORATION TRACK**

Wednesday, September 23rd | Location: Rocky Mountain

**SR1 1:30 pm**  
**CREATING RESILIENCY IN COLORADO STREAMS: RESTORATION AND FLOODPLAIN RECONNECTION**

Brian Murphy – CDM Smith  
[murphybm@cdmsmith.com](mailto:murphybm@cdmsmith.com)

This presentation will explore the concept of incorporating floodplain reconnection in stream restoration and floodplain management. Discussion will focus on the concept of resiliency as it relates to stream restoration and reconnecting a channel to its floodplain. In addition, the presentation will describe the challenges and opportunities for floodplain reconnection using the Colorado master planning process as an example.

**SR2 2:00 pm**

**UPPER COLORADO RIVER IRRIGATION AND RESTORATION ASSESSMENT PHASE 1: K.B. DITCH TO BLUE RIVER**

Chris Romeyn, John Sikora – AECOM; Paul Bruchez - Reeder Creek Ranch  
[chris.romeyn@aecom.com](mailto:chris.romeyn@aecom.com), [john.sikora@aecom.com](mailto:john.sikora@aecom.com)

The Upper Colorado River has been significantly impacted by trans-basin diversions. The Colorado-Big Thompson project, authorized in 1937, resulted in the construction of 9 pump stations to address the project's negative impacts on agriculture. Hydromodification of the Colorado River has resulted in failing diversion structures, loss of agricultural infrastructure and lands, severe bank erosion, and significant loss of aquatic habitat. AECOM performed a detailed geomorphic assessment of the Colorado River to find sustainable solutions to these issues that enhance the Colorado River ecosystem. This unique project demonstrates the close ties between agriculture and the river and how both can benefit from restoration.

**SR3 2:30 pm**

**GREENCREST CHANNEL STABILIZATION**

Richard Mulledy – Matrix Design Group, Inc.  
[Richard\\_Mulledy@matrixdesigngroup.com](mailto:Richard_Mulledy@matrixdesigngroup.com)

The single remaining section of natural channel in the Greencrest Reach has become increasingly unstable due to significant flows resulting in amplified erosion. This degradation has created substantial problems for the surrounding residential and commercial areas which reside along the channel and are in close proximity to the steep slopes of the channel banks. Matrix Design Group, Inc. has developed several unique design applications to provide permanent stability in the reach up to the 100-Year event.

**SR4 3:30 pm**  
**CLEAR CREEK RESTORATION**

Josh Hollon - Atkins  
[josh.hollon@atkinsglobal.com](mailto:josh.hollon@atkinsglobal.com)

CDOT's expansion of eastbound I-70 and construction of the Veteran's Memorial Tunnels provided the opportunity for CDOT to join with project partners to restore Clear Creek, just east of Idaho Springs. Historical impacts have reduced natural riparian benches, floodplains and aquatic habitat. The project restores the natural functions of this section of river and enhances the recreational access and value. Aquatic habitat enhancements included rock ribs, J-hooks, a cross vane, multiple pools and numerous habitat rocks placed in the channel.

**SR5 4:00 pm**

**WHY ARE THE ARTICULATING CONCRETE BLOCKS DETERIORATING?**

Kevin Gingery – City of Loveland; Paul Clopper - Ayres  
[kevin.gingery@cityofloveland.org](mailto:kevin.gingery@cityofloveland.org); [clopperp@ayresassociates.com](mailto:clopperp@ayresassociates.com)

This presentation is a case study of an in-depth investigation conducted by Ayres Associates for the City of Loveland to determine the cause(s) of physical deterioration of articulating concrete blocks (ACBs) that had been installed as rundowns in steep channelized applications. Soil and water samples were collected and analyzed. Undamaged specimens of the concrete blocks were also obtained and tested for physical and chemical properties to determine if the concrete was of substandard quality. Recommendations were developed for similar future ACB applications.

**SR6 4:30 pm**

**MANITOU INCLINE – THE MOST EXTREME TRAIL PROJECT YOU'LL EVER SEE**

Don Jacobs – Enginuity Engineering Solutions; Jesse Clark – Stream Design; Sarah Bryarly – City of Colorado Springs  
[djacobs@enginuity-es.com](mailto:djacobs@enginuity-es.com); [sbryarly@springsgov.com](mailto:sbryarly@springsgov.com); [jclark@streamla.com](mailto:jclark@streamla.com)

The Manitou Incline or simply "The Incline," is considered by many to be one of the most challenging recreation sites in the nation. Rising above Manitou Springs, the trail is the remains of a former 3 foot narrow gauge funicular railway whose tracks washed out during a rock slide in 1990. The Incline gains over 2,000 feet of elevation in less than one mile, and has gained popularity in recent years as a hiking trail attracting up to 45,000 visitors per month. The Incline is famous for its sweeping views and steep grade, as steep as 68% in places making it a fitness challenge for both casual hikers and Olympic athletes. The Incline was closed from August through December, 2014 for some much-needed repairs to prevent further erosion. The Incline work included repair and replacement of damaged retaining walls, cleanup of rebar and loose debris, construction of additional drainage structures, stabilization of existing ties and of surrounding slopes, and a new sustainable connection to the Barr Trail. All of these improvements were completed without vehicular access or the use of heavy machinery.





