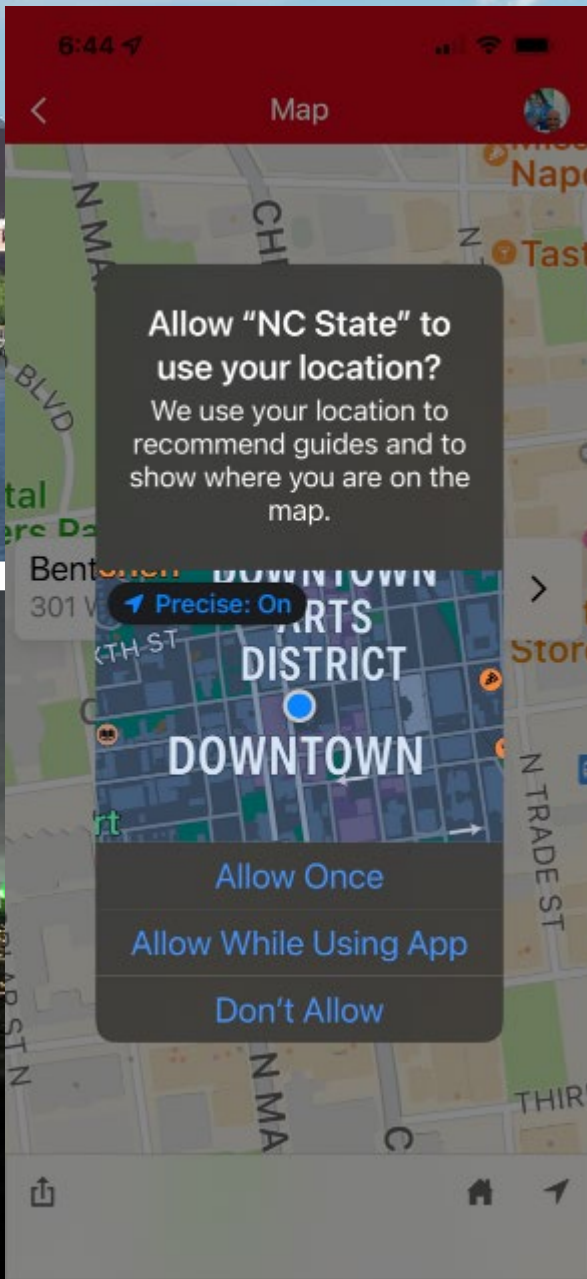




Location
Location
Location.

The placement of SCMs means more than you think.





