GLOBAL CONNECTIONS DAY
OCTOBER 23, 2019
WATER: SAFETY, EFFICIENCY AND CONSERVATION

2019 ANNUAL CONFERENCE
Oct. 20–23, 2019 | Rio Hotel & Convention Center
ICC GLOBAL CONNECTIONS DAY
Las Vegas, NV // October 23, 2019
THE JOURNEY
181 FREMONT
LEED 2009 C&S PLATINUM
ONSITE WATER RECYCLING
### Fremont Water Recycling Platinum Opportunity

#### Sustainable Sites (SS)

<table>
<thead>
<tr>
<th>POINTS</th>
<th>Sustainable Sites (SS)</th>
<th>MAX PTS</th>
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<tbody>
<tr>
<td>1</td>
<td>SS PrEq 1.0 Construction Activity Pollution Prevention</td>
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<td>5</td>
<td>SS 2.0 Development Density</td>
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<td>6</td>
<td>SS 3.0 Brownfield Development</td>
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<td>3</td>
<td>SS 4.3 Alternative Transportation - Bicycle Storage and Changing Rooms</td>
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<td>SS 4.4 Alternative Transportation - Parking Capacity</td>
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<td>SS 5.1 Six Development Projects on Restore Habitats</td>
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<td>1</td>
<td>SS 5.2 Six Development Maximize Open Space</td>
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<td>SS 6.1 Stormwater Design Quality Control</td>
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<td>SS 9.0 Tenant Design and Construction Guidelines</td>
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#### Water Efficiency (WE)

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<tr>
<td>4</td>
<td>WE PrEq 1 Water Use Reduction - 20% Reduction</td>
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<td>3</td>
<td>WE 2.0 Innovative Wastewater Technologies</td>
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#### Energy and Atmosphere (EA)

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<tr>
<td>8</td>
<td>EA PrEq 1 Fundamental Commissioning of Building Systems</td>
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<td>EA PrEq 2 Fundamental Refrigration Management</td>
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<td>EA 6.0 Commissioning - Base Building</td>
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<td>EA 7.0 Commissioning - Tenant Submetering</td>
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<td>MR 6.0 Certified Wood</td>
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#### Indoor Environmental Quality (EQ)

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<td>EQ 3.0 Construction IAQ Management Plan, DURING CONSTRUCTION</td>
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<td>EQ 4.3 Low-Emitting Materials, Adhesives and Sealants</td>
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<td>EQ 5.0 Indoor and Outdoor Water Sources</td>
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<td>EQ 6.0 Thermal Comfort - Design</td>
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<td>EQ 8.0 Daylight and Views - DAYLIGHT</td>
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<td>EQ 9.0 Daylight and Views - VIEWS</td>
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#### Innovation in Design (ID)

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<td>1</td>
<td>ID 2.0 LEED AP+</td>
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#### Regional Priority (RP) ZIP 94105

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<tr>
<td>1</td>
<td>RP 3.0 Innovation Wastewater Technologies</td>
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</tbody>
</table>

#### Legend

- **Regional Priority Credit**: Credits required by the San Francisco Green Building Ordinance (SF GBO)
- **ID Design Phase LEED Online Documentation Credit**: Credited toward LEED Online Documentation Credit
- **ID Construction Phase LEED Online Documentation Credit**: Credited toward LEED Online Documentation Credit
- **Other Credits to discuss/revise with project team**

“YUCK” HAS BECOME LESS SCARY
Well hello again.
RESOURCE FOR THE INDUSTRY
PRESS RELEASE

The Urban Fabrick Collaborative, a 501c3 public benefit corporation, now The William J. Worthen Foundation, is pleased to announce the upcoming release of "A Design Professional’s Guide to Onsite Water Use and Reuse" on Friday, January 19, 2018.