**WATER QUALITY TRACK**

Thursday, September 24th | Location: Centennial D

**WQ1 1:30 pm**

**THE SUPPLY IRRIGATING DITCH COMPANY DIVERSION STRUCTURE PROJECT, LYONS, COLORADO**

Nathan Werner, Scott Shipley - s2o Design and Engineering

[nathan@s2odesign.com](mailto:nathan@s2odesign.com); [scott@s2odesign.com](mailto:scott@s2odesign.com)

In 2013, Lyons was at the epicenter of a 500-year return flood event on the St.Vrain Creek. The flood left many residents stranded and caused over \$50 million worth of damage to infrastructure and property. All in-stream structures along the St. Vrain Creek through Lyons were damaged or destroyed during the flood. An effort was begun to rebuild these structures following the flood but designers were met with many challenges stemming from the priorities the watershed groups and regulatory agencies have set for the St. Vrain watershed. The identity of the Town of Lyons is closely tied to the river and its recreational opportunities, and creating safe navigation and fish passage through rebuilt in-stream structures became a priority during the design process.

The Supply Irrigating Ditch Company (Ditch Company), which diverts water in Lyons, recognized these priorities and hired s2o Design and Engineering (s2o), a local engineering firm, to design a multipurpose diversion structure that would replace a temporary structure that had been installed following the flood. The objectives of the project were to design a diversion structure that ensured the Ditch Company would receive their allotted flow while providing fish passage and safe navigation.

**WQ2 2:00 pm**

**CITY & COUNTY OF DENVER – STORMWATER QUALITY PRIORITIZATION AND BMP OPPORTUNITY ANALYSIS**

Drew Beck – Matrix Design Group ; Sarah Anderson - Denver Water Quality

[drew\\_beck@matrixdesigngroup.com](mailto:drew_beck@matrixdesigngroup.com) ; [Sarah.Anderson@denvergov.org](mailto:Sarah.Anderson@denvergov.org)

The project establishes a methodology to prioritize watersheds and sub-basins which have the highest need to improve water quality. The prioritization creates separate GIS scorecards such that high scoring sub-basins are overlaid by high scoring BMP opportunity parcels to identify potential projects which could have the greatest impact on at the watershed scale. The methodology is applied to the Central Platte Valley basin as an example. Modeling 10 to 35 high and medium priority BMP projects with the UDFCD BMP Real Cost Tool it was determined that loads could be reduced by 27% to 67%.

**WQ3 2:30 pm**

**BENEFICIAL STORMWATER USE AND WATER QUALITY ENHANCEMENT IN DENVER: TECHNIAL, ECONOMIC AND LEGAL FEASIBILITY**

John McCray, Darren Mollendor – Colorado School of Mines; Kevin Lewis – City and County of Denver

[jmccray@mines.edu](mailto:jmccray@mines.edu)

An investigating the technical, economic, and legal/policy feasibility of implementing a centralized stormwater treatment facility at a golf course in west Denver to collect, treat, and potentially use the treated stormwater for urban irrigation, with an overarching goal of providing clean water to the nearby receiving stream. The project analyzes innovative regional BMPs that also serve to enhance the recreational golfing experience by doubling as water hazards at the golf course. The project benefits include water savings, reduced fertilizer costs, and increased revenues at the golf course.

**WQ4 3:30 pm**

**PERMEABLE PAVEMENT APPLICATIONS IN COLORADO – LESSONS LEARNED**

Chris Olson – Colorado State University; Holly Piza - UDFCD

[chris.olson@colostate.edu](mailto:chris.olson@colostate.edu); [hpiza@udfcd.org](mailto:hpiza@udfcd.org)

In this presentation, we will discuss current knowledge about the state of permeable pavement technologies. We will also discuss best practices for maintaining permeable pavement systems and will present recent research findings that demonstrate the potential for using readily-available technologies to restore the infiltration capacities of clogged systems

**WQ5 4:00 pm**

**STREETSIDE WATER QUALITY TREATMENT – AN APPLICATION OF THE CITY AND COUNTY OF DENVER'S GREEN INFRASTRUCTURE MANUAL**

Craig Wilkening, Kayla Ranney – SEH, Inc.; Billy Gregg, Studio CPG

[cwilkening@sehinc.com](mailto:cwilkening@sehinc.com) ; [kranney@sehinc.com](mailto:kranney@sehinc.com) ; [billy@studiocpg.com](mailto:billy@studiocpg.com)

Water quality treatments are evolving for large-scale and site-scale applications. The "Green Infrastructure Manual", developed by the City and County of Denver, details several different types of streetside stormwater quality options that can be incorporated into a roadway section. These site-scale treatments mimic larger treatment systems through the use of soils and vegetation to treat stormwater runoff. This presentation provides an introduction into the design and function of these treatments and how they are being designed for a project for the City and County of Denver.

**WQ6 4:30 pm**

**ACTUAL FIELD MEASURED SHEET FLOW INFILTRATION SHOWS HOW WELL MDCIA WORKS!**

Jim Wulliman – Muller Engineering Company; Tom Repp – Douglas County; Lanae Raymond - SEMSWA

[jwulliman@mullereng.com](mailto:jwulliman@mullereng.com); [lraymond@semswa.org](mailto:lraymond@semswa.org)

The practice of disconnecting impervious areas from direct conveyance to storm drains and, instead, allowing runoff to pass over vegetated pervious areas, has been encouraged by the UDFCD for many years for its runoff reduction and water quality benefits. This presentation describes an evaluation of actual field-measured infiltration in vegetated turf areas that demonstrates that this practice has a surprisingly high potential for reducing runoff and enhancing water quality. It is hoped that this presentation will encourage others to consider the practice of minimizing directly connected impervious area.





