



Operation & Maintenance of Stormwater Control Measures

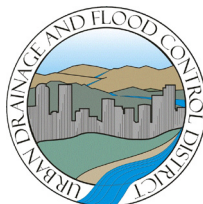
Minneapolis, MN | August 4-7, 2019



Hyatt Regency Minneapolis
Final Program
www.omsconference.org

Please join us in thanking our...

Cooperating Organizations



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Welcome to O&M



Welcome! On behalf of EWRI's Urban Water Resources Research Council and the organizing committee, it is my pleasure to welcome you to Minneapolis and EWRI's second conference on Operation and Maintenance of Stormwater Control Measures. Implementation of green stormwater control measures is increasing, and we are learning new lessons and developing an understanding of how to maintain these systems.

Additionally, these conversations about understanding and efficiency of operations and maintenance have spurred new questions about gray stormwater control measures that have been in place for decades. Learn from your colleagues about the latest research, lessons learned from practitioners, and innovative institutional approaches and have an opportunity to discuss the current and future needs and importance of stormwater facility operations and maintenance.

Choose from over 120 technical presentations on maintenance topics including:

- Design Considerations
- Asset Management
- Costs and Decision Making
- Performance Aspects
- Vegetation
- Climate Considerations
- Cold Climate and Chloride
- Training and Communications
- Equipment and Tools
- Construction Considerations
- Underground, Filtration, and Active Systems.

The implementation of stormwater control measures in Philadelphia have been impressive, and you will not want to miss the keynote address by Marc Cammarata, Deputy Water Commissioner for Planning and Environmental Services of the Philadelphia Water Department. You will also want to hear the well-respected legal perspective on stormwater maintenance from Louis Smith of Smith Partners and hear about the stormwater management operation from Wesley Saunders-Pierce of the City of St. Paul, MN.

Plan to arrive early to attend a maintenance inspection course, which will take place at the University of Minnesota Landscape arboretum. Be sure to experience one of the multiple Technical Tour opportunities on the last day of the conference. You will want to make time to attend the networking social on Monday night at the conference venue, and if you still have unfinished conversations you can head over to Lakes and Legends, the nearby venue serving as the conference pub.

Part of EWRI's International Low Impact Development conference series, the Stormwater O&M Conference is a chance to engage with municipal staff, leading consultants, academics doing seminal work in the field, and regulators. Join the conversation about how to ensure that your stormwater controls work. We look forward to joining you at the conference!

John Chapman, P.E., M.ASCE

Meet the Host



Created in 1999, the Environmental and Water Resources Institute (EWRI) is a specialty organization, over 26,000 members strong, that functions semi-autonomously within the American Society of Civil Engineers (ASCE) to

integrate technical and public policy expertise and promoting the planning and management, design, construction, and operation of environmentally sound and sustainable infrastructure impacting air, land, and water resources.

In addition to Governing Board-Level Committees, EWRI is organized around three primary interest areas: Technical Activities, Products, and Institute Operations. If you are not a member of EWRI, we invite you to consider the benefits of membership. Visit the EWRI web site or stop by the registration desk. If you have registered as a non-member for this conference you will receive a complimentary 2020 EWRI membership.

EWRI of ASCE

1801 Alexander Bell Drive, Reston, VA 20191

Tel: 703-295-6380 | Fax: 703-295-6371

International 1-800-548-2723 ext. 6380

www.asce.org/ewri

Meet the O&M Committee

STEERING COMMITTEE

John Chapman, Chair, *University of Minnesota*

Mike Isensee, Co-Chair, *Carnelian Marine St. Croix Watershed District*

Scott Struck, Technical Program Co-Chair, *Geosyntec*

John Gulliver, Technical Program Co-Chair, *University of Minnesota*

Andy Erickson, Local Host Chair, *University of Minnesota St. Anthony Falls Laboratory*

Jay Michels, Sponsorship & Exhibits Chair, *Emmons and Olivier Resources*

ASCE STAFF

Brian Parsons, Director, EWRI

Jenn Jacyna, Manager, EWRI

Mark Gable, Senior Conference Manager, EWRI

Kelly Frere, Manager, Conference & Event Services, ASCE

ADA Compliance: The Hyatt Regency Minneapolis Hotel is barrier-free in compliance with the Americans with Disabilities Act (ADA). While ASCE-EWRI will make every effort to meet the needs of the physically challenged, accommodations cannot be guaranteed without prior notification.

Badge Policy: Your name badge is your admission to the conference. Please wear your badge at all times while at the venue. ASCE recommends that you remove your badge when leaving the venue. Where tickets are required, please bring them with you as you will not be admitted without one.

Conference Attire: The dress code for the conference is business casual. Meeting room temperatures will vary, so layered clothing is recommended. We also recommend attendees wear comfortable shoes.

Hotel Information: Hyatt Regency Minneapolis, 1300 Nicollet Mall, Minneapolis, MN 55403

No Smoking Policy: ASCE supports a “No Smoking” policy. Smoking is prohibited inside the Hyatt Regency Minneapolis and all venues hosting ASCE events.

Cancellation Policy: Please refer to:
<http://www.omsconference.org/registration> to review the ASCE-EWRI cancellation and refund policy.

Weather in Minneapolis: The average high is 80°- 86°F during the day. The average low is 61°- 67°.

Medical Emergencies: ASCE-EWRI hopes that your visit will be free of medical incident. However, if you become ill, please contact the front desk and tell them you have a medical emergency. The closest hospital is 2.3 miles away, at Abbott Northwestern Hospital - 800 East 28th Street, Minneapolis, MN 55407

General Information

Post-Conference Evaluations: An electronic evaluation will be sent to all conference attendees following the conference.

Professional Development Hours (PDHs): You may earn PDHs by attending technical sessions and workshops. ASCE follows NCEES guidelines on continuing professional competency. Since continuing education for P.E. license renewal vary from state to state, ASCE recommends that individuals check with their state registration board(s) for their specific requirements. For details on your state's requirements, please visit <https://ncees.org/state-links/>.

Recording Policy: Video or audio recording of any educational session is strictly prohibited without written permission from both ASCE and the session presenter(s). Photographs may be taken if used for personal purposes only.

Photographic Release: By attending this conference, I hereby release any photographs that may be incidentally taken of me by ASCE-EWRI during these events to be used for any purpose.

Nursing Mother's Room: To better serve nursing mothers attending this year's conference, a nursing mother's room will be available during all regular events including plenary, technical & special sessions, meals and breaks. See the hotel front desk for directions on how to access room. We hope that you find this room comfortable and useful.

Liability Waiver: By attending this conference, I agree and acknowledge that I am participating in ASCE-EWRI events and activities as my own free and intentional act. I am fully aware that possible physical injury might occur to me as a result of my participation. I give the acknowledgement freely and knowingly that I am, as a result, able to participate in ASCE-EWRI events, and I do hereby assume responsibility for my own well-being. I also agree not to allow others any other individual to participate in my place.

