

Water, Wastewater & Stormwater Systems



CAROLINA NORTH

The UNIVERSITY of NORTH CAROLINA *at* CHAPEL HILL

Water Systems

- **POTENTIAL GOAL**
 - Reduce use of potable water
- **TECHNIQUE**
 - Collect rainwater for re-use
- **CASE STUDY**
 - Phillip Merrill Environmental Center; Annapolis, MD
- **DESCRIPTION:**
 - Cisterns are used to collect and store rainwater that is re-used in the building
- **POTENTIAL BARRIERS:**
 - Aesthetics of re-use water
 - Additional Operation & Maintenance



Water Systems

- **POTENTIAL GOAL:**
 - Reduce use of potable water
- **TECHNIQUE**
 - Collect rainwater for re-use
- **CASE STUDY:**
 - Seattle City Hall; Seattle, WA
- **DESCRIPTION:**
 - A cistern located in the basement is used to collect rainwater to be re-used for toilet flushing and irrigation purposes
- **POTENTIAL BARRIERS:**
 - Aesthetics of re-use water
 - Additional Operation & Maintenance



Water Systems

- **POTENTIAL GOAL:**
 - Implement water conservation
- **TECHNIQUE:**
 - Use reclaimed water
- **CASE STUDY:**
 - Irvine Ranch Water District; Irvine, CA
- **DESCRIPTION:**
 - Reclaimed water is 20% of the district's total water supply and provides irrigation for 80% of all commercial and community landscapes. In addition, reclaimed water is used for toilet flushing in several offices in the district.
- **POTENTIAL BARRIERS:**
 - Reclaimed water demand
 - Additional Operation & Maintenance



Water Systems

- **POTENTIAL GOAL:**
 - Implement water conservation
- **TECHNIQUE:**
 - Use reclaimed water
- **CASE STUDY:**
 - University of Arizona; Tucson, AZ
- **DESCRIPTION:**
 - The campus uses reclaimed water for irrigation and for evaporative cooling of campus facilities.
- **POTENTIAL BARRIERS:**
 - Reclaimed water demand
 - Additional Operation & Maintenance



Wastewater Systems

- **POTENTIAL GOAL:**
 - Treat wastewater on site
- **TECHNIQUE:**
 - Constructed Wetland
- **CASE STUDY:**
 - Sisters, Servants of the Immaculate Heart of Mary Motherhouse Renovation; Monroe, MI
- **DESCRIPTION:**
 - Greywater from the facility's sinks and showers are treated in wetlands and reused on site in the building's toilets
- **POTENTIAL BARRIERS:**
 - Land Intensive
 - Additional operation & maintenance



Wastewater Systems

- **POTENTIAL GOAL:**
 - Treat wastewater on site
- **TECHNIQUE:**
 - Re-use sewage solids and compost
- **CASE STUDY:**
 - North Shore Country Club; Glenview, Il.
- **DESCRIPTION:**
 - A 50-50 mix of nutrient-rich biosolids from the Chicago Metropolitan Sanitary Sewer District and compost made from yard waste are used to upkeep the golf course grass.
- **POTENTIAL BARRIERS:**
 - Aesthetics/ Public Acceptance/ Odor Issues
 - Land Intensive
 - Additional Operation & Maintenance



Wastewater Systems

- **POTENTIAL GOAL:**
 - Treat wastewater on site
- **TECHNIQUE:**
 - On-site package plant
- **CASE STUDY:**
 - Thomas Jefferson Visitor Center and Smith History Center; Charlottesville, VA
- **DESCRIPTION:**
 - An advanced wastewater treatment plant [BioMicrobics (FAST system)] coupled with a drip irrigation disposal system
- **POTENTIAL BARRIERS:**
 - Proprietary System
 - Requires Suitable Soils
 - Land Intensive
 - Additional Operation & Maintenance



Wastewater Systems

- **POTENTIAL GOAL:**
 - Treat wastewater on site
- **TECHNIQUE:**
 - Membrane Bioreactor
- **CASE STUDY:**
 - Creemore Wastewater Treatment Plant; Ontario, Canada
- **DESCRIPTION:**
 - Conversion from individual septic tanks to a centralized municipal wastewater treatment plant using a Membrane Bioreactor
- **POTENTIAL BARRIERS:**
 - Additional Skilled Operation & Maintenance
 - High Maintenance



