

Report from the American Society of Civil Engineers

Presentation to the ACWI

October 27, 2015

Eric D. Loucks, PhD, D.WRE, P.E.

City of Austin, Texas

Watershed Protection



- World's leading society of Civil Engineering Professionals
- 150,000 Civil Engineers and Affiliated Professionals
- Members in 177 Countries
- Founded in 1852

ASCE Initiatives

- Sustainability - Embrace and encourage civil engineers' role as contributors to a sustainable world
- Infrastructure - Propose practical solutions to maintain and modernize our nation's deteriorating infrastructure
- Raise the Bar - Increase education requirements for engineering licensure to better protect the public in the future

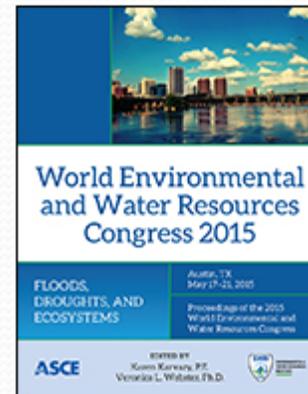
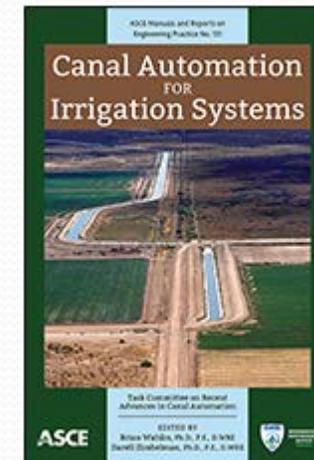
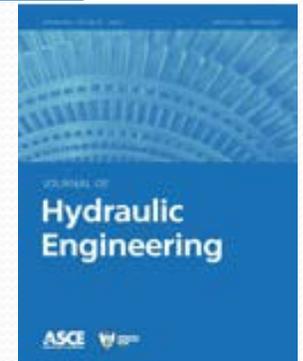
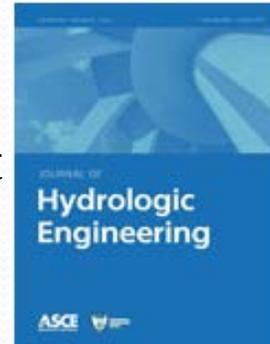
- Nine Technical Institutes
 - ARCHITECTURAL ENGINEERING INSTITUTE
 - COASTS, OCEANS, PORTS, AND RIVERS INSTITUTE
 - CONSTRUCTION INSTITUTE
 - ENGINEERING MECHANICS INSTITUTE
 - **ENVIRONMENTAL & WATER RESOURCES INSTITUTE**
 - GEO-INSTITUTE
 - STRUCTURAL ENGINEERING INSTITUTE
 - TRANSPORTATION & DEVELOPMENT INSTITUTE
 - UTILITY ENGINEERING & SURVEYING INSTITUTE

Environmental & Water Resources Institute (EWRI)

- 23,000 Members
- Eleven Technical Councils
- Fifty-two technical committees
- Fifty five technical task committees

EWRI Products

- Journals
 - Journal of Environmental Engineering
 - Journal of Hazardous, Toxic, and Radioactive Waste Management
 - Journal of Hydraulic Engineering
 - Journal of Hydrologic Engineering
 - Journal of Irrigation and Drainage Engineering
 - Journal of Water Resources Planning and Management
 - Journal of Sustainable Water In The Built Environment
- Books, Manuals of Practice, Standards
- Continuing Education
- Conferences
- Webinars

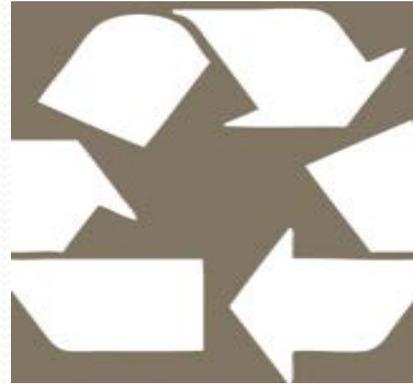


Leading Technical Activities

- ISI Envision Certification
- Stormwater BMP Database
- America's Infrastructure
- Climate Change
- Hydraulic Fracturing
- Cyber Infrastructure
- Nepal Glacial Impoundment Investigation



THE ENVISION RATING SYSTEM



www.sustainableinfrastructure.org

What Types Of Infrastructure Will Envision™ Rate?