Sunday, August 4

7:30 a.m. - 5:30 p.m.	Short Course: Stormwater Control Measure Inspection and Maintenance*
8:00 a.m. - 4:00 p.m.	Rainwater Harvesting Task Committee
12:00 - 4:00 p.m.	Registration
1:00 - 5:00 p.m.	Committee Meeting - Lake Bemidji
5:00 - 8:00 p.m.	Exhibitor Move-in - Regency Room

Monday, August 5

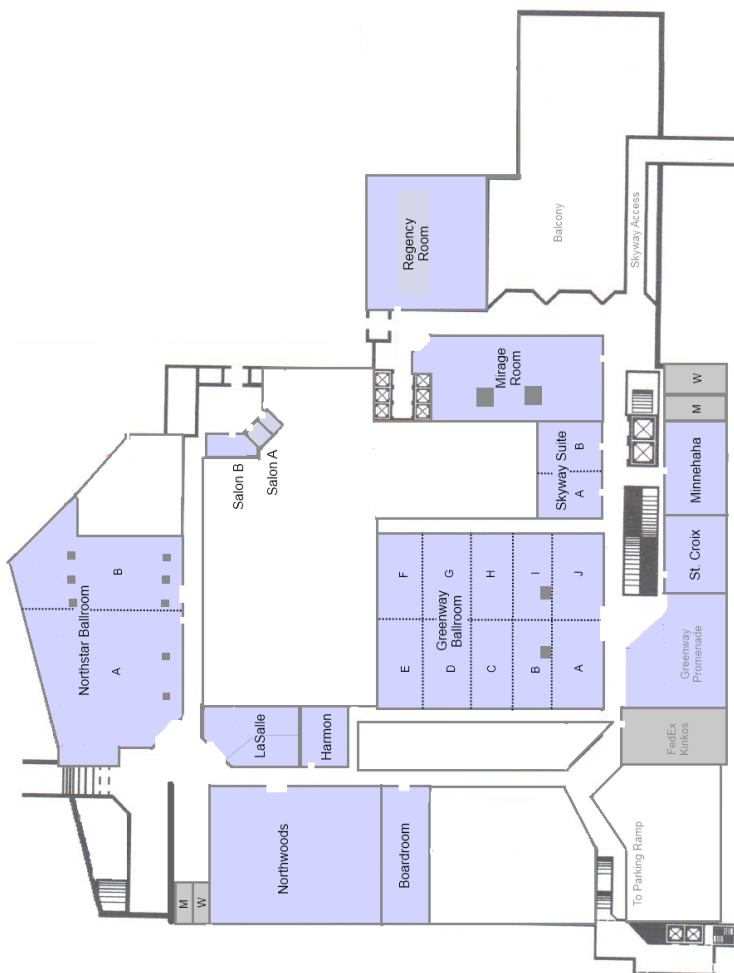
7:30 a.m. - 5:00 p.m.	Registration
8:00 - 10:00 a.m.	Opening Plenary Session - North Star A
10:00 - 10:30 a.m.	Networking Break - Regency Room
10:00 a.m. - 5:00 p.m.	Poster Presentations - Regency Room
10:30 a.m. - 12:00 p.m.	Concurrent Technical Sessions
12:00 - 1:30 p.m.	Plated Lunch - North Star A
1:30 - 3:00 p.m.	Concurrent Technical Sessions
3:00 - 3:30 p.m.	Networking Break - Regency Room
3:30 - 5:00 p.m.	Concurrent Technical Sessions
5:00 - 5:30 p.m.	Lightning Talks - North Star A
6:00 - 8:00 p.m.	Reception -Regency Room

Schedule at a Glance

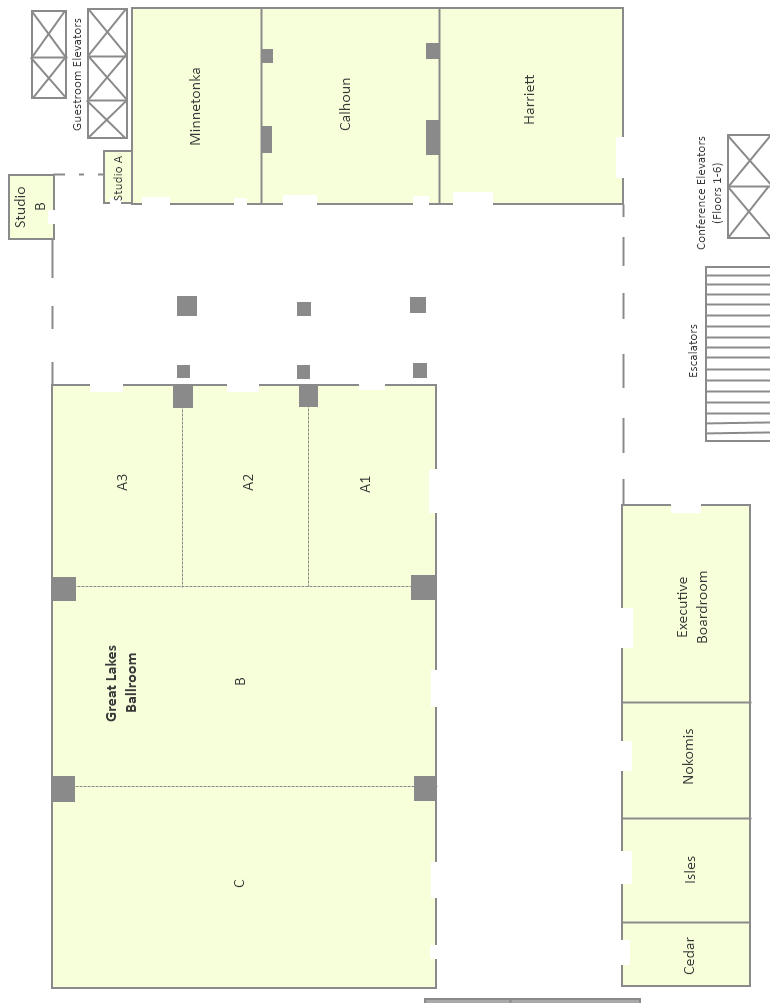
Tuesday, August 6	
8:00 a.m. - 4:00 p.m.	Registration
8:00 - 9:00 a.m.	Morning Plenary - North Star A
9:00 a.m. - 10:30 a.m.	Concurrent Technical Sessions
10:30 - 11:00 a.m.	Networking Break - Regency Room
11:00 a.m. - 12:00 p.m.	Concurrent Technical Sessions
12:00 - 1:30 p.m.	Plated Lunch - North Star A
1:30 - 3:00 p.m.	Concurrent Technical Sessions
3:00 - 3:30 p.m.	Networking Break - Regency Room
3:30 - 5:00 p.m.	Concurrent Technical Sessions
Wednesday, August 7	
8:00 a.m. - 12:00 p.m.	Registration
8:30 - 10:00 a.m.	Concurrent Technical Sessions
10:00 - 10:30 a.m.	Networking Break - Regency Room
10:30 a.m. - 12:00 a.m.	Concurrent Technical Session
1:00 - 5:00 p.m.	Technical Tours*
Conclusion of Conference	

**** Additional registration required***

Hyatt Regency Minneapolis - 2nd Floor



Hyatt Regency Minneapolis - 4th Floor



Opening Plenary & Keynote Lectures

Northstar A

Monday, August 5 | 8:00 - 10:00 a.m.



Marc Cammarata is a regional and national leader in sustainable stormwater management practices and water resources planning. He is a Professional Engineer with a Bachelor of Science in Civil and Environmental Engineering from Villanova University and a Master of Science in water resources engineering from Drexel

University. He has spent all 21 years of his professional career with the Philadelphia Water Department where he currently serves as the Deputy Water Commissioner for Planning and Environmental Services.