Wastewater Systems

- **POTENTIAL GOAL:**
 - Treat wastewater on site
- **TECHNIQUE:**
 - Biological Wastewater Treatment
- **CASE STUDY:**
 - Living Machine™ at Oberlin College Lewis Center; Oberlin, OH
- **DESCRIPTION:**
 - Biological wastewater treatment designed to replicate natural purification
 - Uses sunlight, greenhouse, organisms, plants to breakdown and digest organic pollutants
- **POTENTIAL BARRIERS:**
 - Proprietary System
 - Bio-remediation is an evolving technology



Stormwater Systems

- **POTENTIAL GOAL:**
 - Replicate natural hydrology
- **TECHNIQUE:**
 - Control stormwater quality, rate and volume
- **CASE STUDY:**
 - Morgan View Student Housing Complex at Morgan State University; Baltimore, MD
- **DESCRIPTION:**
 - Grass channels, bioretention areas, sand filters and underground storage pipes are used to control stormwater runoff
- **POTENTIAL BARRIERS:**
 - Land Intensive
 - Maintenance required
 - Hydraulic gradient



Stormwater Systems

- **POTENTIAL GOAL:**
 - Replicate natural hydrology
- **TECHNIQUE:**
 - Control stormwater quality, rate and volume
- **CASE STUDY:**
 - University of North Carolina at Chapel Hill Rams Head Center; Chapel Hill, NC
- **DESCRIPTION:**
 - A green roof and underground cistern are used for water reduction and re-use
- **POTENTIAL BARRIERS:**
 - Aesthetic of re-use water
 - Hydraulic gradient



Stormwater Systems

- **POTENTIAL GOAL:**
 - Replicate natural hydrology
- **TECHNIQUE:**
 - Control stormwater quality, rate and volume
- **CASE STUDY:**
 - SW 12th Avenue Green Street ;
Portland, OR
- **DESCRIPTION:**
 - Landscaped stormwater planters are used to capture street runoff
- **POTENTIAL BARRIERS:**
 - Infiltration capacity of soils
 - Hydraulic gradient
 - Public vs. Private maintenance



Stormwater Systems

- **POTENTIAL GOAL:**
 - Replicate natural systems
- **TECHNIQUE:**
 - Control stormwater quality, rate and volume
- **CASE STUDY:**
 - Siskiyou Green Street; Portland, OR
- **DESCRIPTION:**
 - Landscaped curb extensions reduces the amount of stormwater that flows into the sewer system
- **POTENTIAL BARRIERS:**
 - Infiltration capacity of soils
 - Hydraulic gradient
 - Public vs. Private maintenance
 - Roadway capacity



Stormwater Systems

- **POTENTIAL GOAL:**
 - Replicate natural hydrology
- **TECHNIQUE:**
 - Make stormwater improvements off-site
- **CASE STUDY:**
 - Baltimore City Schools Greening Program; Baltimore, MD
- **DESCRIPTION:**
 - Convert unnecessary asphalt pavements to lawn and plantings
- **POTENTIAL BARRIER:**
 - Intergovernmental coordination