## FLOODPLAIN MANAGEMENT TRACK

Thursday, September 24th | Location: Centennial E/F

### FM1 1:30 pm

#### UPDATE ON COLORADO EROSION HAZARD MAPPING PROJECT

Jamie Prochno - Colorado Water Conservation Board

[Jamie.Prochno@state.co.us](mailto:Jamie.Prochno@state.co.us)

The erosion hazard mapping project will develop standards for mapping erosion hazard areas and best practices for development regulations in erosion hazard areas. This presentation will introduce participants to the State's erosion hazard mapping project and provide information about the expected deliverables and next steps.

### FM2 2:00 pm

#### HOW DO YOU DEFINE FLOODPLAIN MANAGEMENT?

David Mallory, Bill DeGroot – UDFCD

[dmallory@udfcd.org](mailto:dmallory@udfcd.org)

The current default definition of Floodplain Management: "A continuous process of making decisions about whether and how floodplain lands and waters are to be used" comes from the 1994 report A Unified National Program for Floodplain Management by the Federal Interagency Floodplain Management Task Force. In light of recent recognition of the value of the natural and beneficial functions of floodplains, an increasing population, and climate change; is this definition still appropriate?

### FM3 2:30 pm

#### LESSON LEARNED FROM CRS CYCLE VISIT UNDER THE 2013 MANUAL

Kimberley Pirri, Joe Roerkohl – AECOM

[Kimberley.Pirri@aecom.com](mailto:Kimberley.Pirri@aecom.com) ; [joseph.roerkohl@aecom.com](mailto:joseph.roerkohl@aecom.com)

In 2014, AECOM assisted the Southeast Metro Stormwater Authority (SEMSWA) in preparing Arapahoe County and the City of Centennial for their NFIP Community Rating System Cycle Verification visits. These Cycle Verifications were the communities' first under the 2013 CRS Coordinator's Manual. The revised manual presented a significant overhaul of the CRS program, with new scoring criteria and point totals for most of the credit activities. This presentation will highlight some of the lessons learned during the preparation for these visits.

### FM4 3:30 pm

#### RISKMAP FLOOD RISK PROJECT – RIVERINE EROSION HAZARD STUDY

John Loranger – AMEC Foster Wheeler; Luke Swan – Otak; Thuy Patton – CWCB

[jlorange@amecfw.com](mailto:jlorange@amecfw.com); [thuy.patton@state.co.us](mailto:thuy.patton@state.co.us)

The purpose of the study is to evaluate the utility of two approaches – Washington State Department of Ecology's planning-level Channel Migration Zone (CMZ) delineation and Vermont Agency of Natural Resources' (ANR) River Corridor delineation - to assess channel migration and erosion hazard in the state of Colorado. The result is a hazard mapping product delineating a planning CMZ and river corridor delineation for the Town of Collbran, Colorado and recommendations regarding the application of particular methods appropriate for characterizing the risk for high value resources for the State of Colorado.

### FM5 4:30 pm

#### CLIMATE SCIENCE IN FLOODPLAIN MANAGEMENT

Kristina Murphy

[cirruskfm@aol.com](mailto:cirruskfm@aol.com)

"Climate science" is cited in the Biggert-Waters reform act to the National Flood Insurance Program and the Federal Flood Risk Management Standard. These changes may affect floodplain management for our communities and clients. What information will we have to specifically address? What climate data, tools, and references are available to assess 'future' flood risk from extreme events and shifts in the climate?





## TECHNICAL MODELING TRACK

Thursday, September 24th | Location: Rocky Mountain

### TM1 1:30 pm

#### POST-FLOOD HYDROLOGIC EVALUATION

Kevin Houck - Colorado Water Conservation Board; Steven Humphrey - Muller Engineering Company

Kevin.Houck@state.co.us; shumphrey@mullereng.com

Shortly after the September 2013 event, CDOT and CWCB began a partnership to evaluate the hydrology in several key flood affected watersheds. The result was the largest, most closely coordinated hydrologic evaluation in the State's history. Through partnership and a collaborative team effort, new precedent was set at the Federal, State and Local level, all within an 18 month time frame that seemed impossible when the project began in December of 2013. Not only will the hydrology studies help guide the State's infrastructure re-construction and floodplain management for years to come, but the partnership and team approach serves as a model for future projects.

### TM2 2:00 pm

#### HYDROLOGIC MODELING OF A "RECOVERING" BURN AREA: LESSONS LEARNED FOR SYSTEM IMPROVEMENTS

Baxter Vieux – Vieux & Associates, Inc.; Kevin Stewart – UDFCD

baxter.vieux@vieuxinc.com; kstewart@udfcd.org

When a wildfire affects the hydrologic character of a watershed, infiltration capacity can be severely reduced, thus increasing the threat of flooding, both within and downstream of a burn area. The Fourmile Burn (2010) in Boulder County is showing recovery in infiltration rates. A real-time system, in operation since 2011, provides emergency flood information, including the Colorado Front Range flood in 2013. Hydrologic recovery is evident in the burn area, witnessed by improvement in watershed infiltration capacity during review of a number of modeled storm events during the 2011-2014 flood seasons.