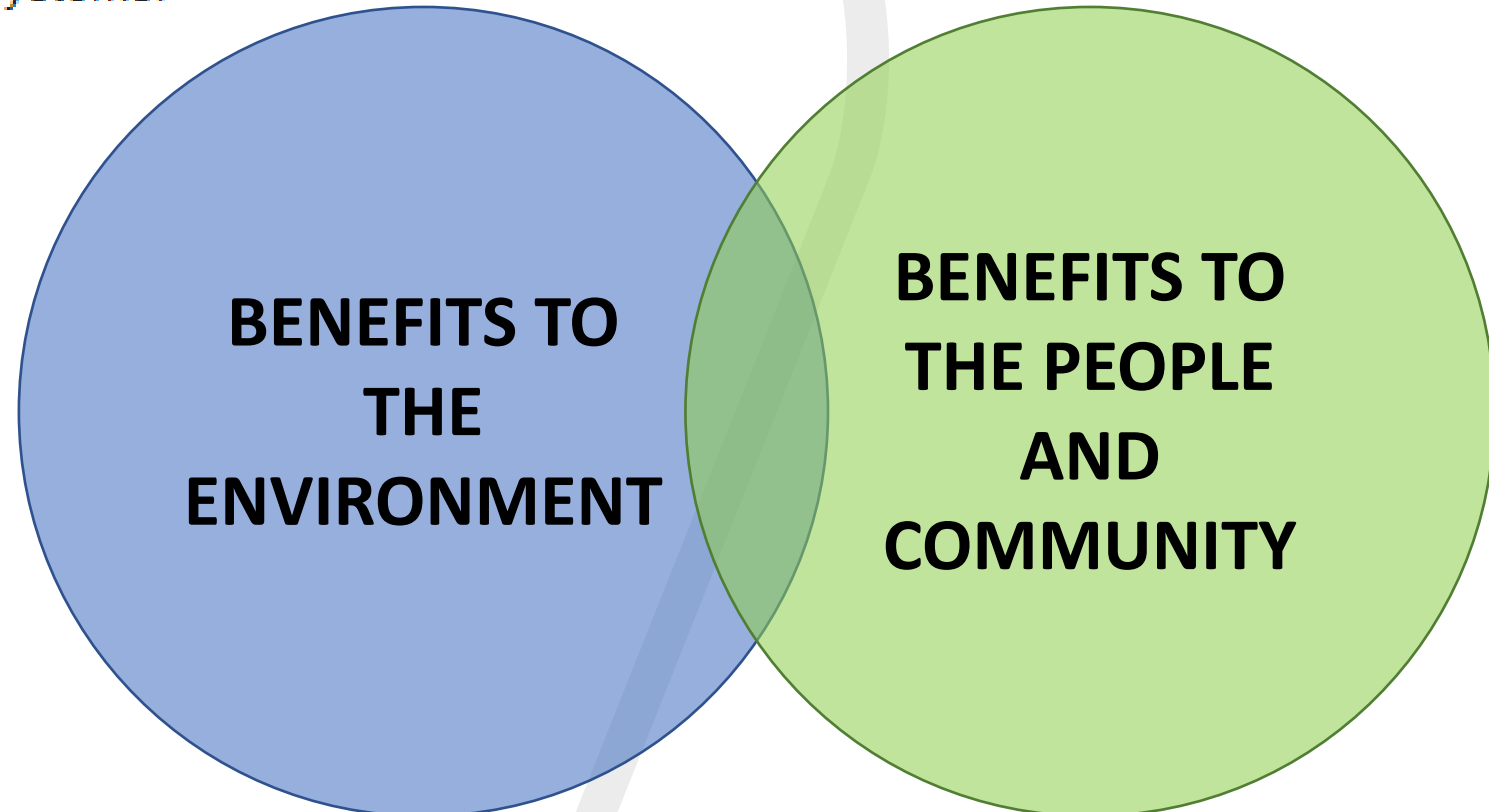


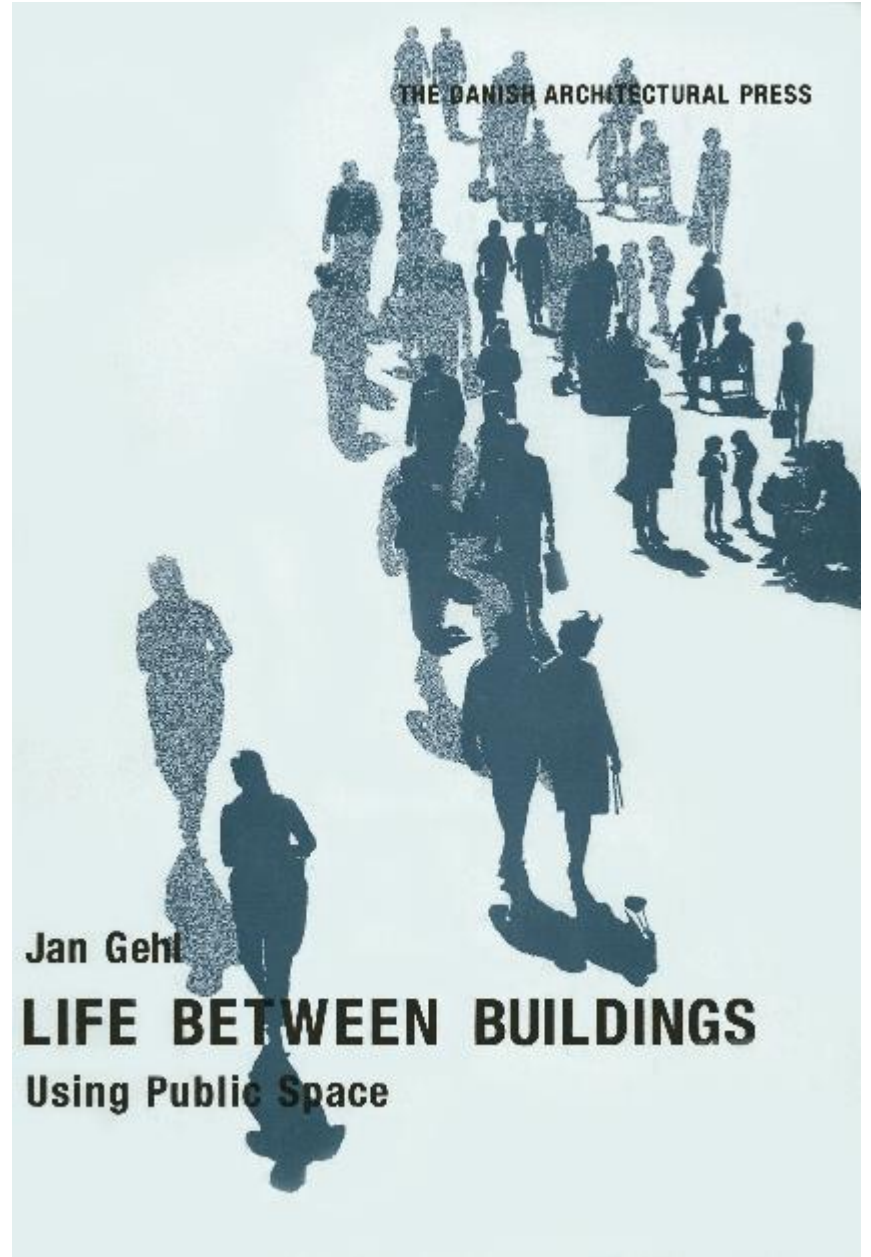
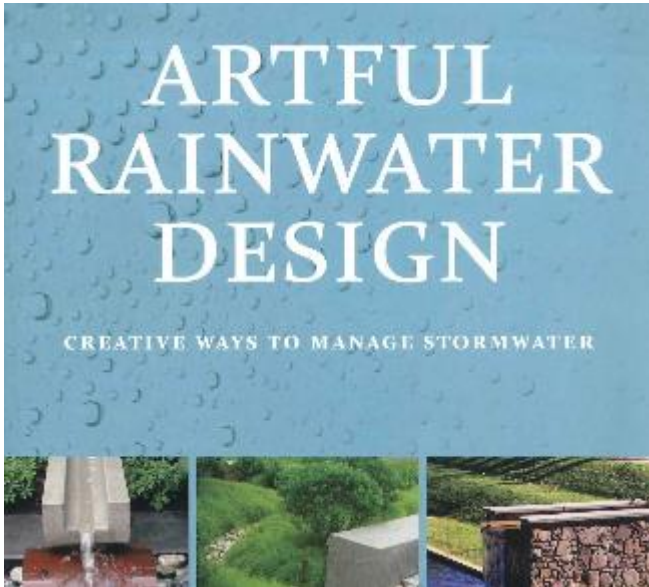
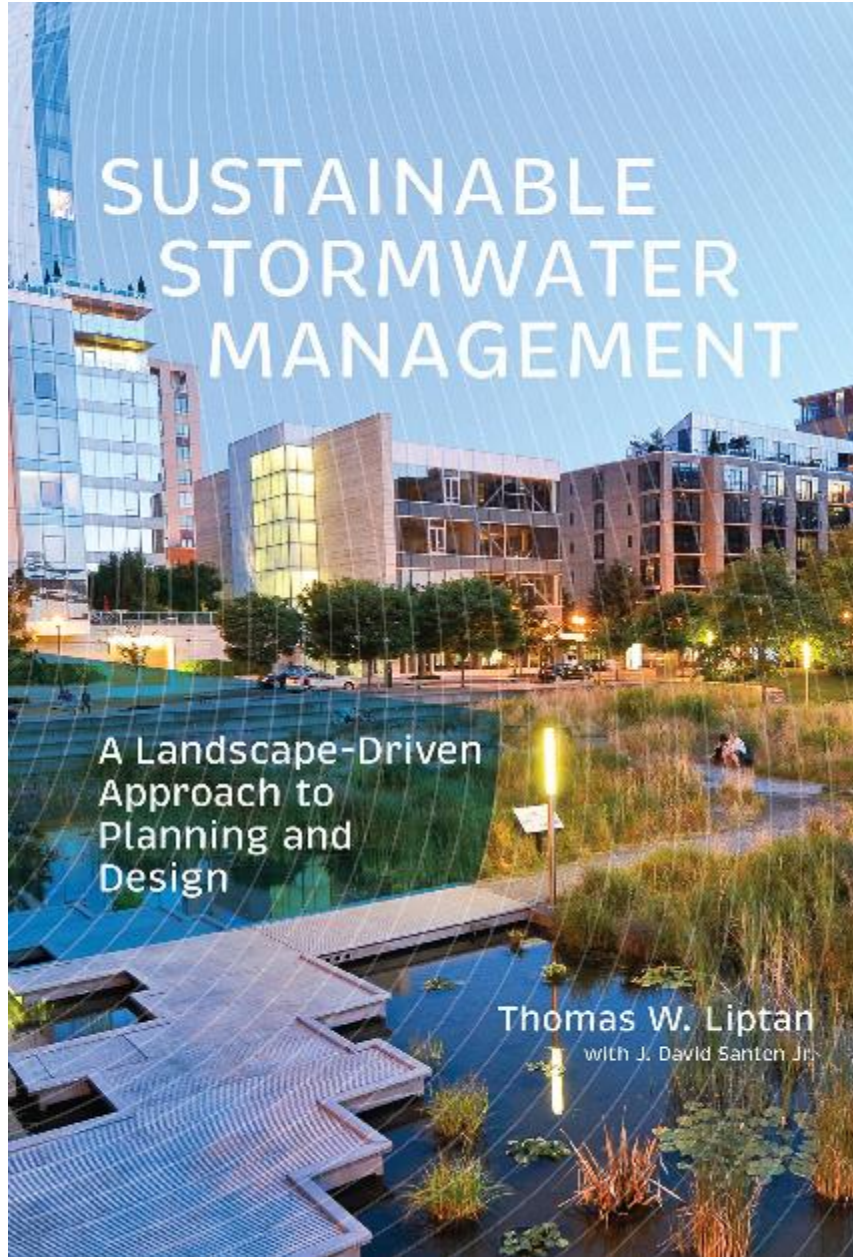
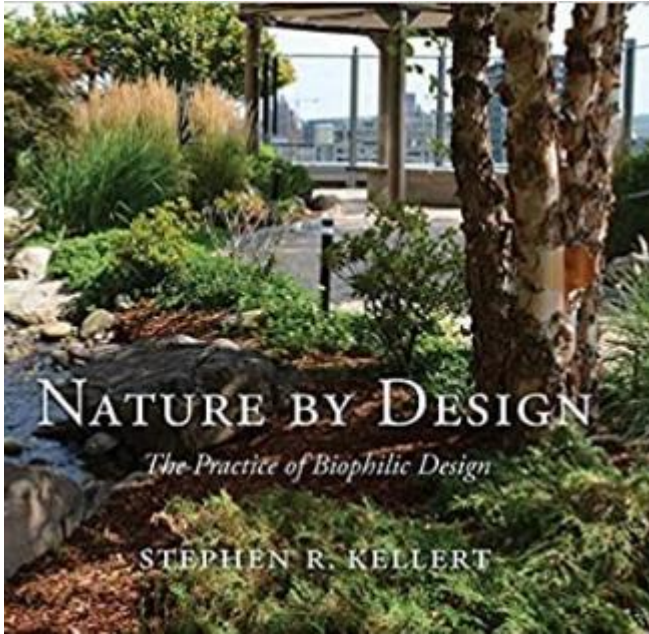
About 1,550,000,000 results (0.65 seconds)