His responsibilities include the integration, direction and management of the Department's strategic environmental and sustainability programming, water quality and quantity modeling and wet weather compliance programs, flood mitigation efforts, both green and traditional infrastructure planning, stream and wetland restoration, laboratory services, and climate mitigation and adaptation efforts.

His team is leading the efforts for the City of Philadelphia's "Green City, Clean Waters" program – a 25 year, multi-billion-dollar infrastructure program integrating land-based urban sustainability goals with the goals for clean, safe, attractive and accessible rivers and streams.



Louis Smith is an attorney who has practiced water law for more than 30 years. He is a member of Smith Partners PLLP, a law firm devoted to water resources law and public-private partnerships. His firm represents a dozen watershed organizations throughout Minnesota, and has counseled state agencies on the coordination of municipal and

watershed stormwater management programs; modernization of the drainage code to better integrate drainage, wetlands management, and water quality; and implementation of Minnesota's buffer law. He counseled the Minnehaha Creek Watershed District in structuring the Minneapolis Chain of Lakes Clean Water Partnership, which completed the largest urban lake restoration project in the United States and received five environmental awards, including the CF Industries National Watershed Award and the Minnesota Governor's Award for Excellence in Pollution Prevention.

Mr. Smith is past president of the Rivers Council of Minnesota. He was appointed by Governor Tim Pawlenty to the Clean Water Council to guide the state's constitutional Clean Water Legacy Fund, served as the Council's first chair, and was reappointed by Governor Mark Dayton. Mr. Smith served as counsel for a statewide task force convened by the Department of Public Safety to develop a strategic plan for criminal justice and drug policy, and chaired a task force to develop a partnership model to promote Minnesota's Green Economy.

Lightning Rounds

Northstar A

Monday, August 5 | 5:10 - 5:50 p.m.

Maintenance Costs of Stormwater Control Measures (SCMs) In North Carolina
Sarah Waickowski, NC State University; Bill Lord, NC Cooperative Extension;
Bill Hunt, NC State University

Event-Based Adaptive Management To Optimize De-Icing Chloride Loads
Lawrence Baker, University of Minnesota; Douglas Klimbal, University of Minnesota; Ben Janke, University of Minnesota; Bruce Wilson, University of Minnesota; Melissa Friese, University of Minnesota

Stormwater Research Roadmap For Minnesota – Identifying The Priority Needs For New Research and Plotting A Course To Find The Answers For Operations and Maintenance of Stormwater Management Practices

John Bilotta, University of Minnesota; Shahram Missaghi, University of Minnesota; John Chapman, University of Minnesota; Lawrence Baker, University of Minnesota; David Fairbairn, Minnesota Pollution Control Agency

Management of Riparian Buffers and Use of Mycorrhizal Fungi Amendments To Maximize Phosphorus Removal and Ecological Performance In Agricultural Watersheds

Christian Lenhart, University of Minnesota; Laura Bender, University of Minnesota

What If Plants Die In The Green Infrastructures

Wei Zhang, TreeDiaper (Zynnovation LLC); Hailing Yang, TreeDiaper (Zynnovation LLC)

Trees, Stormwater and Suspended Pavements: Research and Reality

Albert Key, DeepRoot Green Infrastructure, Inc.

Operation and Maintenance Challenges of China "Sponge City" Initiative

Jim (Yuming) SU; Shengyi Qin, China Key Laboratory of Silica Sand Utilization; Zhangfei Li, Rechsand Ecological Environmental Protection Science and Technology Co., Ltd.

TDA: The Next Generation Stormwater Management Aggregate

Monte Niemi, I.Do.TDA

Asset Performance Management and The Evolution of the Digital Watershed

Jeffrey Wright, Atkins; Micah Strauss, Opti

Morning Plenary & Keynote Lecture

Northstar A

Tuesday, August 6 | 8:00 - 9:00 a.m.



Wesley Saunders-Pearce is a multiple-award winning advocate for clean water. As the Water Resource Coordinator for the City of Saint Paul, Wes provides leadership for citywide initiatives including green infrastructure and climate change strategies. Since joining Saint Paul in 2011 he has pioneered new frontiers for local stormwater

management.

Operating from a challenging position of zero budget or staff, he has skillfully led the city towards using rain as a resource. Wes spearheads Saint Paul's district-based approach to stormwater systems, which includes maintenance funding solutions.

His innovative approach has framed strategic policy and revolutionized the city's stormwater ordinances. He has led landmark demonstration projects such as the city's first green alley and Minnesota's first municipal project to harvest rainwater for indoor use.

As chair of the city's inter-agency Water Resource Work Group, he works across departments and agencies in defining and addressing stormwater maintenance needs. Wes also is responsible for advancing the city's stormwater regulatory program, guiding floodplain development, and protecting the city's wetlands.

Wes holds a Bachelor's degree from Macalester College and a Master's degree in Water Resource Science from the University of Minnesota.

Technical Tours*

Wednesday, August 7 | 1:00 - 5:00 p.m.

Complete Operations and Maintenance Program with Unique BMPs at a Watershed Scale

Join us as we tour unique stormwater management sites in the northeast metro area of Minneapolis and St. Paul and discuss a robust operations and maintenance program established by the Ramsey-Washington Metro Watershed District (RWMWD). The RWMWD is a special purpose unit of government that partners with its 12 cities, two counties, and many private landowners to improve and protect our 20 lakes and 5 streams as well as the Mississippi River.

Tour participants will visit sites at the Maplewood Mall, Willow Pond Spent Lime Filter, Shoreview PaveDrain Streets, and the Tanners Lake Alum Plant.

Each site includes unique BMPs that require specific operations and maintenance procedures. We will also experience the RWMWD's overall inspection and maintenance program that started as a pilot program in 2013. Now every year the RWMWD inspects hundreds of BMPs (of its over 1,000) and hires a contractor to maintain surface BMPs around the watershed.

The program is also offered to the cities where the watershed will manage the contractor and then be reimbursed for the BMP maintenance. A major component of the program is the outreach and education of landowners for transfer of maintenance responsibilities. One of the maintenance contractors will be on the tour to discuss this unique partnership with the watershed. Successes and lessons learned will be shared by watershed staff, city staff, and private landowners and contractors.

Sweep, Suck, Seed and More - Maintenance Equipment Demonstrations

The tour will include interactive demonstrations of equipment used to maintain a range of stormwater best management practices. Demonstrations will include; a high efficiency street sweeper with the latest high efficiency particulate air (HEPA) system, a vacuum truck to clean a sump structure, a skid mounted seeder for enhancing a first flush in slope with native plant species, maintenance of a permanent inlet insert device that can trap solids/soils/chemicals, power washing of equipment with water recovery to reduce the spread of invasive species, maintenance of permeable interlocking concrete pavement, loading and unloading operations for temporary irrigation system to control fugitive dust, and various spill capture and removal technologies.

The afternoon will be structured as a learning opportunity and allow participants to interactively assess the need for, and effectiveness of, maintenance practices for each demonstration.

The tour will include stops at two or more sites at or near the University of Minnesota.

Automated Stormwater Controls Tour: Actively Managing Urban Flows

Join us to see how stormwater is being actively managed in St. Paul with automated controls, and how the application of real-time data and analytics is optimizing O&M. Hosted by the Capitol Region Watershed District (CRWD), this tour will consist of visiting three intelligently managed stormwater best management practices that utilize continuous monitoring and adaptive control (CMAC).