### TM3 2:30 pm

#### ESTABLISHING CALIBRATED GUIDELINES FOR 2-D RAINFALL MODELING WITHIN THE UDFCD

Don Jacobs, Timothy Fry – Enginuity Engineering Solutions Shea Thomas - UDFCD

djacobs@enginuity-es.com ; tfry@enginuity-es.com ; sthomas@udfcd.org

A recent calibration study has been completed by the UDFCD and CCD establishing guidelines for the consistent and reliable use of 2-D rainfall/hydrology modeling within the District. Much of the District's 2-D hydraulic modeling to date has utilized external CUHP analysis to remain consistent with local hydrologic criteria. This study provides calibration analysis derived from multiple 2-D rainfall simulations, allowing engineers and floodplain managers to confidently utilize 2-D rainfall simulations within the District. Calibration was achieved by modeling actual storms of record over gaged watersheds.

### TM4 3:30 pm

#### US 34 EAST FLOOD RECOVERY 2D ANALYSIS

George Cotton – Tsiouvaras Simmons Holderness

george.cotton@tshengineering.com

In 1969, the Colorado State legislature created the Urban Drainage and Flood Control District (UDFCD) to "work with local During the September 2013 flooding of South Platte River, a 500 ft long section of US 34 Bypass was breached and a 1600 foot segment of US34 Business was breached in three locations. TSH evaluated five possible options for the permanent repairs for both US 34 Bypass and US 34 Business. Due to the complex hydraulics in this area, the proposed solutions utilized both 1D and 2D modeling. The results of this analysis resulted in FHWA funding an additional new bridge to carry a portion of the flow split and minimize the risk of future interruption of service.

### TM5 4:00 pm

#### HEC-RAS 5.0: A REVIEW OF DATA REQUIREMENTS, DEVELOPMENT TECHNIQUES, AND MODELING RESULTS ON WESTERLY CREEK

Frans Lambrechtsen, Aaron Cook, Alan Turner – CH2M

frans.lambrechtsen@ch2m.com; aaron.cook@ch2m.com; alan.turner@ch2m.com

CH2M applied HEC-RAS 5.0 to a project located in Aurora, Colorado known as Westerly Creek upstream of the Westerly Creek dam. CH2M previously developed the Flood Hazard Area Delineation (FHAD) model, which included a one-dimensional model of the main channel and overland flooding and a FLO-2D two-dimensional model of the overland flooding. With one-dimensional and two-dimensional results, a comparison to HEC-RAS 5.0 could be drawn in regards to resources, time, relative difference of the floodplain, flow rates and velocities of the main channel flow and the overbank flooding using each of the different models.

### TM6 4:30 pm

#### RAPID SCREENING METHOD FOR BRIDGE VULNERABILITY TO SCOUR FAILURE

Noelle Beegle – Alfred Benesch and Company; Lisa Lauver - Stantec

nbeegle@benesch.com ; lisa.lauver@stantec.com

In 2013, FHWA issued a revision to the National Bridge Inspection Program which includes the requirement for all bridges over water to have a documented evaluation of scour vulnerability. The three off-system bridge inspection consultants for the Colorado Department of Transportation were tasked with developing the process and criteria to meet this requirement. The presentation will provide some background on the methodology, step through the screening process, and show initial results. This screening method is a valuable tool for quickly quantifying the probability of bridge failure due to scour.



## SPONSORS

Thank you to the sponsors and exhibitors participating in our 2015 conference.  
Please take the time to stop by their booths to learn about the products and services they offer.

