



## Who we are

The Great Plains Research and Innovation Symposium (GPRIS) was created to expose decision-makers, professional designers, developers, citizens and others to the full range of regional LID practices available today. Attendees can then return to their communities and encourage the adoption of LID principles through public education, necessary changes in zoning codes to improve LID utilization, and technical support for their successful implementation relative to regional soils and climatic challenges. The GPRIS strives to foster creativity in sustainable development, wider understanding and acceptance of LID within the regulatory structure that guides development, and broader acceptance of interdisciplinary design approaches that are critical to successful LID implementation.



## Symposium Organizers

This event was organized and hosted by the **Colorado Stormwater Center** and **One Water Solutions Institute**:

Colorado State University  
1372 Campus Delivery Fort Collins, CO 80523  
<http://stormwatercenter.colostate.edu/>  
<http://onewatersolutions.com/>



# Great Plains Low Impact Development Research & Innovation Symposium



**June 24 – 26, 2019**  
Colorado State University  
Lory Student Center



# About LID

## What is Low Impact Development (LID)?

LID is a toolbox of site-scale practices that the site designer and developer can utilize to:

- Manage urban rainfall where it occurs for minimized stormwater concentration and runoff
- Potentially lower short-term and long-term development costs
- Improve water quality
- Enhance natural habitat and flood control
- Improve green space aesthetics and potentially increase property values
- Increase community quality of life and livability

There are many practices used to support these benefits including:

- Bioretention systems
- Rain gardens
- Vegetated rooftops
- Bioswales
- Rain barrels
- Permeable pavements

By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas on the environment while providing numerous additional benefits.

# Sponsors

*A special thanks to the Great Plains LID Symposium Sponsors for supporting student registration, breaks and refreshments!*

## GOLD-LEVEL SPONSORS



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# Keynote Lectures

## ANDY SZATKO

**Stormwater Program Supervisor, City of Omaha Environmental Services**  
*The View of Stormwater & Green Infrastructure from the East Coast of the Great Plains*

Tuesday June 25 at 1:00pm – Grand Ballroom

Andy Szatko was born and raised in Omaha, NE. He is a graduate of the University of Nebraska at Lincoln with a Bachelor’s Degree in Horticulture and a Master’s in Community and Regional Planning, with a specialization in Water Resource Planning and Management. Andy has over 15 years in the landscaping industry as a landscape designer, installer, owner and manager. He has been working for the City of Omaha’s Stormwater Program since 2011 and currently oversees the City’s Stormwater (MS4) Program. Over the course of his career, he has been involved with the installation, design, planning, monitoring and maintenance of numerous green infrastructure projects.



## DR. LARRY ROESNER

**Professor Emeritus, Colorado State University**  
*A History of Stormwater Management: The Transition to Low Impact Development*

Tuesday June 25 at 7:00pm – Grand Ballroom

Larry A. Roesner is Emeritus Professor of Urban Water Infrastructure Systems in the Department of Civil Engineering at Colorado State University. His latest research topics include Integrated Management of Urban Water Systems to minimize the amount of water that must be imported and minimizing the amount of water that is discharged as waste. He assumed a leading role in getting a Legislative Bill passed in Colorado that allows graywater to be used for irrigation and toilet flushing. His research also addressed developing sustainable urban drainage practices that ensure that urban streams will remain geomorphically and ecologically stable following urban development in a watershed. Dr. Roesner taught graduate courses on Urban Water Systems Analysis, Urban Stormwater Management, and Water Quality Modeling.



# Program Overview

## Monday June 24, 2019: Workshops & Networking

1:30 - 2:00 PM	<b>Registration:</b> <a href="#">Lory Student Center (LSC): Longs Peak Room #302</a>
2:00 - 5:00 PM	<b>Workshop 1:</b> Approaches for Evaluating Life-Cycle Costs, Performance, and Co-benefits of LID <a href="#">Longs Peak Room #302</a>
2:00 - 5:00 PM	<b>Workshop 2:</b> Installation of LID in Semi-arid Regions: Challenges with LID Installation and Potential Solutions <a href="#">LSC# 304/306</a>
6:00 - 8:00 PM	<b>Networking &amp; Ice Breaker</b> Avogadro's Number: <a href="#">605 S. Mason Street Ft Collins, CO 80524</a> <i>*Approximately 10 minute walk north of CSU Campus*</i>

## Tuesday June 25, 2019: LID Presentations & Keynotes

8:00 - 8:30 AM	<b>Registration:</b> Lory Student Center <a href="#">Grand Ballroom (LSC #350)</a>
8:30 - 9:00 AM	<b>Conference Welcome</b> ( <a href="#">Grand Ballroom</a> )
9:00 - 10:15 AM	<b>Breakout Session 1</b> <a href="#">Rooms: 304/306</a> (Research) & <a href="#">308/310</a> (Applied)
<i>Break</i>	
10:30 - 11:45 AM	<b>Breakout Session 2</b> <a href="#">Rooms: 304/306</a> (Research) & <a href="#">308/310</a> (Policy)
<i>Break</i>	
12:00 - 2:00 PM	<b>Lunch &amp; Keynote</b> ( <a href="#">Grand Ballroom</a> ): Andy Szatko
2:00 - 3:15 PM	LID Panel Discussion ( <a href="#">Grand Ballroom</a> )
<i>Break</i>	
3:30 - 4:45 PM	<b>Breakout Session 3</b> <a href="#">Rooms: 304/306</a> (Policy) & <a href="#">308/310</a> (Applied)
<b>CLOSING BANQUET</b>	
5:30 - 6:00 PM	Networking & Refreshments ( <a href="#">Grand Ballroom</a> )
6:00 - 8:00 PM	Dinner & Keynote: Larry Roesner ( <a href="#">Grand Ballroom</a> )