Benefits of Green Design

- Reduced environmental impact through material and resource conservation.
- Increased efficiency of heating and cooling systems.
- Reduced operating and utility costs.
- Increased daylight access.
- Enhanced occupant comfort and health.

Feb 13, 2014







**BENEFITS TO
THE PEOPLE
AND
COMMUNITY**

- Increased community resiliency
 - Better air quality
 - Reduction of heat island effects
-
- Increased property value
 - Increased retail value
 - Decrease in crime
 - Faster recovery from illness
 - Reduced depression







Downtown
Greenway

[why](#)

[timing](#)

[maps](#)

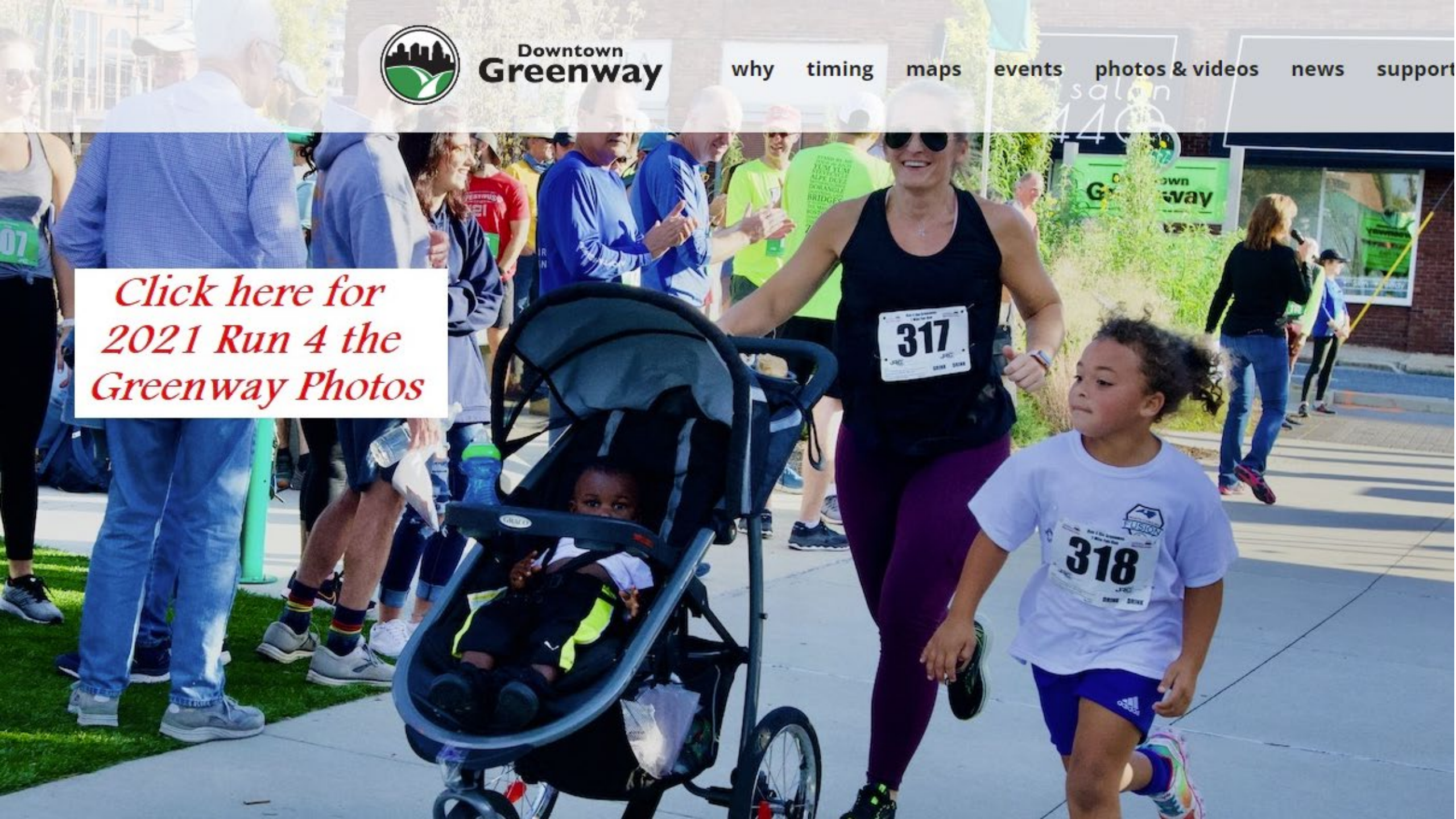
[events](#)

[photos & videos](#)

[news](#)

[support](#)

*Click here for
2021 Run 4 the
Greenway Photos*









IN PURSUIT OF

THE BIG PICTURE

THE FIVE PILLARS WE STAND FOR

We're creating way more than buildings and roads. Spanning across 7,068 acres, we're creating a whole new kind of community. It's these five pillars that inform every planning decision we make, combining for a well-rounded life here.