FIRM	CONTACT	ADDRESS	PHONE / WEBSITE
<b>Advanced Drainage Systems</b>	Peggy Graham Peggy.graham@ads-pipe.com	9830 Niwot Rd. Longmont, CO 80504	720-982-6303 www.ads-pipe.com
<b>AMEC Foster Wheeler</b>	Jeff Brislawn jeff.brislawn@aemc.fw.com	Colorado Town Center II, 2000 S. Colorado Blvd., Ste 2-1000 Denver, CO 80222-7931	303-443-7839 www.amecfw.com
<b>Anderson Consulting Engineers</b>	Brad Anderson brad.anderson@acewater.com	375 Horsetooth Rd., Building #5 Fort Collins, CO 80525	(970) 226-0120 www.acewater.com
<b>Ayres Associates</b>	Tawny Quast quastt@ayresassociates.com	3665 JFK Parkway Fort Collins, CO 80525	970-223-5556 www.ayresassociates.com
<b>BASF Corporation</b>	Katie Piotrowski katie.piotrowski@basf.com	1703 Crosspoint Ave. Houston, TX 77054	(888) 900-3626 www.basf.com
<b>Blocksom &amp; Company</b>	Augie Brazys augie@blocksom.com	450 St. John Road, Suite 700 Michigan City, IN 46361	(219) 874-3231 www.blocksom.com
<b>Bohannon Huston, Inc.</b>	Mark West mwest@bhinc.com	9785 Maroon Circle, Suite 140 Englewood, CO 80112	(303) 799-5103 www.bhinc.com
<b>Borgert Products, Inc.</b>	Glenn Van Horn glennv@borgertproducts.com	5170 Kalamath Street Denver, CO 80221	303-783-3864 www.borgertproducts.com
<b>Brierley Associates</b>	Jessica Padilla jpadilla@brierleyassociates.com	110 16th Street, Suite 700 Denver, CO 80202	303-534-1100 www.brierleyassociates.com
<b>Contech Engineered Solutions Inc.</b>	Scott Houston houston@conteches.com	5670 Greenwood Plaza Blvd., Ste. 530 Greenwood Village, CO 80111	720-587-2701 www.conteches.com
<b>ERO Resources Corporation</b>	Mary Powell mpowell@eroresources.com	1842 Clarkson Street Denver, CO 80218	303-830-1188 www.eroresources.com
<b>Flashfill Services</b>	Bob Bowen bobbowen@flashfillservices.com	8830 Yosemite St. Henderson, CO 80640	(303) 292-7343 www.flashfillservices.com
<b>FLO-2D Software, Inc.</b>	Karen O'Brien karen@flo-2d.com	P.O. Box 66 Nutrioso, AZ 85932	(928) 339-1935 www.flo-2d.com
<b>GiddyUp, Inc.</b>	Lindsey Miketa lindsey@giddyupmonica.com	10500 E. 56th Ave., #103 Denver, CO 80239	(719) 760-2928 www.giddyupmonica.com
<b>Hanes Geo Componets</b>	Jack Knaub jack.knaub@hanescompanies.com	14200 East 35th Pl., Suite 100 Aurora, CO 80011	(303) 307-8111 www.hanesgeo.com
<b>Lynker Technologies</b>	Paige Weil paige@lynkertech.com	5485 Conestoga Ct., Ste. 220 Boulder, CO 80301	303-284-8627 www.lynkertech.com
<b>Merrick &amp; Company</b>	Brian Chevalier brian.chevalier@merrick.com	5970 Greenwood Plaza Boulevard Greenwood Village, CO 80111	303-751-0741 www.merrick.com
<b>Michael Baker Jr., Inc.</b>	Dave Jula djula@mbakercorp.com	165 S. Union Blvd., Suite 200 Lakewood, CO 80228	720-514-1102 www.mbakercorp.com
<b>Muller Engineering Co., Inc.</b>	Jim Wulliman jwulliman@mullereng.com	777 S. Wadsworth Blvd., Ste 4-100 Lakewood, CO 80226	303-988-4939 www.mullereng.com
<b>Oldcastle</b>	Gene Glimpse Gene.glimpse@oldcastle.com	8392 W. Prentice Ave. Littleton, CO 80125	303-791-1100 www.oldcastleprecast.com
<b>Oldcastle Stormwater Solutions</b>	Laddie Fromlieus laddie.fromlieus@oldcastle.com	7921 Southpark Plaza, Suite 200 Littleton, CO 80120	(800) 579-8819 www.kristar.com
<b>RESPEC</b>	Rich Ommert Richard.ommert@respec.com	720 S. Colorado Blvd. Denver, CO 80246	303-757-3655 www.respec.com
<b>SEH</b>	Rick Coldsnow, P.E rcoldsnow@sehinc.com	2000 S. Colorado Blvd., Suite 6000 Denver, CO 80222	720-540-6806 www.sehinc.com
<b>Triton Environmental</b>	Britni Krebs britni@tritonenviro.com	5433 Newport St. Commerce City, CO 80022	720-557-5842 www.tritonenviro.com
<b>Upstream Technologies</b>	Bruce Leach bleach@upstreamtechnologies.us	550 County Road D West, Suite 1 New Brighton, MN 55112	(651) 237-5123 www.upstreamtechnologies.us



Muller Engineering Company is an employee-owned civil engineering consulting firm founded in 1980 by Larry Muller. We provide high-quality services on a broad range of civil engineering projects for clients in the metropolitan area of Denver and throughout the state of Colorado.



### Stormwater and Floodplain Management

- Stream Reclamation
- Stormwater Quality
- Master Planning
- Floodplain Evaluations
- Hydrology/Hydraulics

Water and Waste Water Utilities  
Traffic/Transportation Planning  
Structural/Bridge Design



**Proudly Serving Colorado Communities for 35 years!**

777 S. Wadsworth Boulevard, #4-100, Lakewood, CO | 303-988-4939 | www.mullereng.com

# TRITON

ENVIRONMENTAL

## Your solutions partner for all environmental projects

### Providing:

Triton Environmental is dedicated to providing educated solutions for your environmental needs. We are your one stop, full-service distributor for all erosion/sediment control, fertilizer, amendment, geotextile, geogrid, and geomembrane products.

- Erosion Control Blankets
  - Turf Reinforcement Mats
  - Hydraulic Mulchs
  - Sediment Control
  - Amendments
  - Fertilizers
  - Geomembranes
  - Geotextile
  - Seed
- ...and so much more

### Serving Projects & Clients across the Western US

**Rocky Mountains Regional Office & Corporate HQ**

📍 5433 Newport Street  
Commerce City, CO 80022  
☎ (303) 945-7588

**East Coast Office (Pennsylvania)**

📍 4750 Steubenville Pike  
Pittsburgh, PA 14205  
☎ (412) 458-0260

✉ info@tritonenviro.com

### QUESTIONS?

**WE HAVE ANSWERS**

📞 303-945-7588

Visit us at **TRITONENVIRO.COM**  
or just come by booth #11



## CONTECH STORMWATER – A SOLUTION FOR EVERY SITE

DuroMaxx® Detention



CMP Infiltration



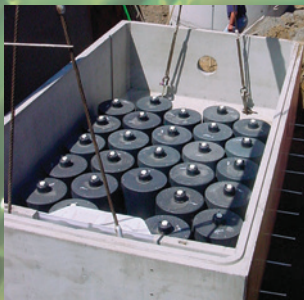
Bioretention



Rainwater Harvesting



Stormwater Management StormFilter®



Jellyfish® Filter



Vortechs®



CDS® Hydrodynamic Separator



Contech Engineered Solutions LLC

5670 Greenwood Plaza Blvd., Suite 530 | Greenwood Village, CO 80111 | 720-587-2700

Design Your Own Project Today » [www.ContechES.com/DYO](http://www.ContechES.com/DYO)