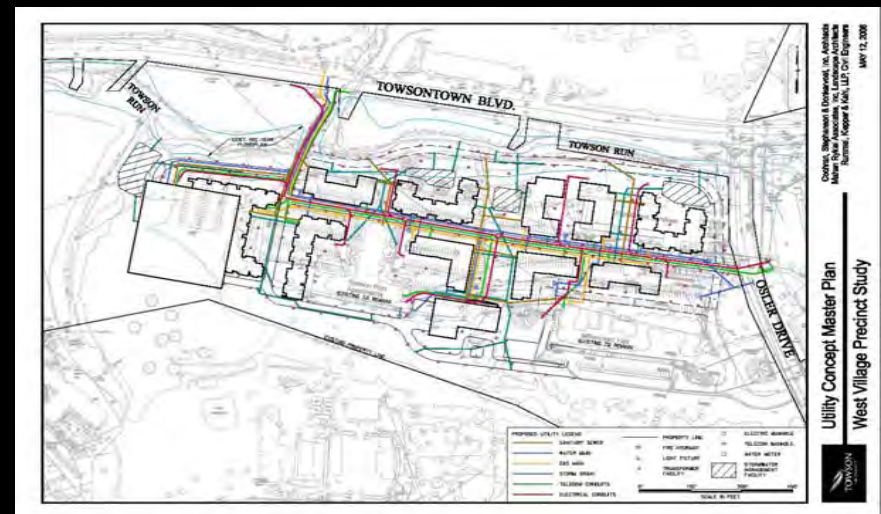
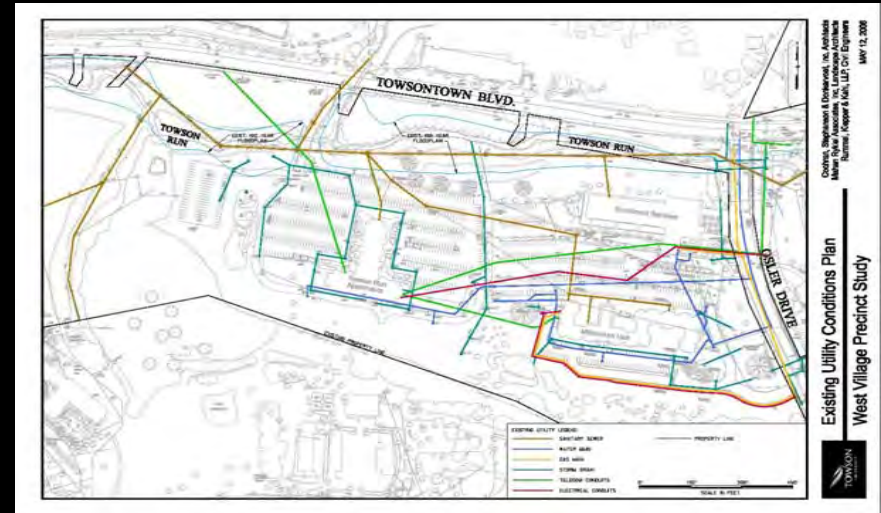
Utility Corridors

- **POTENTIAL GOAL:**
 - Limit land disturbance
- **TECHNIQUE:**
 - Establish Utility Corridors
- **CASE STUDY:**
 - University of Maryland Baltimore County; Baltimore, MD
- **DESCRIPTION:**
 - Master plan included alignment for a utility tunnel between buildings
- **POTENTIAL BARRIERS:**
 - Quantity and depth of excavation
 - Gravity systems not well-suited for tunnel



Utility Corridors

- **POTENTIAL GOAL:**
 - Limit land disturbance
- **TECHNIQUE:**
 - Establish Utility Corridors
- **CASE STUDY:**
 - Towson University West Village; Baltimore, MD
- **DESCRIPTION:**
 - Master plan includes alignment for utility corridor
- **POTENTIAL BARRIERS:**
 - Quantity and depth of excavation
 - Gravity systems not well-suited for tunnel



Water, Wastewater, Stormwater Systems

- **POTENTIAL GOAL:**
 - Flexibility, Adaptability in Innovative Systems
- **TECHNIQUE:**
 - Membrane bioreactor for wastewater
- **CASE STUDY:**
 - Town of Huntsville Wastewater Treatment Plant; Huntsville, TN
- **DESCRIPTION:**
 - Wastewater Treatment Plant was retrofitted with a membrane bioreactor package plant that doubled treatment capacity.
- **POTENTIAL BARRIER:**
 - Additional skilled Operation & Maintenance
 - High Maintenance



Water, Wastewater, Stormwater Systems

- **POTENTIAL GOAL:**
 - Standardize de-centralized water, wastewater, stormwater systems
- **CASE STUDY:**
 - ?
- **DESCRIPTION:**
 - To the extent possible, standardize the various components for the multiple innovative treatment/distribution systems
- **POTENTIAL BARRIERS:**
 - Additional Operation & Maintenance
 - May limit implementation of innovative facilities



Funding for Innovative Systems

- POTENTIAL GOAL:
 - Funding for Innovative Systems
- CASE STUDY:
 - Harvard University Green Campus Loan Fund; Cambridge, MA
- DESCRIPTION:
 - The Green Campus Loan Fund provides interest-free capital for high performance campus design, operations, maintenance and occupant behavior projects.
 - <http://www.greencampus.harvard.edu/gclf/>
- POTENTIAL BARRIERS:
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