ENERGY

Geothermal
Hydroelectric
Nuclear
Coal
Natural Gas
Oil/Refinery
Wind
Solar
Biomass



WATER

Potable water
distribution
Capture/Storage
Water Reuse
Storm Water
Management
Flood Control



WASTE

Solid waste
Recycling
Hazardous
Waste
Collection &
Transfer



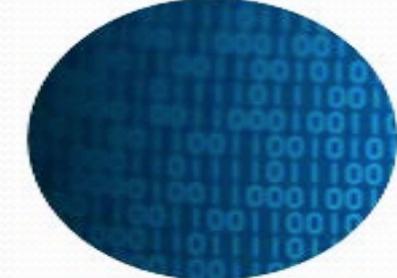
TRANSPORT

Airports
Roads
Highways
Bikes
Pedestrians
Railways
Public Transit
Ports
Waterways



LANDSCAPE

Public Realm
Parks
Ecosystem
Services



INFORMATION

Telecommunications
Internet
Phones
Satellites
Data Centers
Sensors

Why Was Envision™ Developed?

- Current rating systems for infrastructure in the U.S. are sector specific
- No U.S. system covers all aspects of infrastructure
- Envision™ is designed to fill the gap



60 Credits in 5 Categories



**QUALITY
OF LIFE**

Purpose, Community, Wellbeing



LEADERSHIP

Collaboration, Management, Planning



**RESOURCE
ALLOCATION**

Materials, Energy, Water



**NATURAL
WORLD**

Siting, Land & Water, Biodiversity



**CLIMATE
AND RISK**

Emission, Resilience

The First ISI Envision™ Sustainable Infrastructure Project

- William Jack Hernandez Sport Fish Hatchery in Anchorage Alaska
- \$96 million
- 141,000 square feet
- Envision™ “Gold” Award,



2013 REPORT CARD FOR AMERICA'S INFRASTRUCTURE

Evaluation Criteria

- Capacity
- Condition
- Operations & Maintenance
- Funding
- Future Need
- Public Safety
- Resilience
- Innovation

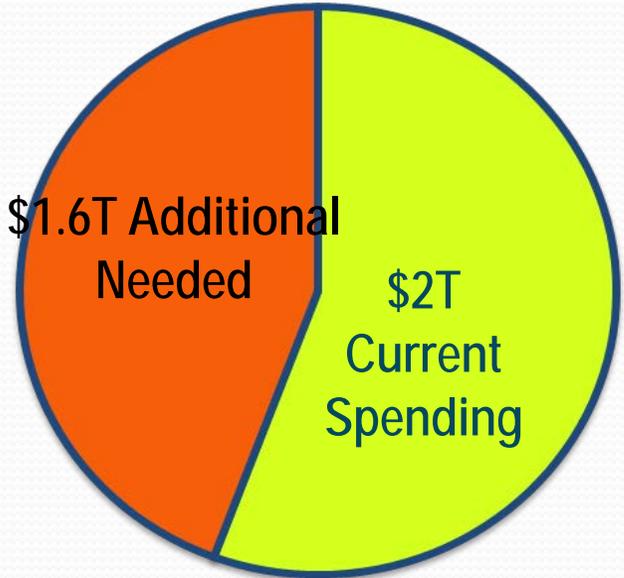
A = Exceptional
B = Good
C = Mediocre
D = Poor
F = Failing

Aviation	D	
Bridges	C+	↑
Dams	D	
Drinking Water	D	↑
Energy	D+	
Hazardous Waste	D	
Inland Waterways	D-	
Levees	D-	
Ports	C	
Public Parks and Recreation	C-	
Rail	C+	↑
Roads	D	↑
Schools	D	
Solid Waste	B-	↑
Transit	D	
Wastewater	D	↑
America's Cumulative G.P.A.	D+	↑