The goal of this guide is to make the design, value and benefits of cost-effective integration of onsite water reuse systems a core competency for architects and engineers. A working group of subject matter and industry experts was convened to develop the content for this guide and infographics, and to validate technical resources for water use and reuse.

The guide will address project pitch, design, scope definition, system specification, permitting, and operation of onsite non-potable water reuse technologies including rainwater, stormwater, and gray- and blackwater systems for residential and non-residential uses. The guide also includes onsite treatment strategies and conservation measures, the value of a more collaborative and integrated design process to ensure the success of sustainable water reuse systems, the water-energy nexus, and strategies for communicating the value of water reuse systems to clients.

“The challenge for most architects is to understand how to better engage in a water discussion much earlier in the design process. If the first time you seriously discuss water with your client and plumbing engineer is at the time of bathroom and kitchen fixture selection, or when running the calculations to confirm how many LEED credits you get, you are very likely missing some interesting opportunities to collaborate and engage with your client and project team on the subject of water,” said Bill Worthen FAIA, LEED Fellow®, co-founder of Urban Fabrick Inc. and The Urban Fabrick Collaborative.

The guide has been funded with generous contributions by The Charles Pankow Foundation, Google, AIA California Council, Magnuson Klemencic Associates, the City of Santa Monica, WEARF, Crescent Heights, and Urban Fabrick, Inc. and will be made available as a free download on the William J Worthen Foundation’s website: collaborativedesign.org

Kyle Pickett, MSOD
Co-Founder & Executive Director

*December 28, 2017
WHAT DOES THE GUIDE COVER?
WATER TYPES IN BUILDINGS

**Blackwater**
- Wastewater from toilets, dishwashers, kitchen sinks and utility sinks (can include graywater)

**Graywater**
- Wastewater from clothes washers, bathtubs, showers and bathroom sinks

**Condensate**
- Condensed water from air conditioning equipment

**Foundation Drainage**
- Nuisance groundwater that infiltrates foundation

**Rainwater**
- Precipitation collected from roofs and above-grade surfaces

**Evaporative Cooling**
- or “blow down water,” is the water that is drained from cooling towers and is heavy with mineral content

**Stormwater**
- Surface water that results from rainfall and snowmelt
# Stakeholders & Decision Drivers

<table>
<thead>
<tr>
<th>Internal Stakeholders</th>
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<tbody>
<tr>
<td><strong>Developer/Owner</strong></td>
</tr>
<tr>
<td>• Cost efficiency</td>
</tr>
<tr>
<td>• Regulatory compliance</td>
</tr>
<tr>
<td>• Brand enhancement</td>
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<tr>
<td><strong>Design Team/Builder</strong></td>
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<tr>
<td>• Positive industry reputation</td>
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<tr>
<td>• New expertise</td>
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<tr>
<td><strong>Occupants</strong></td>
</tr>
<tr>
<td>• Ease of use</td>
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<tr>
<td>• Control over rate increases</td>
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<tr>
<td><strong>Facility Manager</strong></td>
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<tr>
<td>• Seamless, cost effective, reliable operations</td>
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</tbody>
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<table>
<thead>
<tr>
<th>External Stakeholders</th>
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</thead>
<tbody>
<tr>
<td><strong>Regulators</strong></td>
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<tr>
<td>• Protect public health and water quality</td>
</tr>
<tr>
<td>• Conserve scarce resource</td>
</tr>
<tr>
<td>• Enforce code compliance</td>
</tr>
<tr>
<td><strong>Utilities</strong></td>
</tr>
<tr>
<td>• Guarantee water supply</td>
</tr>
<tr>
<td>• Maintain revenue</td>
</tr>
<tr>
<td><strong>Financial institutions</strong></td>
</tr>
<tr>
<td>• Avoid risk</td>
</tr>
<tr>
<td>• Maintain long term value of investment</td>
</tr>
</tbody>
</table>
KEY TALKING POINTS WITH REGULATORS