CMAC is a stormwater management technology that combines weather forecast information and real-time continuous environmental sensors to actively control stormwater storage and flows.

The site visits included in this tour are Curtiss Field Park, the Upper Villa Park and the CRWD Headquarters Office.

The tour at Curtiss Field Park includes a stormwater pond and infiltration gallery that is actively management with CMAC to mitigate flood risk.

When visiting Upper Villa Park, guests will learn about the underground infiltration gallery that uses CMAC to mitigate flood risk, improve water quality, and ensure irrigation water is available in the underground cistern.

The tour will conclude with a visit to the CRWD Headquarters Office in St. Paul. The CRWD Office has a CMAC-enabled rainwater harvesting system. This system collects rainwater for beneficial onsite use, and minimizes untreated overflow to the storm sewer.

Also included in this tour will be a demonstration of the CMAC online operating platform used by CRWD for the above projects.

Attendees will see how stormwater storage and flows are being controlled via an automatic online software system, using weather forecast information and environmental data in real time.

Minneapolis Ultra Urban Green Infrastructure Operations and Maintenance Tour

Join us for an interactive operations and maintenance tour of private and public green infrastructure practices in Minneapolis. Tour participants will evaluate maintenance and function of a

wide range of practices on four redevelopment project areas: University of Minnesota Gopher Stadium, Towerside District Stormwater System, University Avenue Greenline, and Surley Brewing.

After evaluating practices at each site learn about maintenance techniques, schedule, and lessons learned from both private and public operations and maintenance staff.

Tour site location information is available in the Minnesota Stormwater Manual Green Infrastructure Case Studies Section.

**Please note: All Tours require additional registration. Buses for all tours will assemble outside the hotel at 12:45 p.m., with a 1:00 p.m. departure. All tours will require some physical exercise. Please wear comfortable walking shoes. Tour refunds will not be given if a participant misses the bus.*

Monday, August 5

Opening Plenary & Keynote Lectures

8:00 - 10:00 a.m. | Northstar A

Marc Cammarata, P.E., Deputy Water Commissioner for Planning & Environmental Services, Philadelphia Water Department

Louis Smith, J.D., Smith Partners, PLLP
Managing Risks and Forging Watershed Partnerships

Session 1.1: Asset Management GI - As A Community Asset

Moderator: Kathlie Jeng-Bulloch

10:30 a.m. - 12:00 p.m. | Skyway

Potentials for Enhancing the Management of Stormwater-Collection Infrastructure

Mohammadsoroush Tafazzoli, Washington State University

Asset Management and Rate Structure Development for Municipal Stormwater Programs

Maureen Kerner, Office of Water Programs at California State University, Sacramento; Erik Porse, Office of Water Programs at California State University, Sacramento

Stormwater Basins as Community Assets

Douglas Mensing, Applied Ecological Services, Inc.

Session 1.2: Establishing and Maintaining Vegetation - Growing Vegetation & Wetlands

Moderator: Travis Wolfe

10:30 a.m. - 12:00 p.m. | St. Croix

Successful Vegetation Establishment & Maintenance of City Stormwater BMPs

Danielle Schumerth, City of Minneapolis; Jen Merth, Landbridge Ecological; Tory Christensen, Landbridge Ecological

Optimizing Green Infrastructure Performance: Case Studies of Los Angeles Wetlands

James Bays, Jacobs Engineering; Wing Tam, City of Los Angeles; Gordon Haines, City of Los Angeles; Kosta Kaporis, City of Los Angeles

Application of a Watershed Approach for Improving the Functionality and Resiliency of Constructed Wetlands

Jason Martin, Kleenco Maintenance & Construction; Suzanne Beyeler, Manchester University

Session 1.3: Helping to do the Right Thing - Ordinance and Regulations

Moderator: John Bilotta

10:30 a.m. - 12:00 p.m. | Northstar B

Fate of Grant-Funded Green Stormwater Infrastructure: Lessons Learned and Ideas for the Future

James Cooper, Biohabitats, Inc.; Bryan Arvai, Biohabitats, Inc.

SCM I&M in Metro Nashville Tennessee, Where We Are and Where We Are Going

Elizabeth Stienstraw, MWS, Stormwater NPDES

Adapting Your O&M Program to Ever Changing Regulations
Charles Crowell, Gwinnett County Department of Water Resources

Session 2.1: Asset Management - Assessing Asset Condition and Optimizing Performance

Moderator: Nico Cantarero

1:30 - 3:00 p.m. | Skyway

Building Resilient Communities: Asset Management and Condition Assessment for Stormwater Management Programs
Allison Bell, HDR; Michael Ryan, HDR; Amiee Navicks-Brasch, HDR

City of Austin Asset Management
Sergio Mendoza, City of Austin

Proactive Maintenance Planning through Purposeful Data Collection: Applying Lessons Learned from 32 miles of Stormwater Pipe Inspections
Bethany Bezak, Tetra Tech, Inc.; Olivia August, Tetra Tech, Inc.

Use of a Decision-Making Tool for Aging Infrastructure for Asset Management and O&M Planning
Rajat Chakraborti, Jacobs Engineering Co.; Jagjit Kaur, Jacobs Engineering Co.

Session 2.2: Establishing and Maintaining Vegetation - Tree and Plant Selection Strategies

Moderator: Steven Polk

1:30 - 3:00 p.m. | St. Croix

Maintenance-friendly Planting Design for Green Stormwater Infrastructure
Hong Wu, The Pennsylvania State University; John Hall, The Pennsylvania State University

*Successful Plant Species for Harsh Urban Gardens:
Observations from the Field and Strategies for Planning and
Design*

Andrew Novak, Capitol Region Watershed District

*Oswego County Tree Planting Project: A Collaborative Urban
Forestry Effort to Manage Stormwater Runoff, Reduce Pollution
and Test Novel Management Technology*

Hongbin Gao, Atlantic States Legal Foundation, Inc.; Karen
Noyes, Oswego County Department of Community
Development; Hailing Yang, Zynnovation LLC; Wei Zhang,
Zynnovation LLC

Session 2.3: Management of Ponded Water - Improved Management of Ponded Systems

Moderator: Andy Erickson

1:30 - 3:00 p.m. | Northstar B

How to Stop Ponds from Releasing Phosphorus

Vinicius Taguchi, St. Anthony Falls Laboratory - University of
Minnesota Twin Cities; Benjamin Janke, St. Anthony Falls
Laboratory - University of Minnesota Twin Cities; Poornima
Natarajan, St. Anthony Falls Laboratory - University of
Minnesota Twin Cities; Jacques Finlay, Department of Ecology,
Evolution, and Behavior - University of Minnesota Twin Cities;
John Gulliver, St. Anthony Falls Laboratory - University of
Minnesota Twin Cities

Control and Management of Algae in Stormwater Facilities

Dwayne Giesbrecht, The City of Calgary; *presented by Mohd
Gazi*

MS4 Pond Assessments: How to Tread Water

Jake Newhall, WSB; Bill Alms, WSB

Restorative versus Transformative Maintenance: A Dry Pond Case Study

William (Bill) Hunt, NC State University; Katy Mazer, Purdue University; Sarah Waickowski, NC State University