UNC
HEALTH CARE



DURING A TYPICAL THUNDERSTORM, OVER
4,000 gallons
OF RAIN WATER IS
COLLECTED FROM THE ROOF



RAIN WATER IS CONVEYED TO THE STORAGE
TANK THROUGH **8** DOWNSPOUTS
INTEGRATED INTO THE BUILDING
ARCHITECTURE AND **2** FROM THE ROOF

CANOPY PROVIDES COOLING
SHADE TO THE COURTYARD
BELOW

GRANITE RUNNELS ARE BOTH
FUNCTIONAL & ARTISTIC

PLANTS CREATE A
WOODLAND GARDEN IN
AN URBAN COURTYARD

SOIL RETAINS NUTRIENTS IN THE
RAINWATER, ENRICHING THE PLANTS

STORED RAIN WATER IS
USED FOR IRRIGATION

UP TO
10,000 gallons
OF RAIN WATER CAN BE STORED
IN THE TANK BELOW THE PLANTS-
ENOUGH TO SUPPLY A ENTIRE
HOUSEHOLD FOR **ONE MONTH**

RAIN WATER

PLANTS

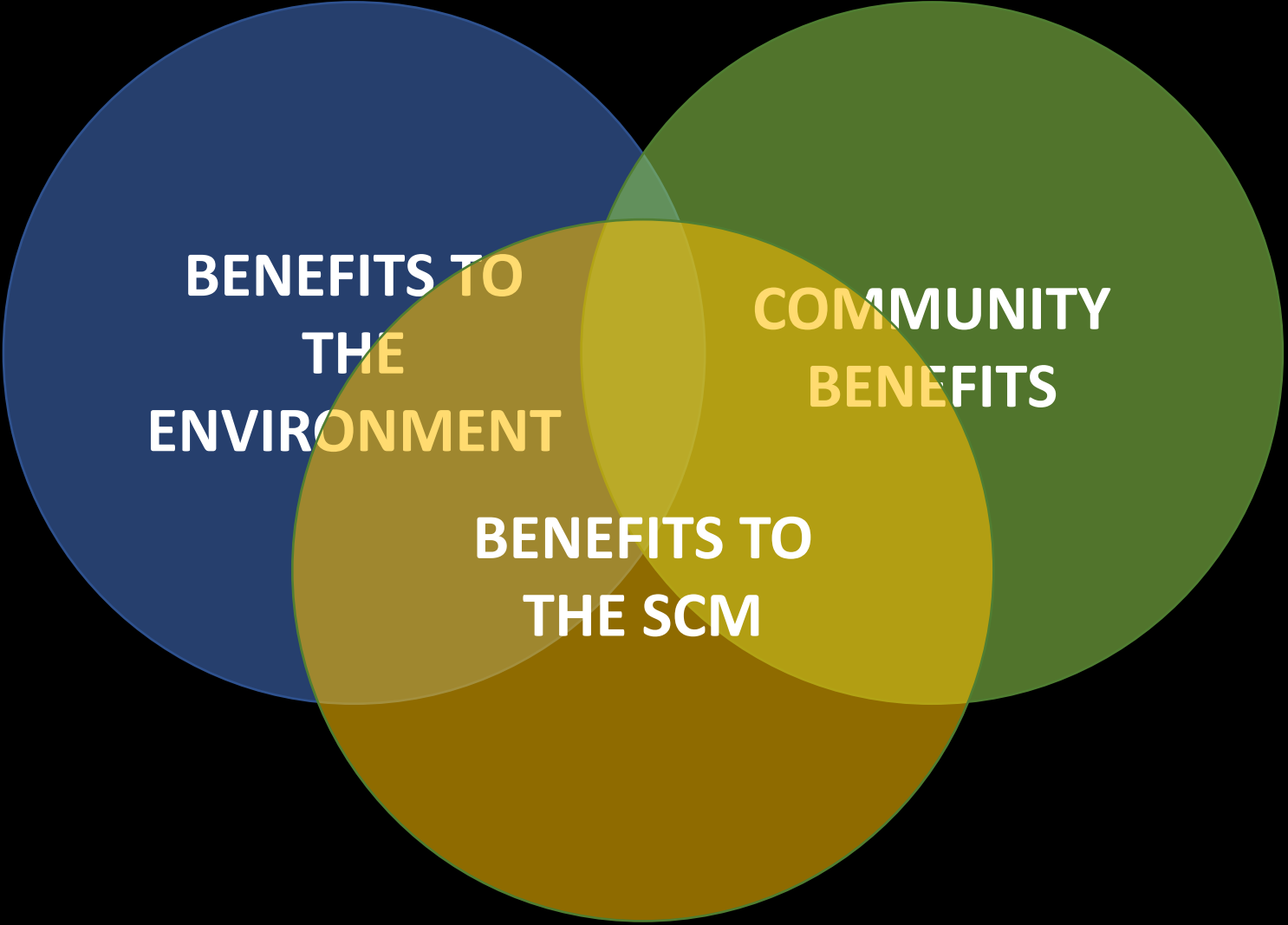
SOIL

STONE

STORAGE
TANK

HOW IT WORKS

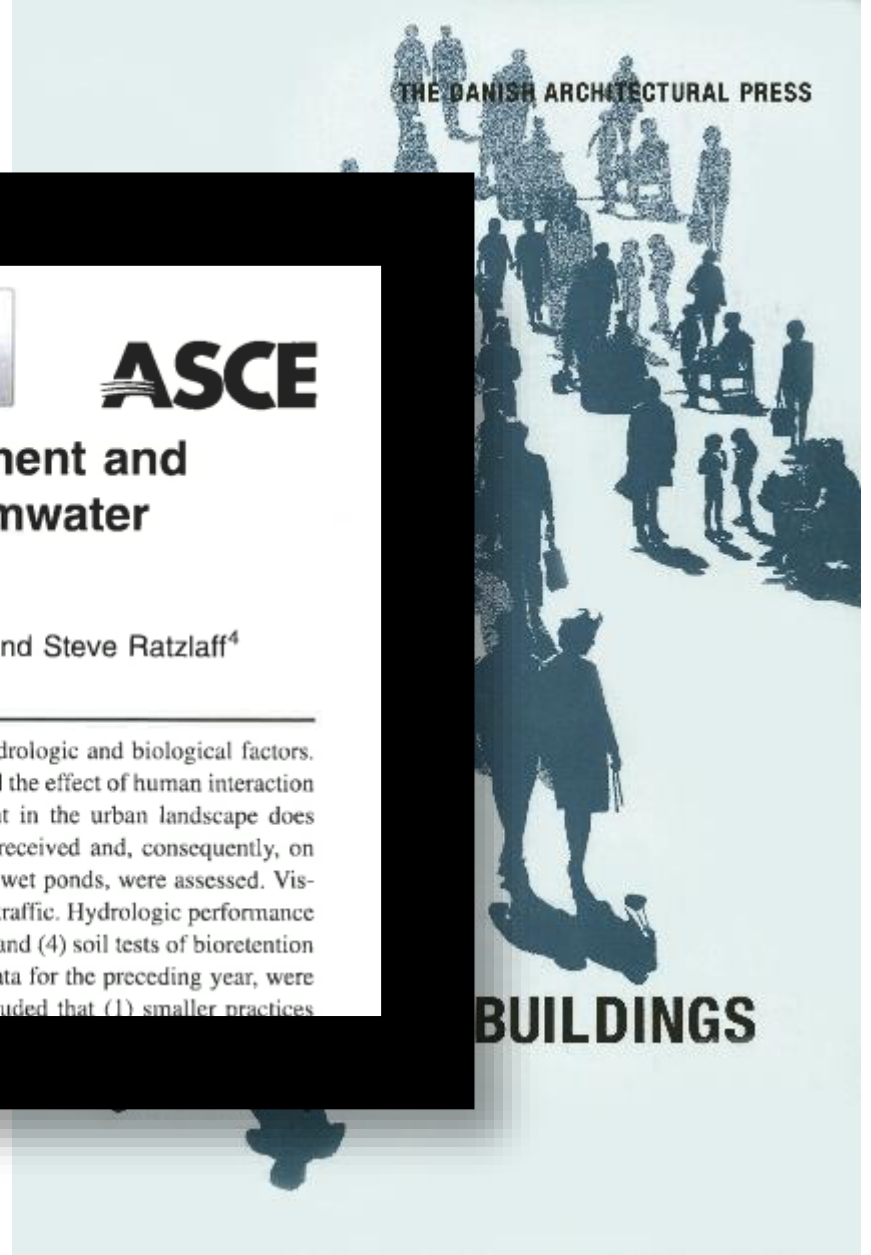
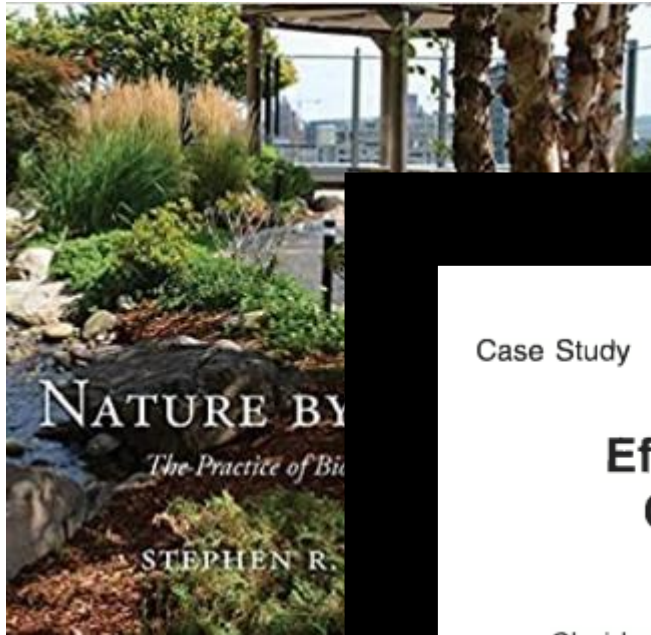




**BENEFITS TO
THE
ENVIRONMENT**

**COMMUNITY
BENEFITS**

**BENEFITS TO
THE SCM**



Case Study

 **ASCE**

Effect of Visibility on Maintenance Investment and Consequent Performance of Urban Stormwater Control Measures

Sheida Moin, S.M.ASCE¹; William F. Hunt III, M.ASCE²; François Birgand³; and Steve Ratzlaff⁴