- Non-potable onsite reuse is safe and feasible in this project. The reused water will not be used for drinking and will minimize public health risks.
- The project is using treatment technologies that are proven effective.
- The building will remain connected to centralized water/wastewater systems to continue providing drinking water and to serve as a backup in the unlikely event of system failure.
- The design meets all codes and regulations.
- The system will be regularly monitored and maintained.
- Appropriate signage and public education and outreach are integrated into the project.
KEY TALKING POINTS WITH UTILITIES

- You have an interest in working with utilities, not against them.
- **Non-potable onsite reuse can supplement local and regional efforts to build water security and promote environmental sustainability.**
- It can reduce treatment costs by reducing unnecessary potable water consumption.
- **It can delay or mitigate the need for expensive infrastructure expansion.**
- It reduces energy consumption and system overflows.
- A blend of decentralized and centralized treatment boosts system reliability and resiliency.
- **You understand that the building will still require connections to water and wastewater systems, regardless of the level of onsite non-potable water reuse.**
KEY TALKING POINTS WITH OCCUPANTS

- Non-potable onsite reuse is safe. All water is already recycled water.
- Effective treatment technologies ensure water is of a sufficient quality to use for non-drinking purposes.
- Regular monitoring and maintenance are conducted.
- Reuse saves energy, water, and costs—contributing to building and community sustainability.
DESIGNING FOR WATER REUSE

MAPPING WATER REUSE TO THE DESIGN PROCESS

Water Reuse Decision Points
- Water reuse project goals
- Refine goals
- Understand hurdles & barriers
- Initiate conversations with key regulators
- Continue conversation with regulators
- Schematic water balance (supply & demand analysis)
- Complete system documentation

Project Design Phase
- Select system components
- Understand permit process
- Refine budget & lead time
- Identify O&M requirements & services
- Identify O&M requirements & services

Related Design Phase Activities
- Site selection
- Programming
- Budget & schedule
- Team selection
- Preliminary code analysis
- Occupancy Analysis
- Site design
- Design solidified

Design Development
- System types & sizes defined
MECHANICALLY BASED SYSTEMS

MBR - Membrane Bio Reactor

MABR - Membrane Aerated Biofilm Reactor

FO - Forward Osmosis

RBC – Rotating Biological Contractor
OTHER TECHNOLOGIES

**TYPICAL HYDROPONIC TREATMENT SYSTEM**

1. Select plant species grown hydroponically in aerated reactors will produce dense root mats up to four feet in depth. The fractal structure of the roots provides greater surface area than synthetic media for biofilm development.

2. Hydroponic reactors generally have greater biodiversity of microorganisms that graze on bacteria, resulting in reduced sludge volumes.

**TYPICAL RECIPROCATING OR TIDAL FLOW WETLANDS TREATMENT SYSTEM**

1. After primary treatment, wastewater is pumped into subsurface wetland cells that are alternately filled and drained multiple times per day. During the fill phase, biofilm communities on plant roots and aggregate consume nutrients in the wastewater.

2. During the drain phase, atmospheric oxygen passively fills the void area, helping to “turbocharge” the microbial processes. Plants play an important role by increasing nutrient removal, microbial diversity, and long-term aggregate porosity.
OPERATIONS & MAINTENANCE

Water Reuse Operations
- Visual Inspection
- Water Quality Testing
- Servicing Instrumentation
- Replenishing Consumables
- Preventative Maintenance
- Emergency Maintenance

Equipment Replacement
- Filter/Membranes
- Mechanical Components

Waste Removal
- Fats, Oils, and Grease (FOG)
- Sludge

Know your Costs!
- Energy Use – Variable among system types
- Pumps
- Treatment
- Disinfection
- Monitoring Equipment

Road Map for Wastewater Reuse

BOD & TSS Removal, Nitrification

Toilet Flushing
Water Features
Vehicle Washing
Surface Irrigation
Subsurface Irrigation
Cooling Towers
Boilers

Public Health Regulations
- Disinfection: Required for possible public contact with water or aerosol

Environmental Regulations
- Nitrogen Removal: Required for coastal environments or for areas with groundwater contamination concerns

End Use Requirements
- Deionization: Required for sensitive soil and plant communities or for HVAC reuse

Depicts general water reuse applications and treatment requirements.
‘SHOW ME THE MONEY’
Key Question: Does onsite water reuse make financial sense?