[www.ContechES.com/stormwater](http://www.ContechES.com/stormwater) | 800-338-1122



ERO Resources Corporation  
Consultants in Natural Resources  
and the Environment

For More Information  
Please Contact:

**Ron Beane**, Senior Wildlife Biologist/Principal  
[rbeane@eroresources.com](mailto:rbeane@eroresources.com)

**Jenelle Kreutzer**, Ecologist  
[jkreutzer@eroresources.com](mailto:jkreutzer@eroresources.com)

303-830-1188

[www.eroresources.com](http://www.eroresources.com)

- Biological Resources
- NEPA and Environmental Compliance
- Site Assessments and Remediation
- Water Resources
- Conservation Planning
- Cultural and Historical Resources
- GIS, Technical Editing, Graphic Design

*Creative solutions to environmental issues*

# RESPEC

[respec.com](http://respec.com)



## SOLUTIONS HYDROLOGIC

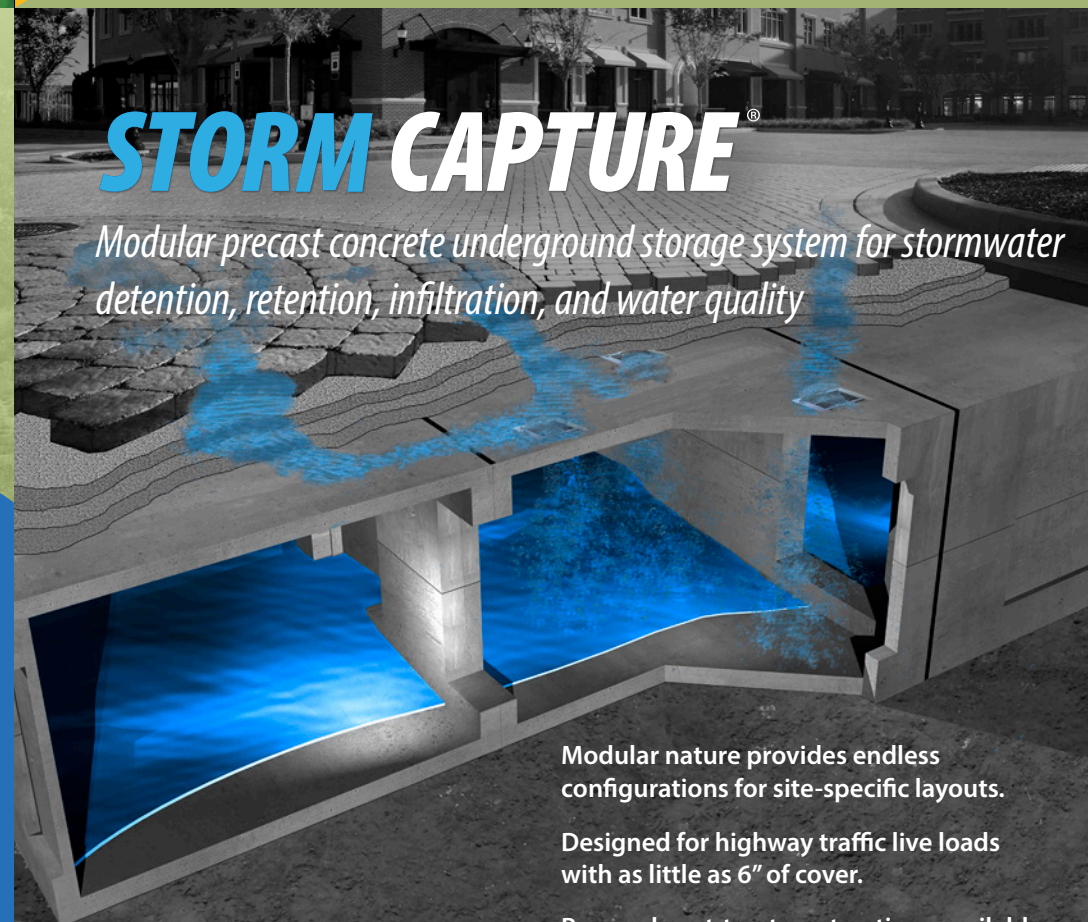
WATERSHED MANAGEMENT  
WATER QUALITY SERVICES  
STREAM RESTORATION  
FLOODPLAIN MANAGEMENT  
STORMWATER PLANNING & DESIGN  
WATER RIGHTS



303.757.3655

## STORM CAPTURE®

*Modular precast concrete underground storage system for stormwater  
detention, retention, infiltration, and water quality*



Modular nature provides endless  
configurations for site-specific layouts.

Designed for highway traffic live loads  
with as little as 6" of cover.

Pre- and post-treatment options available.