Infrastructure Funding Needs by 2020

Infrastructure System	DOLLARS IN \$2010 BILLIONS		
	Total Needs	Estimated Funding	FUNDING GAP
Surface Transportation ¹	\$1,723	\$877	\$846
Water/Wastewater Infrastructure ¹	\$126	\$42	\$84
Electricity ¹	\$736	\$629	\$107
Airports ^{1,2}	\$134	\$95	\$39
Inland Waterways & Marine Ports ¹	\$30	\$14	\$16
Dams ³	\$21	\$6	\$15
Hazardous & Solid Waste ⁴	\$56	\$10	\$46
Levees ⁵	\$80	\$8	\$72
Public Parks & Recreation ⁶	\$238	\$134	\$104
Rail ⁷	\$100	\$89	\$11
Schools ⁸	\$391	\$120	\$271
TOTALS	\$3,635	\$2,024	\$1,611
YEARLY INVESTMENT NEEDED	\$454	\$253	\$201

\$3.6T Investment Needed by 2020



Annual additional investment needed to achieve a "B"



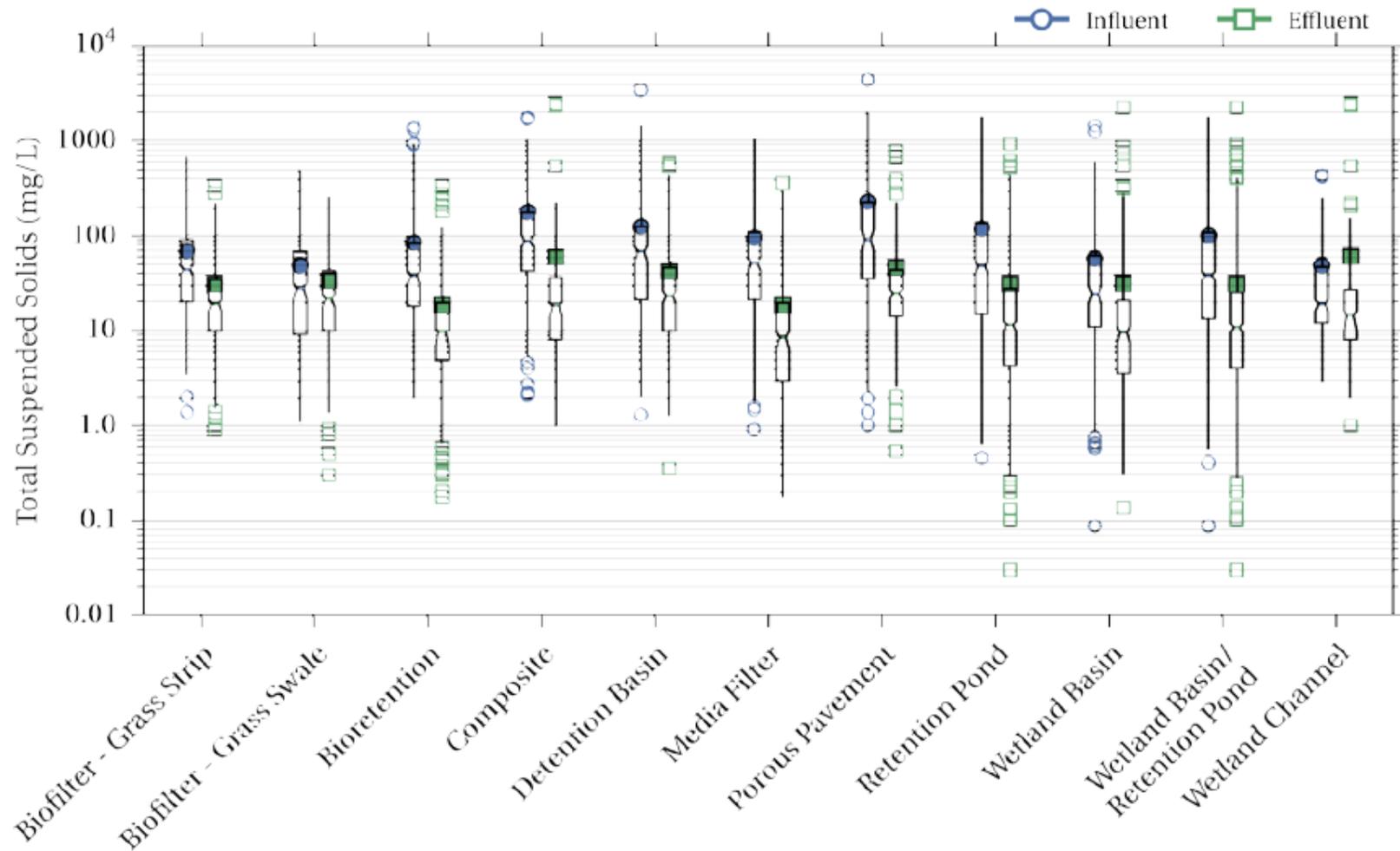
**INTERNATIONAL
STORMWATER BMP
DATABASE**
www.bmpdatabase.org