Combined water, sewer and stormwater prices for households in 30 major cities.

- **Seattle** and **Atlanta** have the highest total monthly bills. Each is building costly underground storage facilities and treatment plants to comply with federal requirements to reduce raw sewage that is dumped into lakes and rivers.
- **Santa Fe** has the highest water prices in the survey. The small city of 70,000 recently completed a $187 million pipeline from the Rio Grande.
- **Baltimore** has stormwater fees that are mandated by state law as part of a program to keep polluted runoff from entering the Chesapeake Bay.
DEVELOPMENT INCENTIVES
MUNICIPAL DEVELOPMENT INCENTIVES

Properly researching incentives and funding opportunities in your region can substantially inform you and your clients’ decisions during the vetting process. Some development incentives offered in the marketplace include:

- **Chicago’s Green Permit program expedites reviews for projects that meet certain LEED criteria**
- New Jersey adopted business tax credits and sales tax refunds as incentives to support reuse in industrial processes
- Seattle launched The Living Building Pilot Program to encourage innovative green buildings
- **Cincinnati offers financial grants and low-interest loans for innovative projects**
- City and Co of San Francisco offer capacity charge adjustments for new buildings installing onsite non-potable water systems to ensure projects are only charged for the demand placed on the municipal water and sewer systems. San Francisco also offers grants for onsite non-potable water projects that meet eligibility criteria (*heat recovery grant*)
- **City of Santa Monica waives building permit fees for projects and properties that include water reuse systems**
- New York City charges discounted service rates for projects and properties that include water reuse systems (*new grant*)
LEGISLATION
WATER REUSE LEGISLATION
California SB966 *passed Sept 2018*

Recognition that as onsite water treatment systems are being installed across CA, current water quality standards do not address ongoing oversight, management, and monitoring.

SB966 directs the State Water Resources Control Board (SWRCB) to develop risk-based standards to assist local governments in developing oversight and management programs for onsite non-potable water systems.

SWRCB will develop the framework in consultation with the California Building Standards Commission.

Passage of SB966 will ensure that innovators can develop technologies to a single, clear standard and that local governments can permit onsite water reuse with the assurance that public health will be protected.
“The best way to predict the future is to design it.”

— Buckminster Fuller
RESOURCES

Non-potable Water Program Guidebook
A Guide for Implementing Onsite Non-potable Water Systems In San Francisco
RESOURCES

O N S I T E  N O N - P O T A B L E  W A T E R  R E U S E
P R A C T I C E  G U I D E

BLACKWATER
GRAYWATER
RAINWATER
STORMWATER
FOUNDATION DRAINAGE

FREE DOWNLOAD – COLLABORATIVEDESIGN.ORG

WERF.ORG
DESIGN PROFESSIONAL’S GUIDE TO
DECARBONIZATION OF THE BUILT ENVIRONMENT

PRIMARY AUDIENCE
Architects, designers and industry professionals practicing in the U.S., with a specific focus on States and Municipalities with established emissions reduction and carbon neutrality goals.

SECONDARY AUDIENCE
Engineers, building owners and property managers, code officials, contractors, students and professors of architecture, and policy makers.

EARLY FUNDING COMMITMENTS FROM:

THANK YOU!

KYLE PICKETT, MSOD
Co-Founder & COO, Urban Fabrick, Inc.
Co-Founder & Executive Director, The William J. Worthen Foundation

kyle@urbanfabrick.com