Abstract: Studies on the performance of urban stormwater control measures (SCMs) mainly focus on hydrologic and biological factors. SCMs are located in an urban context and humans are part of this ecosystem, yet few studies have investigated the effect of human interaction on SCM performance. While SCM designs rarely encourage physical human interaction, their placement in the urban landscape does allow visual interaction. This study explores the impact of SCM visibility on the degree of maintenance received and, consequently, on the hydrologic performance of the system. Forty SCMs, including 20 bioretention cells and 20 wetlands or wet ponds, were assessed. Visibility was evaluated through SCM surveys to determine viewshed size, noticeability, and potential passerby traffic. Hydrologic performance was evaluated through (1) visual inspection, (2) surveying vegetation health, (3) measuring drawdown rates, and (4) soil tests of bioretention media. As the degree of maintenance varied for each SCM, previous maintenance records, including cost data for the preceding year, were obtained and compared to visibility scores and hydrologic performance metrics. The study findings concluded that (1) smaller practices

Chatham Pk Wy Opas

Chatham Pk Wy Opas





Existing conditions CP-SCM#6



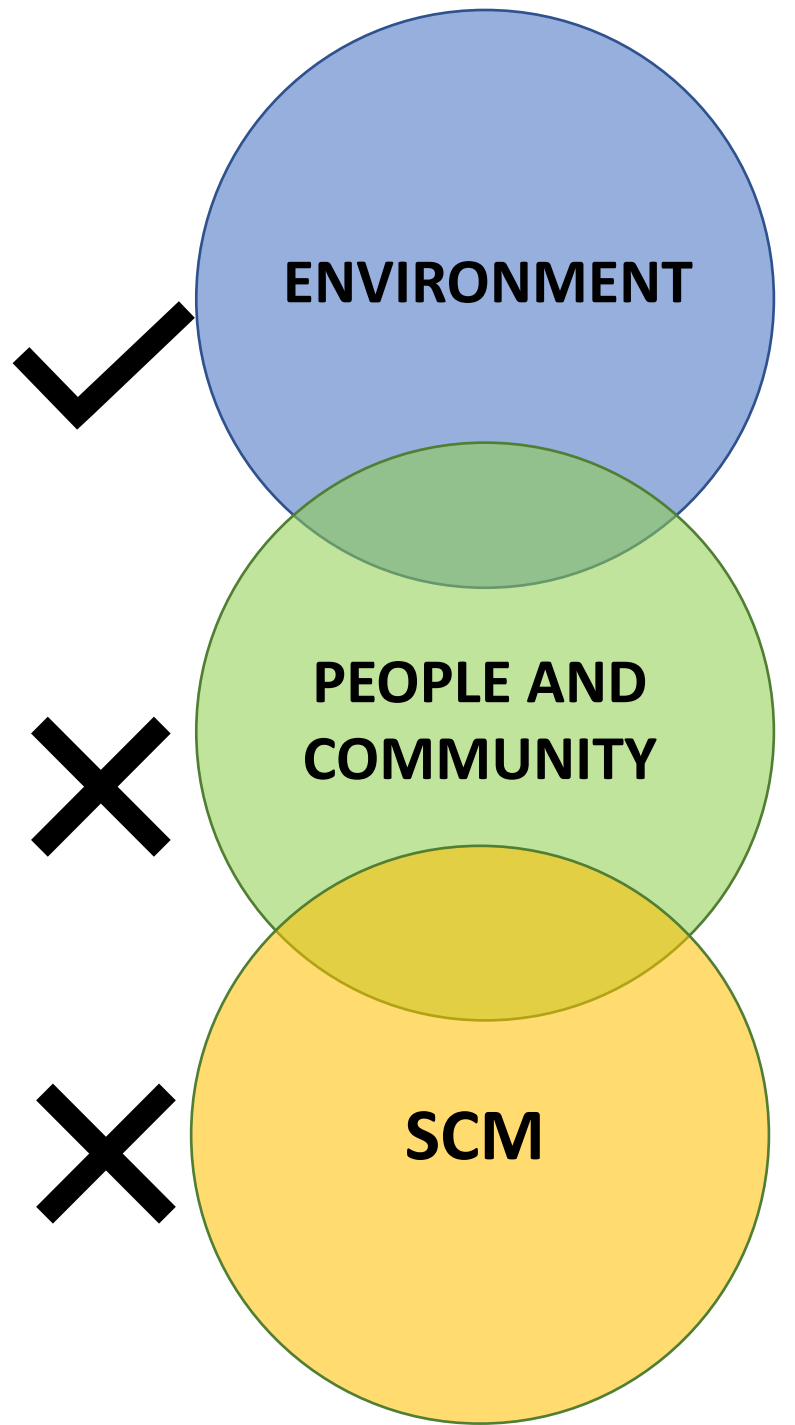
Interior slopes have experienced excessive rill erosion