Session 2.4: Performance Assessment - Monitoring

Moderator: John Gulliver

1:30 - 3:00 p.m. | Minnehaha

Monitoring of an Iron Enhanced Sand Filter to Determine Maintenance Requirements

Mark Houle, Capitol Region Watershed District; Bob Fossum, Capitol Region Watershed District

Monitoring of Gross Solids in Residential Street BMPs to Determine Performance, Maintenance, and Costs

Sarah Wein, Capitol Region Watershed District; Britta Belden, Capitol Region Watershed District

St. Anthony Regional Stormwater Treatment and Research Facility - Monitoring, Operation and Maintenance

Jen Keville, Mississippi Watershed Management Organization; Brian Jastram, Mississippi Watershed Management Organization; Udai Singh, Mississippi Watershed Management Organization; Stephanie Johnson, Mississippi Watershed Management Organization; John Pedrick, Contech Engineered Solutions LLC

Quantifying the Mass and Volume of Gross Solids/Trash in Stormwater Runoff: Effects on SCM Pretreatment Design

Ryan Winston, Ohio State University; Lauren Sester, Ohio State University; Jon Witter, Ohio State University

Session 3.1: Asset Management - Asset Management Planning & Big City Program Development

Moderator: Holly Piza

3:30 - 5:00 p.m. | Skyway

Optimising Operation and Maintenance of Auckland's Stormwater Network to Ensure Performance

Frank Tian, Auckland Council; Dukessa Blackburn-Huettner, Auckland Council

Multifaceted Asset Assessment, Flood Reduction, and Proactive Hurricane Protection in Virginia Beach

Alan Davis, Hazen and Sawyer

Tools for Strategic Asset Management of Green Stormwater Infrastructure

Tavi Michini, Sci Tek Consultants; Ashley Willis, Philadelphia Water Department; Gerald Bright, Philadelphia Water Department

Operations & Maintenance (O&M) and Asset Management of Green Stormwater Infrastructure (GSI) Projects in City of Los Angeles, California

K. Majid Sadeghi, LA Sanitation, City of Los Angeles; Wing Tam, LA Sanitation, City of Los Angeles; Kosta Kaporis, LA Sanitation, City of Los Angeles; Shahram Kharaghani, LA Sanitation, City of Los Angeles

Session 3.2: Establishing and Maintaining Vegetation - Trees, Plants, and GI in Big Cities

Moderator: Steven Polk

3:30 - 5:00 p.m. | St. Croix

Real-Time Soil Moisture Monitoring in Rain Gardens to Inform Site Maintenance Decisions with Low-Cost Internet of Things Technology

Karly Soldner, Drexel University; Ziwen Yu, Drexel University; Matthew Fritch, Philadelphia Water Department; Stephen White, Philadelphia Water Department; Franco Montalto, Drexel University

Factors Affecting Sedimentation Rates, Surface Infiltration, and Vegetative Health within Right-of-Way Green Infrastructure in New York City: Implications for System Design, Construction, and Maintenance

John McLaughlin, NYC Department of Environmental Protection; Miki Urisaka, NYC Department of Environmental Protection; Shandor Szalay, AKRF Inc.; Ted Brown, Biohabitats Inc.; Zhongqi Cheng, Brooklyn College; Jerry Kleyman, Arc

It's Always Rainy in Philadelphia: Priorities and Progress of GSI Monitoring

Billy Nichols, Philadelphia Water Department; Stephen White, Philadelphia Water Department; Taylor Heffernan, Philadelphia Water Department; Chris Bergerson, Philadelphia Water Department

Baltimore City Experience with Environmental Impact Bond Process

Rosanna La Plante, Baltimore City

Session 3.3: Inspection and Maintenance - Inspection and Other Lessons Learned

Moderator: Peter Weiss

3:30 - 5:00 p.m. | Northstar B

New Approaches for Cost-Effective Inspection of Stream Restoration Sites in the Chesapeake Bay Watershed

David Wood, Chesapeake Stormwater Network; Thomas Schueler, Chesapeake Stormwater Network

City of Austin, TX-Watershed Protection Department's Commercial SCM Inspection and Enforcement Overview

Matthew Boger, City of Austin-Watershed Protection Department

Inspections and Maintenance of Stormwater Controls – Program Components, Lessons Learned, and Asset Management Concepts

Fenando Pasquel, Arcadis

Dedesigning and Constructing Storm Water Management Facilities for Inspections and Maintenance

Cliff Buhman, Inspec

Session 3.4: Performance Assessment - Technology for Inspections and Operation

Moderator: John Loomis

3:30 - 5:00 p.m. | Minnehaha

Get Real-Time! Automation and Telemetry to Improve Stormwater Monitoring and BMP Performance

Joe Sellner, Capitol Region Watershed District; Forrest Kelley, Capitol Region Watershed District

Development and Implementation of a Mobile Inspection Tool for Outfall Inspections

Nicolas Cantarero, City of Minneapolis

A Municipal Rainwater/Stormwater BMP Inspection and Maintenance Tracking Program - Implementation and Effectiveness

Neal Shapiro, City of Santa Monica Office of Sustainability & the Environment

Lightning Talks

Moderator: Scott Struck

5:10 - 5:50 p.m. | Northstar A

Maintenance Costs of Stormwater Control Measures (SCMs) In North Carolina

Sarah Waickowski, NC State University; Bill Lord, NC Cooperative Extension; Bill Hunt, NC State University

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Neal Shapiro, City of Santa Monica Office of Sustainability & the Environment

Event-Based Adaptive Management To Optimize De-Icing Chloride Loads

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Monte Niemi, I.Do.TDA

Asset Performance Management and The Evolution of the Digital Watershed

Jeffrey Wright, Atkins; Micah Strauss, Opti

Posters

Posters are available daily during the networking breaks

Heavy Metals Removal from Industrial Runoff using Manganese Modified Diatomite

Laura Nell, Penn State Capital College; Tatiana Dominguez, Penn State Capital College; Faegheh Moazeni, Penn State Capital College; Shirley Clark, Penn State Capital College

Storm Water Asset Management Program (SWAMP)

Jake Newhall, WSB; Bill Alms, WSB

A study of water infiltration basin and clogging using column experiments

Elyasse el Mrabet, Ibn Tofail University; Bouabid El Mansouri, Ibn Tofail University; Badr Benseddik, Ibn Tofail University

Discussion on Sponge City Construction, Operation and Maintenance of Old Residential Area in Southern China --Case Study of the Old Residential Area in Changde City of China

Huiyun Luo, Hunan Architectural Design Institute Limited Company; Jiamu Huang, Hunan Architectural Design Institute Limited Company; Siyuan Wu, Hunan Architectural Design Institute Limited Company

Converting Traditional Landscape into Resilient Landscape Citywide to Manage Stormwater

Hui Chen, China Machinery International Engineering Design & Research Institute Co., Ltd; Xiaolin Zhong, China Machinery International Engineering Design & Research Institute Co., Ltd; Nian She, Tsinghua University Innovation Center in Zhuhai

Modeling the pollutant removal mechanisms of bioretention system

Junxie Zuo, Jiangsu University; Qingqing Yang, China Machinery International Engineering Design & Research Institute Co., Ltd

A Review of the Best Management Practices in Green Roof Vegetation Maintenance

Ali Karji, Penn State University; Mohammadsorouh Tafazzoli, Washington State University