**Oldcastle**  
Stormwater Solutions



Detention/Infiltration

[oldcastlestormwater.com](http://oldcastlestormwater.com)  
(800) 579-8819  
[stormcapture.com](http://stormcapture.com)

*KriStar, now an Oldcastle Precast Company*





Storm Water Inlet Filter



## SILVER SPONSORS



"I'm your huckleberry"



Embroidery ★ Screenprint ★ Ad Specialty  
www.giddyupmonica.com



AMEC Foster Wheeler  
Ayres Associates  
Merrick & Company  
SEH

THANKS! TO OUR 2014-2015  
OUTGOING OFFICERS AND REGIONAL REPRESENTATIVES

## OUTGOING CASFM OFFICERS (2014/2015)

### CHAIR

Brian Varrella  
CDOT Region 4  
brian.varrella@state.co.us



### VICE CHAIR

Shea Thomas  
Urban Drainage and Flood  
Control District  
stthomas@udfcd.org



### SECRETARY

Jason Messamer  
Olsson Associates  
jmessamer@olssonassociates.com



## OUTGOING REGIONAL REPRESENTATIVES (2014/2015)

### NORTHEAST REGION

Beck Anderson  
City of Fort Collins  
banderson@fcgov.com



### SOUTHWEST REGION

Sam Samuelson  
Town of Telluride  
ssamuelson@telluride-co.gov



## BRONZE SPONSORS



## VAIL CASCADE MAP

**VAIL CASCADE**  
1300 Westhaven Drive  
Vail, CO 81657  
(970) 476 - 7111  
[www.vailcascade.com](http://www.vailcascade.com)

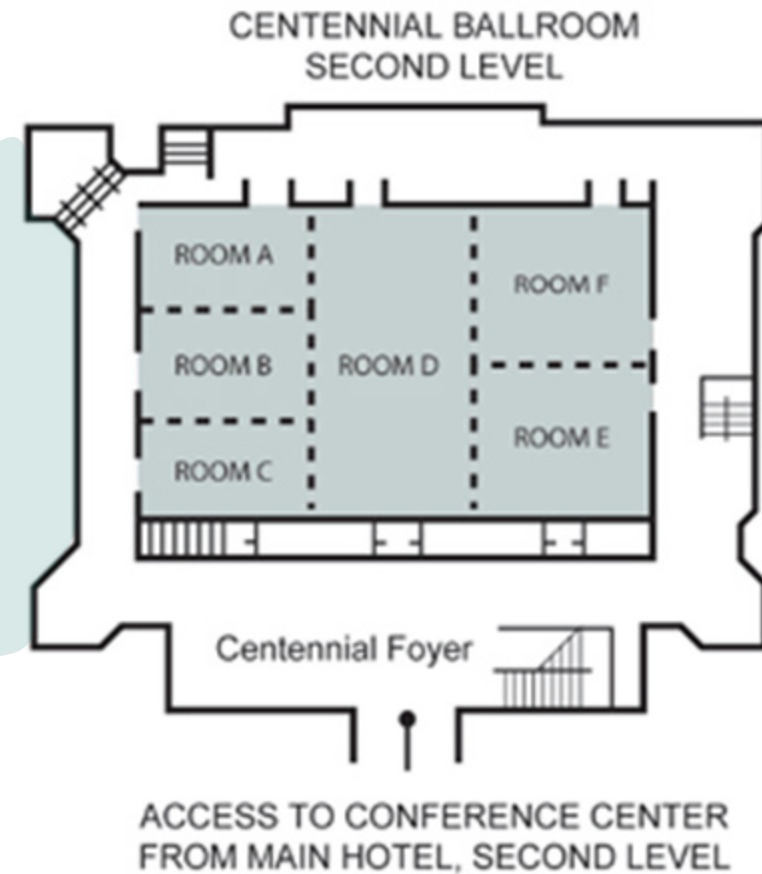
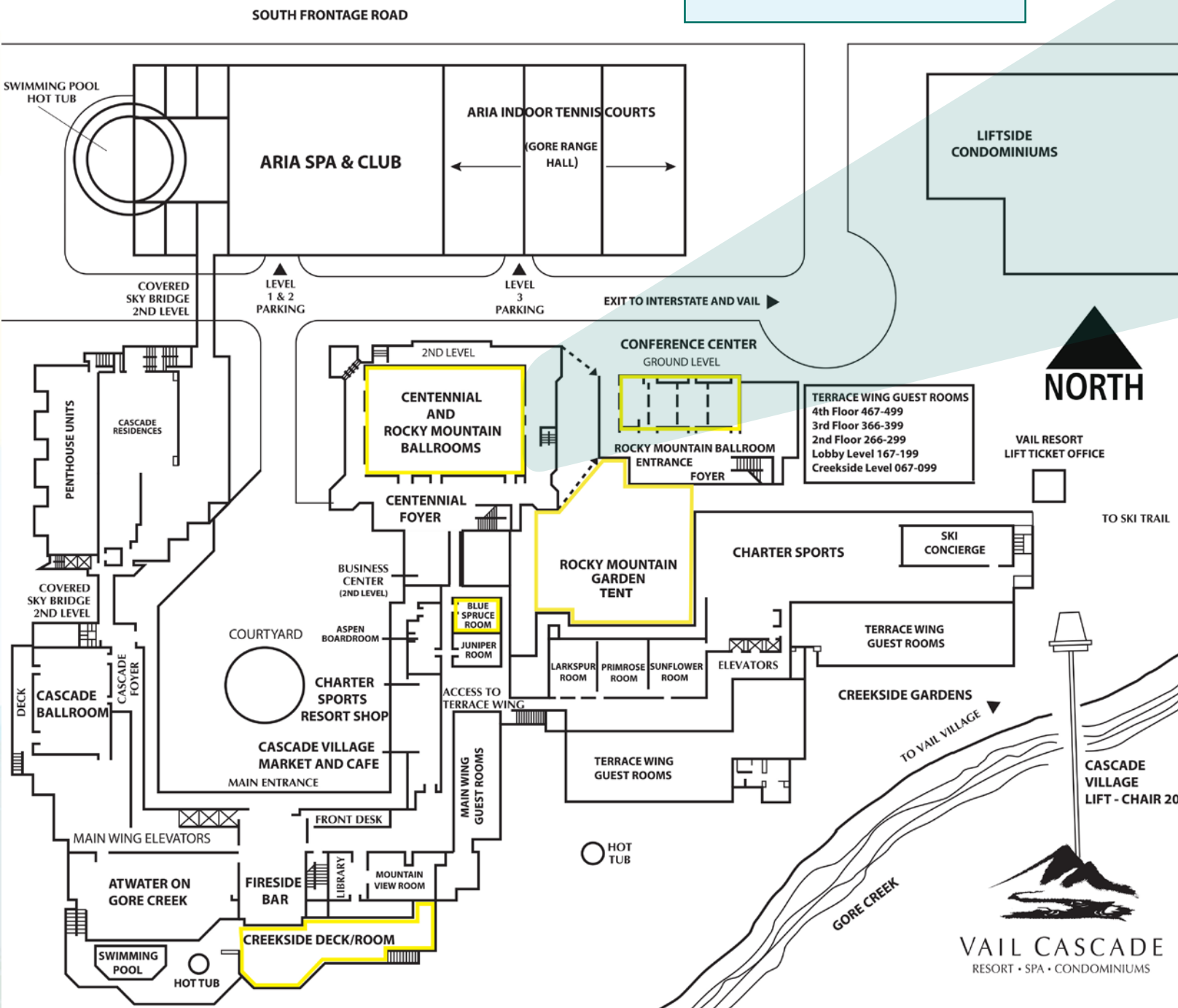
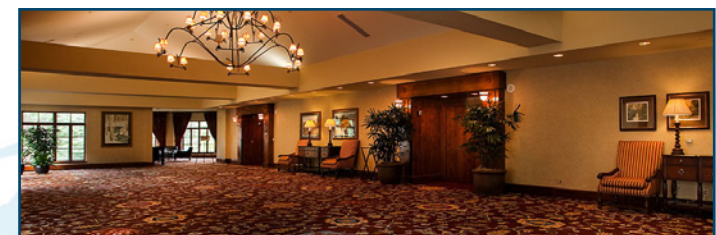
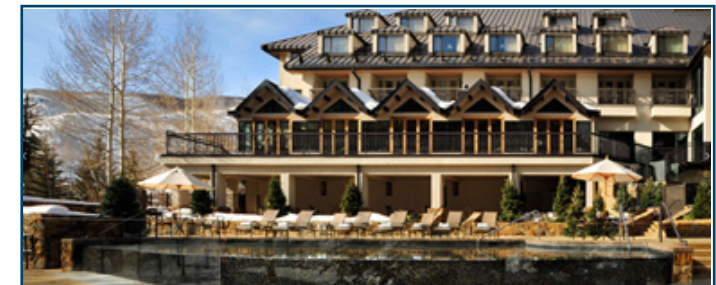