Interior slopes have experienced excessive rill erosion



The drawdown upturn device needs repair





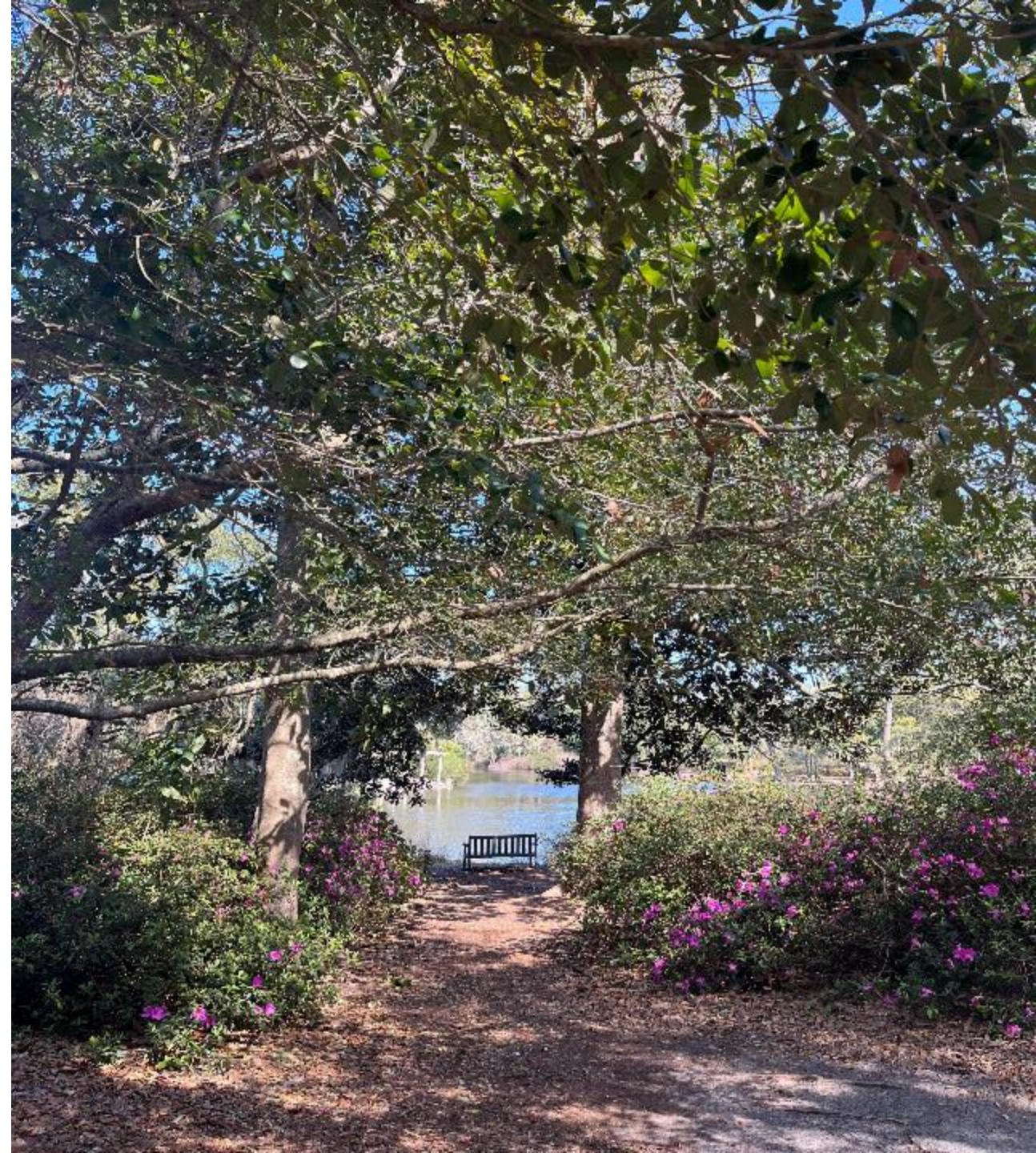
Surface



Bradley Creek Overlook



Here you can experience a rare occurrence – a tidal creek ecosystem on one side and a freshwater lake on the other. The Airlie Lake was created in 1902 when Sarah Jones, one of Airlie’s original owners, dammed off a section of Bradley Creek, known then as Church Creek. This area provides guests a wonderful wildlife viewing opportunity.