- A compilation of more than 530 stormwater best management practice (BMP) performance studies





Figure 2. Box Plots of Influent/Effluent TSS Concentrations



EWRI Task Committees

- Teams composed of Academic, Government and Private Sector Practitioners integrating research outcomes for use in problem solving
- Usually a 2-year delivery commitment
- Typical products include Books, Manuals of Practice, Journal Special Issues and Conference Sessions

EWRI Task Committees

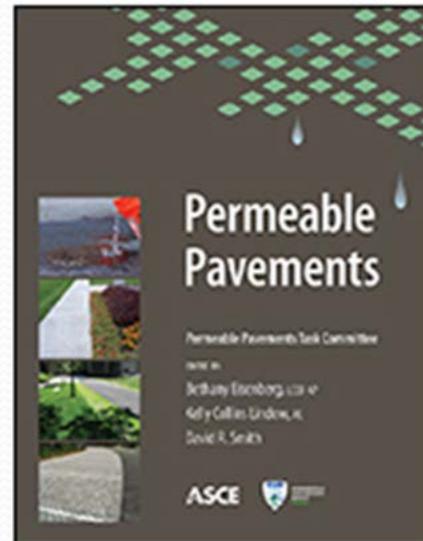
- Urbanization Effects on Groundwater
- Well Hydraulics
- Advancement of 3d Free-Surface Flow Model Verification and Validation Methodology
- Calibration/Validation Of Free-Surface Hydraulic Models
- Experimental Uncertainty and Measurement Errors
- Interdisciplinary River Restoration Symposium
- River Restoration Guiding Principles
- Stream Restoration Educational Materials
- Bridge Scour
- Cloud Computing and Technology In the Water and Environmental Fields
- Environmental & Water Resources Vision 2050
- Environmental Sensing and Cyber-Infrastructure: Technologies

EWRI Task Committees

- Transboundary Environmental Management after NAFTA
- Revision of Manual 70: ET and Irrigation Water Requirements
- Recent Advances in Canal Automation
- Envisioning the Next Generation of Irrigation Advisory Programs
- Use of Recycled Water for Irrigation of Turf and Landscape Plants
- System Analysis for Watershed Management
- Water Systems Planning Under Climate Change
- Integrated Water Resources Management
- Reallocation of Federal Multipurpose Reservoirs
- Water Systems Security Training
- Bioswales and Filter Strips
- Green Highways and Green Streets
- Green Roofs
- LID Technology For Combined Sewer

EWRI Task Committees

- Low Impact Development Bioretention Technology
- Low Impact Development Computational Methods
- Low Impact Development National Guidelines
- **Permeable Pavements**
- Rainwater Harvesting
- Urban Hydrology
- Urban Stream Restoration Monitoring and Assessment
- Guidelines for Certification of Manufactured Stormwater BMPs Joint
- **Pathogens in Wet Weather Flows**
- Development Of Guidelines On Concentrate Management In Inland Desalination Projects
- Development of Pre-Standard on Case Studies for Concentrate Management in Desalination