Use of Recycled Materials for the Design Improvement of Bench Scale Bioretention Cells

Taufiqul Alam, Texas A&M University - Kingsville; Juan C. Bezares-Cruz, Texas A&M University - Kingsville

Maintenance Costs of Stormwater Control Measures (SCMs) in North Carolina

Sarah Waickowski, NC State University; Bill Lord, NC Cooperative Extension; Bill Hunt, NC State University

Event-based adaptive management to optimize de-icing chloride loads

Lawrence Baker, University of Minnesota; Douglas Klimbal, University of Minnesota; Ben Janke, University of Minnesota; Bruce Wilson, University of Minnesota; Melissa Frieze, University of Minnesota

Stormwater Research Roadmap for Minnesota – identifying the priority needs for new research and plotting a course to find the answers for operations and maintenance of stormwater management practices

John Bilotta, University of Minnesota; Shahram Missaghi, University of Minnesota; John Chapman, University of Minnesota; Lawrence Baker, University of Minnesota; David Fairbairn, University of Minnesota

Management of riparian buffers and use of mycorrhizal fungi amendments to maximize phosphorus removal and ecological performance in agricultural watersheds

Christian Lenhart, University of Minnesota; Laura Bender, University of Minnesota

What If Plants Die in the Green Infrastructure

Wei Zhang, TreeDiaper (Zynnovation LLC); Hailing Yang, TreeDiaper (Zynnovation LLC)

Trees, Stormwater and Suspended Pavements: Research and Reality

Albert Key, DeepRoot Green Infrastructure, Inc.

Asset Performance Management and the Evolution of the Digital Watershed

Jeffrey Wright, Atkins; Micah Strauss, Opti

Operation and Maintenance Challenges of China “Sponge City” Initiative

Jim (Yuming) SU, Maryland International Incubator, China Key Laboratory of Silica Sand Utilization; Shengyi Qin; Zhangfei Li, Rechtsand Ecological Environmental Protection Science and Technology Co., Ltd.

TDA: The Next Generation Stormwater Management Aggregate

Monte Niemi, I.Do.TDA

Tuesday, August 6

Morning Plenary & Keynote Lectures

8:00 - 9:00 a.m. | Northstar A

Wesley Saunders-Pearce, City of St. Paul

Rebirth of the Forever Machine

Session 4.1: Rainwater Harvesting and Reuse

Moderator: Anna Eleria

9:00 - 10:30 a.m. | Skyway

Benefits of Real-time Control Systems for Operation of Large-scale Rainwater Harvesting Cisterns in Philadelphia, PA
Babak Kasaei Roodsari, Drexel University; Ziwen Yu, Drexel University; Matthew Fritch, Philadelphia Water Department; Stephen White, Philadelphia Water Department; Franco Montalto, Drexel University

Water Capture Efficiency and Water Quality Variation in Semi-Arid Medium to Large Scale Rainwater Harvest Systems
Nathan Howell, West Texas A&M University; Ryan Williams, Texas Tech University; Tania Agreda, West Texas A&M University; Rebecca Crosman, West Texas A&M University

The Buzz About Rainwater Harvesting Systems and Mosquitoes: Is There a Problem and What Do We Do About It?
Kathy Gee, Longwood University; Kaitlyn Dobyns, Longwood University; Kyrsten Gage, Longwood University; Charlotte Pfamatter, Longwood University; Curran Atkinson, Longwood University; William Hunt, North Carolina State University; Shawn Kennedy, North Carolina State University

Design Reuse For Optimal Maintenance and Operations
Craig Eldred, City of Waconia; Doug Bode, City of Waconia

Session 4.2: Training and Education - Certification Programs

Moderator: Sarah Waickowski

9:00 - 10:30 a.m. | St. Croix

National Green Infrastructure Certification Program: Raising the Bar in Green Infrastructure Construction and Maintenance Industry

Adriana Caldarelli, Water Environment Federation; Doug Fritz, GKY & Associates; Seth Brown, Storm and Stream Solutions

Partnering to Deliver a Blended Learning Training to Enhance GSI in Parks

Wende David, National Recreation and Park Association; Adriana Caldarelli, Water Environment Federation

Clean Water Certificate Training Program Development and Lessons Learned

Carol Wong, Center for Watershed Protection; Neely Law, Center for Watershed Protection

Stormwater Infrastructure Maintenance Training

John Chapman, University of Minnesota; Andy Erickson, University of Minnesota

Session 4.3: Underground Systems - What You Can't See IS Important!

Moderator: Travis Wolfe

9:00 - 10:30 a.m. | Minnehaha

Beneath the Surface: Maintenance and Inspection Challenges of Subsurface BMPs.

Emily Erdahl, Short Elliott Hendrickson Inc.; Sharon Doucette, City of Woodbury, Minnesota; Kristin Seaman, City of Woodbury, Minnesota

Operation and Maintenance of Grit Chambers in the City of Minneapolis

Nico Cantarero, City of Minneapolis Public Works Department;
Sean Oberg, City of Minneapolis Public Works Department

Innovative Pretreatment for Protecting Subsurface Systems

Robert Woodman, ACF Environmental

Sediment Trapping Efficiency and Maintenance of Sump Manholes

John Chapman, University of Minnesota; Rebecca Forman,
University of Minnesota

Session 4.4: Watershed Management - Data-Driven Decision Making

Moderator: Peter Weiss

9:00 - 10:30 a.m. | Northstar B

Modeling Regionalized Life Cycle Cost Ranges for Stormwater Infrastructure

Emily Grubert, Georgia Institute of Technology

Stormwater Behavior Modeling and Diagnostics

Christopher Homer, Tsinghua University; Shirley Clark, Penn State University

Dynamic, Data-driven Maintenance of Green Stormwater Infrastructure

Bridget Gile, Villanova University; Ali Ebrahimian, Villanova University; Robert Traver, Villanova University; Virginia Smith, Villanova University; Bridget Wadzuk, Villanova University; Stephen White, Philadelphia Water Department

What it takes to keep your stormwater BMPs in compliance???

Steven Polk, Stormwater STL LLC

**Session 5.1: Infiltration Performance - The "No Clog Slog""
Clogging/Infiltration**

Moderator: Jim Lenhart

11:00 a.m. - 12:00 p.m. | Minnehaha

Consistency of Rain Garden Infiltration Rates

Michael Anaszewicz, Civiltech Engineering Inc.; William
Gonwa, Milwaukee School of Engineering

*Can the Good (Infiltration) Times Last? Clogging Analysis for
Philadelphia Water Department Green Infrastructure Systems*

Sean Ferrarini, CDM Smith; Andrew Baldrige, CDM Smith;
Stephen White, Philadelphia Water Department

**Session 5.2: Learning from Practice - You're Going to Want
to See This One!**

Moderator: Keith Lichten

11:00 a.m. - 12:00 p.m. | Skyway

*Stormwater Control Measures Inspection and Maintenance:
Program Development, Lessons Learned, and Innovative
Techniques*

Sujit Ekka, AECOM; Alex Nice, AECOM; Melanie Gardner,
AECOM

*Learnings from Management of the Towerside District
Stormwater System: Two Years of Operations + Maintenance,
Observation + Quantification*

Marcy Bean, Mississippi Watershed Management
Organization; Dan Kalmon, Mississippi Watershed
Management Organization

Rainwater Harvesting Home Run at CHS Field

Wes Saunders-Pearce, City of Saint Paul; Rick Jacobs, City of
Saint Paul; Nate Zwonitzer, Capitol Region Watershed District

Session 5.3: Watershed Management - Keeping the Streets Clean

Moderator: Andy Szatko

11:00 a.m. - 12:00 p.m. | Northstar B

Reducing Sources of Solids to Reduce Filling of Stormwater Ponds

Lawrence Baker, University of Minnesota; Jacques Finlay, University of Minnesota; Sarah Hobbie, University of Minnesota; Paula Kalinosky, EOR, Inc.