TOWN OF
WRIGHTSVILLE BEACH
SUMMER CAMPS
LACROSSE, B'BALL
PERFORM CLUB
FOOTBALL & MORE

25





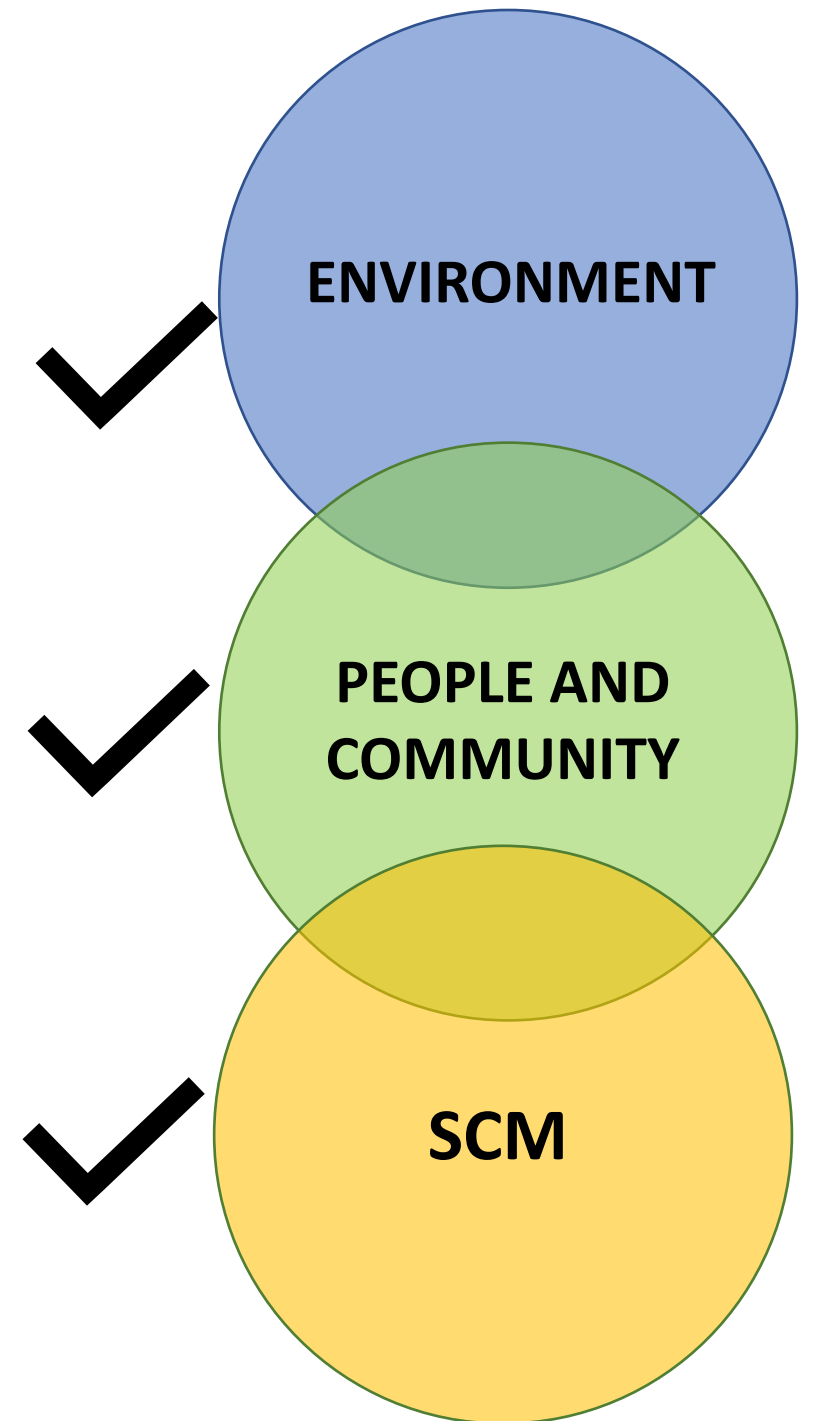


Effect of Visibility on Maintenance Investment and Consequent Performance of Urban Stormwater Control Measures

Sheida Moin, S.M.ASCE¹; William F. Hunt III, M.ASCE²; François Birgand³; and Steve Ratzlaff⁴



- **More frequent maintenance visits**
- **Quicker detection of major issues**
- **Higher costs, but higher value**



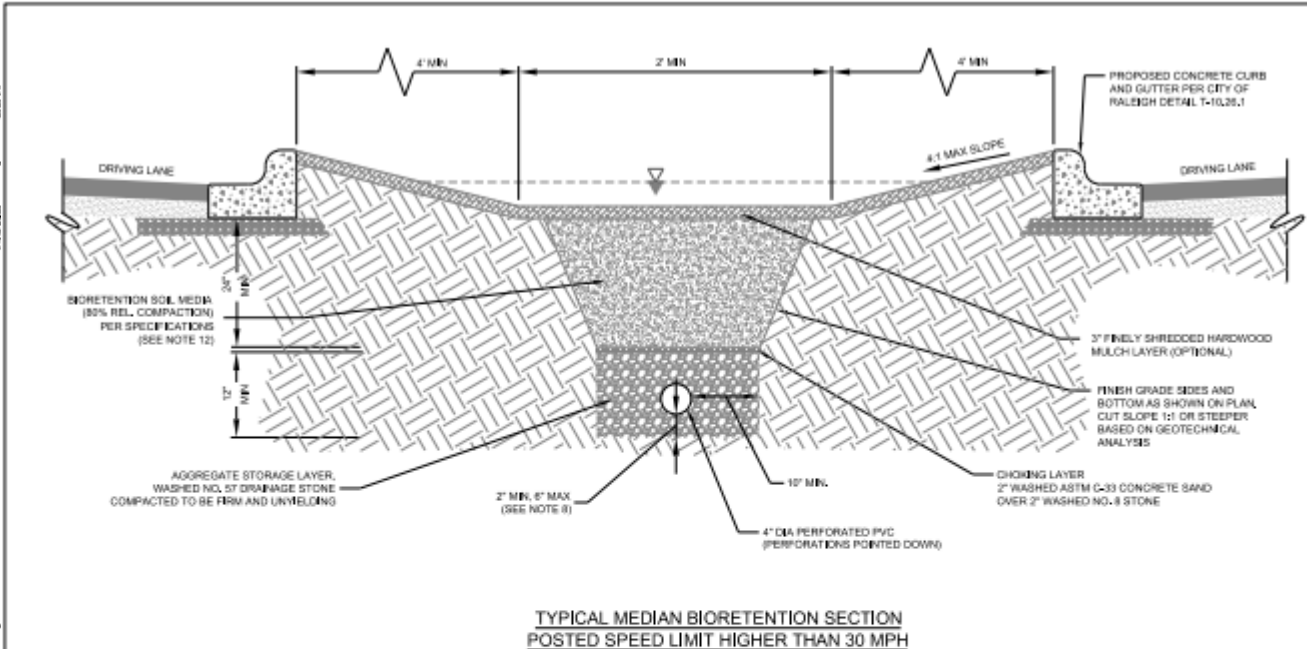
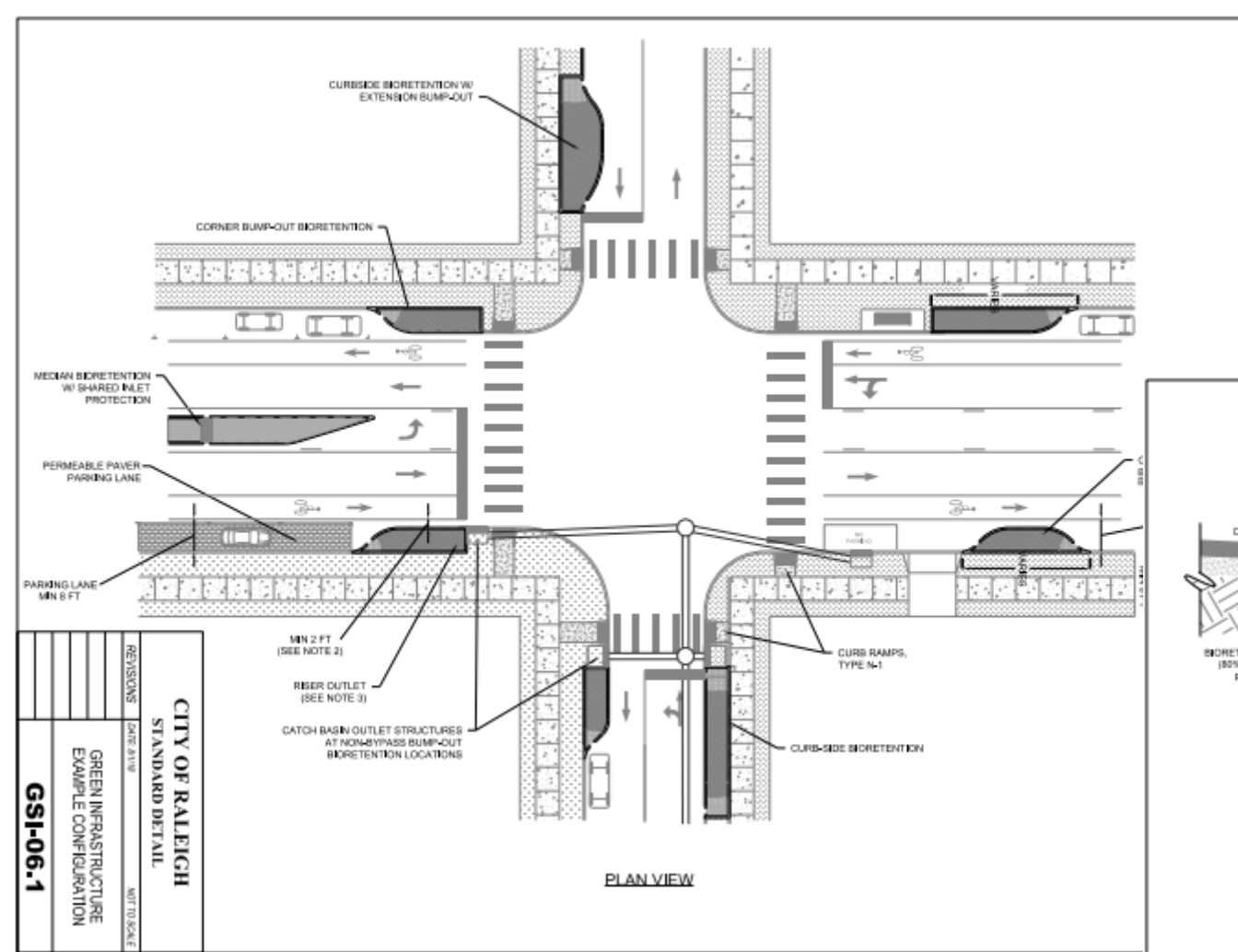