Photo source:  
vailcascade.com





## Tuesday, September 22, 2015

8:00	Certified Floodplain Manager Training Session		
9:00			
10:00			
11:00			
12:00			
1:00			
2:00		Workshop #1 - HEC-RAS 2-D Basics for Dummies	Workshop #2 - Short Course for Bioretention Planning, Design & Maintenance
3:00			
4:00			
5:00			
6:00			
7:00			
8:00			
	Ice Breaker Social Hour		

## Thursday, September 24, 2015

7:00			
8:00	Breakfast		
9:00	2015 CASFM Award Finalists		
10:00	← - - - - - BREAK - - - - - →		
11:00	Featured Speaker – Johnson and Hubbard		
12:00	Lunch General Membership Meeting		
1:00	Committee Meetings		
1:30	Water Quality	Floodplain Management	Technical Modeling
2:00			
3:00	← - - - - - BREAK - - - - - →		
4:00			
5:00	Happy Hour		
6:00			
7:00	CASFM Association Dinner and Awards		
8:00			
9:00	Entertainment		
10:00			

## Wednesday, September 23, 2015

7:00		Certified Floodplain Manager Exam		
8:00	Registration and Breakfast			
9:00	Welcome			
	Revisiting the '65 South Platte River Flood			
10:00	Keynote Address – Andy Reese			
11:00				
12:00	Lunch			
	Board Meeting			
1:00				
	CONCURRENT TECHNICAL SESSIONS		Workshop #3 - FLO-2D	
2:00	Disaster Recovery	Stormwater Management		Stream Restoration
3:00	← - - - - BREAK - - - - - →			
4:00				
5:00	Happy Hour			
6:00				

## Friday, September 25, 2015

7:00			
8:00	Breakfast		
	Closing Remarks		
9:00	Workshop #4 – Culvert Hydraulics Bridge Hydraulics using HEC-RAS	Field Trip - Swan River Restoration Project	Field Trip - Mountain Bike Tour
10:00			
11:00			
12:00			
1:00			
2:00			