Street Sweeping vs Catch Basin Cleaning Effectiveness Study for Development of Maintenance Practices

Aimee Navickis-Brasch, Osborn Consulting, Inc.;
Taylor Hoffman-Ballard, Osborn Consulting, Inc.

Designing a Targeting Street Sweeping Plan for Multiple Benefits

Paula Kalinosky, Emmons and Olivier Resources; Mike Kinney, Comfort Lake Forest Lake Watershed District; Meghan Funke, Emmons and Olivier Resources

Session 5.4: Working in and with the Public - Public Land & Public Collaboration: Making it Better Together

Moderator: John Loomis

11:00 a.m. - 12:00 p.m. | St. Croix

The Importance of Collaboration in Green Infrastructure from Design to Post Installation

Robert Woodman, ACF Environmental

Adopt-a-Raingarden: Engaging Community Members to Care for Raingardens in Stillwater, MN

Angie Hong, Washington Conservation District; Mike Isensee, Middle St. Croix Watershed Management Organization

Incorporating Field-Based Feedback to Improve Philadelphia's Public GSI Design Standards

Daniel Moran, Philadelphia Water Department

Session 6.1: Designing for O&M - Design Tools

Moderator: Keith Lichten

1:30 - 3:00 p.m. | Skyway

Stormwater Project Prioritization: Using Hydrologic Modeling, Water Quality Modeling, and Infrastructure Condition Assessment to Optimize Investments

Paul Hudalla, City of Minneapolis; Lillian Rouillard, City of Minneapolis

Using a GIS-based Water Quality Model to Inform Infrastructure Prioritization

Katie Kowalczyk, City of Minneapolis; Justin Flannery, City of Minneapolis

Getting it right- Implementing an O&M program after 5 years of GI Installation

Ruth Hocker, City of Lancaster; Kate Austin, City of Lancaster

Session 6.2: Making Better Decisions - Designing for Ease and Function

Moderator: Kathlie Jeng-Bulloch

1:30 - 3:00 p.m. | Minnehaha

Every Day Counts – Simpler, More Effective and Maintainable Stormwater Innovations from Departments of Public Works

James Houle, UNH Stormwater Center

How Decoupling Capture and Conveyance Hydraulics When Designing Trench Drains for Green Stormwater Infrastructure Can Reduce Maintenance in Philadelphia

Beth Anne Lutes, Philadelphia Water Department; Jason Wright, Tetra Tech; Ryan Fucci, AKRF

Design for Reduced Maintenance: Pretreatment Designs for Underground System Longevity

Merrill Taylor, Tetra Tech, Inc.; Jason Wright, Tetra Tech, Inc.

Stop Complicating It More Than It Needs To - Straightforward Maintenance Strategies for Green Infrastructure

Andy Szatko, City of Omaha Stormwater Program

Session 6.3: Right of Way Green Infrastructure - Roads, Roadsides, Medians, and More

Moderator: John Gulliver

1:30 - 3:00 p.m. | Northstar B

Roadside Ditch Inventory, Inspection, and Maintenance Recommendations

Rebecca Dugopolski, Herrera Environmental Consultants

Maintenance of New York City's Green Infrastructure Assets

James Rossi, NYC Environmental Protection

A Roadway Median Green Infrastructure Toolbox to Streamline Maintenance

Philip Wong, NYCDEP; Matthew Jones, Hazen & Sawyer

Design, Operations and Maintenance Plan for Wildlife Mortality Windrow Composting

Dwayne Stenlund, Minnesota Department of Transportation

Session 6.4: Training and Education - Training and Education Case Studies

Moderator: John Chapman

1:30 - 3:00 p.m. | St. Croix

Online Stormwater Course - Training for Early Career Stormwater Professionals

Katie Pekarek, University of Nebraska; Shahram Missaghi, University of Minnesota

The Green Stormwater Infrastructure Academy: Los Angeles Sanitation and Environment is Building the Local Workforce for Green Infrastructure Operation and Maintenance

Jagjit Kaur, Jacobs Engineering; Jane Parathara, City of Los Angeles; James Bays, Jacobs Engineering; Jesse Williams, Jacobs Engineering; Rajat Chakraborti, Jacobs Engineering; Ryan Thiha, City of Los Angeles; Wing Tam, City of Los Angeles

Session 7.1: Considering Costs - Maintenance and Life-Cycle Costs

Moderator: Anna Eleria

3:30 - 5:00 p.m. | Northstar B

Maintenance, Construction Costs, and Life Cycles

James Houle, UNH Stormwater Center; Tom Ballesterio, UNH Stormwater Center

Stormwater Maintenance Program: Money Well Spent

Paige Ahlborg, Ramsey-Washington Metro Watershed District

New Tools for Developing a Better Understanding of Maintenance Costs

Jane Clary, Wright Water Engineers; Holly Piza, Urban Drainage and Flood Control District

An Introduction to the Modeling Framework of the Community-enabled Life-cycle Analysis of Stormwater Infrastructure Costs (CLASIC) Tool

Tyler Dell, Colorado State University; Sybil Sharvelle, Colorado State University; Jennifer Egan, University of Maryland - Environmental Finance Center; Christine Pomeroy, University of Utah; Jennifer Cotting, University of Maryland - Environmental Finance Center; Harry Zhang, Water Research Foundation; Mostafa Razzaghamanesh, Colorado State University

Session 7.2: Designing for O&M Maintenance - Contracts

Moderator: Bridget Osborn

3:30 - 5:00 p.m. | Skyway

Maintenance Design of Sponge Cities in Central China

Yuchen Deng, Hunan Architectural Design Institute Limited Company; Shulin Liu, Tongji University; Shilong Ding, Hunan Architectural Design Institute Limited Company

Designing Contracts and Frequencies for Cost-Effective Maintenance of Green Stormwater Infrastructure Subsurface Features in Philadelphia

Barbara Cushing, Philadelphia Water Department; Gerald Bright, Philadelphia Water Department

LID Design and Construction Hindsight and Resulting Maintenance: Reflections from California State University, Sacramento

Maureen Kerner, Office of Water Programs at California State University, Sacramento

Designing for O&M on 88 Green Infrastructure Facilities of a Large-Scale Public Right-of-Way Project

Camille Liebnitzky, AECOM; Carmen Franks, Bio Habitats

Session 7.3: Making Better Decisions - Lessons Learned

Moderator: Udai Singh

3:30 - 5:00 p.m. | Minnehaha

DOW's Valuing Nature Journey. How a Multinational Chemical Corporation is Realizing Value Through Innovative Green Infrastructure Solutions

Todd Guidry, The Dow Chemical Company; Michael Uhl, The Dow Chemical Company; Martha Rogers, The Nature Conservancy

Working Towards Better Private SMP Maintenance: Lessons Learned in Philadelphia

Steven Demmer, Philadelphia Water Department; Tyler Krechmer, Johnson, Mirmiran, and Thompson, Inc.