PATHOGENS

in Urban Stormwater Systems



Prepared by

*Urban Water Resources Research Council
Pathogens in Wet Weather Flows Technical Committee
Environmental and Water Resources Institute, American Society of Civil Engineers*

With Support from

*Urban Drainage and Flood Control District, Denver, CO
Urban Watersheds Research Institute*

August 2014

Editors

Jane Clary, Wright Water Engineers, Inc. (Co-chair)
Robert Pitt, P.E., Ph.D., D.WRE, University of Alabama
Brandon Steets, P.E., Geosyntec Consultants

Contributors

Jane Clary, Wright Water Engineers, Inc. (Co-chair)
Linda D. Pechacek, P.E., D.WRE, LDP Consultants, Inc. (Co-chair)
Shirley Clark, Ph.D., P.E., Pennsylvania State University (Vice-chair)
Robert Pitt, P.E., Ph.D., D.WRE, University of Alabama
Brandon Steets, P.E., Geosyntec Consultants
Cristiane Surbeck, P.E., Ph.D. University of Mississippi
A. Charles Rowney, Ph.D., P.Eng., D.WRE, ACR, LLC
Jon Hathaway, Ph.D., P.E., University of Tennessee
Scott Struck, Ph.D., Geosyntec Consultants
Aaron Packman, Ph.D., Northwestern University
Richard Field, P.E., D.WRE, Michael Baker International
Mary Stinson, M.S.Ch.E., U.S. Environmental Protection Agency (retired)
John Hayes, Ph.D., P.E., Clemson University
Garey Fox, Ph.D., P.E., Oklahoma State University
William Barfield, Ph.D., P.E., Woolpert, Inc.
William Hunt, Ph.D., P.E., North Carolina State University
E. Robert Atwill, Ph.D., D.V.M., University of California, Davis
Ted Brown, P.E., Biohabitats
William R. English, Ph.D., Clemson University
Sivajini Gilchrist, Ph.D., U.S. Environmental Protection Agency
Jorge Guzman, Ph.D., U.S. Department of Agriculture, Agricultural Research Service
Thomas Harter, Ph.D., University of California, Davis
Leigh Anne Krometis, Ph.D., Virginia Tech
Calvin Sawyer, Ph.D., Clemson University
Shawn Ultican, Kitsap Public Health District, Washington
Megan Monroe, Fuentes Designs

EWRI Task Committees

- Discharge of Desalination Concentrate to Oceans and Bays
- Stormwater BMPs Maintenance
- Urban Stormwater Outreach
- Tractive Force Implementation
- Infrastructure Impacts Of Landscape Driven Weather Change
- Drought Monitoring and Assessment
- Hydrologic Data Uncertainty
- Standard Practice on Radar Rainfall Estimation
- Statistical Applications In Hydrology
- Uncertainty Analysis Approaches In Hydrologic Modeling
- Use and Application of Radar Rainfall Data
- Curve Number Hydrology
- TMDL Analysis and Modeling
- Wetland Processes Modeling

EWRI Standards Under Development

- Atmospheric Water Management Standards
- Border International Water Quality Standards
- KSTAT Standards
- Managed Aquifer Recharge Standards
- Aquifer Storage & Recovery
- Land Subsidence
- MAR Guideline Development
- MAR Training Subcommittee
- Management Practices for Control of Erosion & Sediment
- Regulatory Tools
- Development Design Guidebook
- Performance Based BMPs
- Oxygen Transfer Standards
- Urban Drainage Standards
- Water Infrastructure Security Enhancements (WISE) Standards
- Water Regulatory Standards



Takeaways

- ASCE EWRI promotes collaboration among Government, University and Private Sector Practitioners through our Task Committee process
- Our members are on the front lines for addressing numerous critical challenges:
 - Climate Change
 - Aging Infrastructure/ efficiency improvements
 - Sustainability
- Most task committees integrate multiple research results into Standards, Practices and guidelines
- Working to modernize our output which is currently dominated by printed material