## Wednesday June 26, 2019: Field Trip

9:00 – 12:00 PM	<b>Fort Collins LID Tour</b> – meet at <a href="#">Sweet Sensations coffee shop</a> on the southeast corner of the LSC at <b>8:45am</b> (transportation provided and limited to ticketed LID Tour attendees).
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# Breakout Sessions

## Session 1: 9:00 AM - 10:15 AM

RESEARCH (LSC# 304/306)	APPLIED (LSC# 308/310)
<i>Effects Of Stormwater Infiltration Spatial Arrangement On Subsurface Storage And Baseflow, Benjamin Choat</i>	<i>Low Impact Stormwater Quality And Quantity Management Approach At The River Mile Development, Christopher Olson</i>
<i>Utilizing Bioretention For Pesticide Removal From Nursery Runoff, Grant Graves</i>	<i>Designing The Natural City: Consolidated LID Approaches For The River Mile Urban District, Greg Dorolek</i>
<i>Laboratory Investigation Of Removal Of Heavy Metals From Stormwater Using Biochar And Nanoscale Zero Valent Iron Amended Biochar, Md Sazadul Hasan</i>	<i>A Simple Procedure To Optimize Low Impact Development Type And Area Treated Based On User Input, John Mcmaine</i>
<i>Evaluation Of Green Stormwater Infrastructure Network Effects On Incidences Of Urban Roadway Flooding, Katie Knight</i>	<i>LID Planning For Original Aurora: Where Stormwater And Urban Planning Meet, Emily Villines</i>
<i>Optimizing Wave Dissipation By Floating Wetlands For Reduction Of Shoreline Erosion Due To Wave Action, Maxwell O'Brien</i>	<i>Performance Monitoring Of A Simple Retrofit For A Rain Garden In Fort Collins, CO, Tyler Dell</i>

## Session 2: 10:30 AM - 11:45 AM

RESEARCH (LSC# 304/306)	POLICY (LSC# 308/310)
<i>Performance Evaluation Of Extensive Green Roofs In The Semi-Arid Upper Great Plains Region, Jason Phillips</i>	<i>Instituting A GI Program: A Journey From Policy To Implementation, Basil Hamdan</i>
<i>Modeling The Performance Of Agricultural Stormwater Constructed Wetlands, Daniyal Siddiqui</i>	<i>Integrating LID Into Municipal Design Criteria: A Colorado MS4 Perspective, Kevin Koryto</i>
<i>Progress On Using Aggregated Fly Ash For Phosphorus Removal In Bioretention, Jason Vogel</i>	<i>Iowa's LID Success Through Education And Partnerships, Pat Sauer</i>
<i>Effect Of Compost Filter Socks On Nutrient And Sediment Levels In Simulated Construction Site Runoff Containing Sediment From Different Soil Types, Madeline Wade</i>	<i>Case Studies Demonstrating The Evolution Of LID And Green Infrastructure To Meet Combined Sewer Overflow Goals And Regulatory Requirements, Scott Struck</i>
<i>A Comprehensive Tool For Design And Optimization Of Green And Gray Stormwater Infrastructures, Ali Zadeh, Shojaeizadeh</i>	<i>International Stormwater BMP Database: Lessons Learned From Over 20 Years Of Stormwater Monitoring, Christopher Olson</i>

# Breakout Sessions

## Session 3: 3:30 PM - 4:45 PM

POLICY (LSC# 304/306)	APPLIED (LSC# 308/310)
<i>Pervious Concrete Long-Term Clogging Trends And Evaluation Of Cleaning Methods, Jason Vogel</i>	<i>A Plan To Assess The Effectiveness Of Denver's Green Infrastructure Program, Christopher Olson</i>
<i>The New National ASCE Standard For Permeable Interlocking Concrete Pavement, Robert Bowers</i>	<i>Replicating Pre-Development Hydrologic Conditions In Dense Urban Developments: A Case Study At The "Steam On The Platte" Project In Denver, CO, Jay Peters</i>
<i>Topsoil Management As An Effective Stormwater Control Measure, Sara Johnson</i>	<i>Stormwater Monitoring: Urban Drainage &amp; Flood Control District Lessons Learned, Jason Stawski</i>
<i>Quantifying Volume Reduction In Grass Buffers And Grass Swales, Holly Piza</i>	<i>Urban Green Infrastructure Design &amp; Management: Learning From Living Roofs, Rain-Gardens, And A Created Meadow In The Flint Hills Ecoregion, Lee Skabelund</i>
<i>Barriers To Low Impact Development (LID) For Stormwater Management And What Has Changed In The Past 10 Years, Tyler Dell</i>	<i>Integrated Stormwater Management Planning For The Renfrew Neighborhood In Calgary: Translating Lessons Learned From North Of The Border To The Great Plains, Scott Struck</i>

# Posters

## Poster Session: 10:15 AM - 5:00 PM

Grand Ballroom (LSC# 350)
<i>Performance Of A Field-Scale Residential Rain Garden Amended With Biochar, Farhana Akhter</i>
<i>Protecting Our Neighborhood Detention POND Program, Jennifer Salvo</i>
<i>Development Of An LID Design And Inspection And Maintenance Manual For The City Of Tulsa, Kolt Vaughn</i>
<i>Making The First Lady's Garden Sustainable, Kimberly White</i>