Framing the Future of Fridley

Jared Ward, Wenck Associates, Inc.; Ed Matthiesen, Wenck Associates, Inc.; John Penshorn, Wenck Associates, Inc.

An Unmaintained BMP is a Non-Existent BMP

Pasquale Napolitano, Hydro International

Wednesday, August 7

Session 8.1: Global Impacts - Climate Change

Moderator: Travis Wolfe

8:30 -10:00 a.m. | Skyway

Evaluation of Resiliency of Green Stormwater Infrastructure to Climate Change Using 4 km Downscaled Climate Model with Hydrology, Hydraulic and LID models in Zhuai of China

Zhengduo Bao, China Machinery International Engineering Design & Research Institute Co., Ltd; Qingqing Yang, China Machinery International Engineering Design & Research Institute Co., Ltd; Nian She, Tsinghua University Innovation Center in Zhuhai; Yingming Xia, Tsinghua University Innovation Center in Zhuhai

Performance Evaluation of a Climate Resilient LID Treatment Train in Shenzhen University Campus

Jian Liu, Shenzhen University; Lingyi Wu, Shenzhen University; William Lucas, Green Earth Operations; Nian She, Shenzhen University

Was that Normal? Using Data Analytics to Understand Extreme Storms and Maintenance Needs

Matthew Jones, Hazen and Sawyer; Ryan O'Banion, Hazen and Sawyer

Risk-based Approach to Maintenance and Management of Stormwater Infrastructure

Janna Kieffer, Barr Engineering Co.

Session 8.2: Mainstreaming Green Infrastructure - Beyond Pilot Studies: Building a Program

Moderator: Katie Pekarek

8:30 -10:00 a.m. | Northstar B

Coupled Management of Flood Control and TMDL in Sponge City Construction of Zhenjiang City in China

Nian She, Guangzhou University; Jan-tai Kuo, Jiangsu Manjiangchun Urban Planning and Design Institute

Getting to the Source: Reflecting on the Need for Retrofits Based on Several Philadelphia Case Study Sites

Ryan Fucci, AKRF Inc.; Ashley Willis, Philadelphia Water Department

A Maintenance Look Back: The Treatment and Reuse of Stormwater as an Amenity in Minneapolis' Heritage Park

David Filipiak, SRF Consulting Group, Inc.

Building a Comprehensive GI Management Program Through Design, O&M, and Monitoring Plan Development

Mike Moscariello, Arcadis; Ruth Hocker, City of Lancaster PA

Session 8.3: Permeable Hardscapes - Permeable Pavement

Moderator: Stephanie Johnson

8:30 -10:00 a.m. | Minnehaha

Best Practices for the Maintenance of Permeable Interlocking Concrete Pavements

David Smith, Interlocking Concrete Pavement Institute

Comparison of Cleaning Practices to Restore Infiltration in Porous Asphalt, Pervious Concrete, and Permeable Interlocking Concrete Pavers

William Selbig, USGS Upper Midwest Water Science Center

Potentials for Technological Advancements of Pervious Concrete Pavements to Capture Runoffs

Mohammadsoroush Tafazzoli, Washington State University; Ali Karji, Penn State University

Effects of Deicing Salt on Permeable Pavement Performance

Ryan Winston, Ohio State University; Keely Davidson-Bennett, Chagrin River Watershed Partners; Kristen Buccier, Northeast Ohio Regional Sewer District; William Hunt, North Carolina State University

Session 9.1: Global Impacts - Large Sites and/or Multiple BMPs

Moderator: Jane Clary

10:30 a.m. - 12:00 p.m. | Skyway

Overview the Three-Year Sponge City Construction Programs in China

Nian She, Guangzhou University; Xiangqiang Ye, Tsinghua University Innovation Center in Zhuhai; Jiang Zhao, Tsinghua University Innovation Center in Zhuhai

Post-Occupancy Perspective on 10-Year Mature Green Medical Campus

Kevin Biehn, EOR

Linking O&M Guidance and Information Delivery to Research, Experience, and Implementation

Michael Trojan, Minnesota Pollution Control Agency;
Presented by David Fairbairn

Rooting Out Pollution Along the Green Line: Five Years of Green Infrastructure Operation and Maintenance

Anna Eleria, Capitol Region Watershed District;
Andrew Novak, Capitol Region Watershed District; Sarah Wein, Capitol Region Watershed District

Session 9.2: Mainstreaming Green Infrastructure Bioretention

Moderator: John Loomis

10:30 a.m. - 12:00 p.m. | Northstar B

Green Stormwater Infrastructure Maintenance - Costs, Strategy and Design

Catherine Wytychak, Washtenaw County Water Resources
Commissioner's Office

Smaller, Faster, Cheaper – An inside look at the operation and maintenance implications of the race to increase biofilter hydraulic loading rates

Vaikko Allen, Contech Engineered Solutions; Craig Fairbaugh,
Contech Engineered Solutions

Evaluating Long-Term Changes and Maintenance Implications in Bioretention Filter Media

Jeffrey Johnson, North Carolina State University; William Hunt,
North Carolina State University

Aging Bioretention: A Retrospective Comparison of Nutrient Treatment Efficiency in a 16- Year Old Bioretention Cell

Jeffrey Johnson, North Carolina State University; William Hunt,
North Carolina State University

Session 9.2: Making Better - Decisions Considering O&M in Decision Making

Moderator: Brian Jastram

10:30 a.m. - 12:00 p.m. | Minnehaha

City Of Austin, TX Watershed Protection Department's Stormwater Control Measure (SCM) Maintenance Program

Matt Westbrook, City of Austin - Watershed Protection
Department; Tom Franke, City of Austin - Watershed Protection
Department

Private Stormwater Best Management Practice Maintenance Program

Ryan Johnson, City of Roseville

Mechanisms for Protecting Green Stormwater Infrastructure from Urban Development Impacts

Ashley Willis, Philadelphia Water Department; Gerald Bright, Philadelphia Water Department

Stormwater Management Capacity of Artificial Turf Grass Fields

John McLaughlin, NYC Department of Environmental Protection; Miki Urisaka, NYC Department of Environmental Protection; Kimberly DiGiovanni, Auroran Environmental; Franco Montalto, eDesign Dynamics LLC; Jerry Kleyman, Arcadis; Paul Wojtal

Exhibit Hall Hours

Sunday, August 4	
5:00 - 8:00 p.m.	Exhibitor Move In
Monday, August 5	
10:00 a.m. - 8:00 p.m.	Exhibit Hours
10:00 - 10:30 a.m.	Networking Break (Exhibit Hall)
12:00 - 1:30 p.m.	Lunch
3:00 - 3:30 p.m.	Networking Break (Exhibit Hall)
6:00 - 8:00 p.m.	Reception in Exhibit Hall
Tuesday, August 6	
10:00 a.m. - 3:30 p.m.	Exhibit Hours
10:30- 11:00 a.m.	Networking Break (Exhibit Hall)
12:00 - 1:30 p.m.	Lunch
3:00 - 3:30 p.m.	Networking Break (Exhibit Hall)
3:30 - 5:00 p.m.	Exhibitor Move Out

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