How  **Raleigh** increases SCM visibility:

- Staff Support
- Text Changes & Ordinance Revisions
 - Departmental coordination
- Include GSI in Rezoning Conditions
- Standard Details
- Cost Sharing

Advancing Use of Green Stormwater Infrastructure

Bringing more green, eco-friendly features to Raleigh that help protect waterways



- NOTES:
1. REFER TO DESIGN PLANS FOR HORIZONTAL CONTROL INFORMATION.
 2. BIORETENTION SIZING IS THE RESPONSIBILITY OF THE DESIGN ENGINEER. SIZING CALCULATIONS SHALL BE SUBMITTED TO THE CITY FOR REVIEW.
 3. THE INCLUSION OF AN UNDERDRAIN SYSTEM IS DEPENDENT UPON THE RECOMMENDATION OF GEOTECHNICAL INVESTIGATION.
 4. IF UNDERDRAIN IS REQUIRED, REFER TO DESIGN PLANS FOR UNDERDRAIN INVERT ELEVATIONS.
 5. THE SEASONAL HIGH WATER TABLE SHALL BE 2 FEET BELOW THE BOTTOM OF THE AGGREGATE STORAGE LAYER.
 6. REFER TO PLANS FOR UNDERDRAIN CLEANOUT LOCATIONS AND INSTALLATION DETAILS.
 7. GEOTEXTILE MAY BE UTILIZED IN-LIEU OF AGGREGATE CHOKING LAYER IF APPROVED BY ENGINEER.
 8. A MAXIMUM OFFSET OF 6 INCHES IS REQUIRED BETWEEN THE INVERT OF THE UNDERDRAIN AND BOTTOM OF STORAGE LAYER.
 9. BOTTOM OF STORAGE LAYER SHALL BE SCARIFIED TO PROMOTE INFILTRATION PRIOR TO BACKFILL.
 10. ALL UNDERDRAINS, IF REQUIRED, SHALL CONNECT TO STORM DRAIN OR OTHER DRAINAGE FEATURE.
 11. VEGETATION MAY BE PLACED ON SIDE SLOPES TO ANCHOR MULCH IF DESIRED.
 12. ALL FEATURES, INCLUDING VEGETATION, INTEGRATED INTO MEDIAN BIORETENTION SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NCDOT STORMWATER DESIGN MANUAL.
 13. BIORETENTION MEDIA SHALL BE PLACED IN 8" LIFTS THAT ARE WALKED ON OR WATERED TO CONSOLIDATE AND ALLOW SHAPING OF THE MEDIA'S SURFACE. THE MEDIA SHALL NOT BE MECHANICALLY COMPACTED. REFER TO NCDOT STORMWATER DESIGN MANUAL FOR BIORETENTION SOIL MEDIA SPECIFICATIONS.

OPTIONS FOR GREENING RALEIGH

Medium-Density Residential Development Stormwater Management



Bioretention areas, or rain gardens, are structural stormwater controls that capture and temporarily store or infiltrate stormwater runoff using soils and vegetation in landscaped areas to reduce the volume and improve the quality of runoff.



Rain barrels and cisterns harvest rainwater from rooftops temporarily storing water for uses such as irrigation, washing vehicles, washing laundry, and flushing toilets reducing the volume and improving the quality of runoff and delaying the peak flow.



Downspout disconnection can reduce runoff volumes by directing rooftop runoff onto vegetated areas where it can infiltrate rather than being collected in a drainage system.



Permeable sidewalks reduce the volume of runoff by allowing infiltration while maintaining structural stability for pedestrians.



Bioretention located in the right-of-way can treat runoff from the street or rooftops.



Permeable pavement in driveways allows runoff to infiltrate, reducing runoff volume and improving water quality, while providing a structurally stable surface for parking and reducing the overall impervious area.



Bioretention areas located between the curb and sidewalk can treat runoff from the street or adjacent parcel.



Permeable pavement in the parking lanes allows street runoff to infiltrate, reducing the volume and improving water quality, while providing a structurally stable parking surface.



Green Infrastructure practices use vegetation, soils, and natural processes to manage stormwater runoff by mimicking nature to absorb and store water. Integrating these practices into a site can reduce the area required for conventional stormwater management by incorporating treatment within landscaping features and surfaces that would otherwise be impervious. This can be a cost-effective approach to treating stormwater by making more efficient use of a site with the potential for reduced construction costs, increased property values, and greater revenue generation from the additional space made available.

For more information, visit <https://www.raleighnc.gov>, www.ces.ncsu.edu/wco/lidguidebook or contact RaleighStormwater@raleighnc.gov.

This fact sheet is intended to demonstrate multiple options for treating stormwater runoff on a site. Site designs must meet the requirements of the City of Raleigh and are subject to regulatory review.





The Pond

The Museum Park is a living laboratory for the exploration of art, contemporary design, and sustainable environmental management. This constructed landscape is designed to manage storm water flow from a 50-acre drainage area starting at the new West Building, housing the Museum's permanent collection of art, and flowing down to the Pond.

The landscape is designed to manage storm water flow from a 50-acre drainage area starting at the new West Building, housing the Museum's permanent collection of art, and flowing down to the Pond.



Site plan for the West Building, Museum Park, designed by [unreadable] and [unreadable].



Human interaction benefits the SCM
..... and SCM interaction benefits people.



MCADAMS

Allow SCM designers
to prioritize high
visibility locations?

ALWAYS ALLOW

Precise: On

QUESTIONS?



MCADAMS