Building Beautiful Resiliency: Parks, Ponds, and Pollutants

Martin Luther King, Jr. Park
Columbia, SC

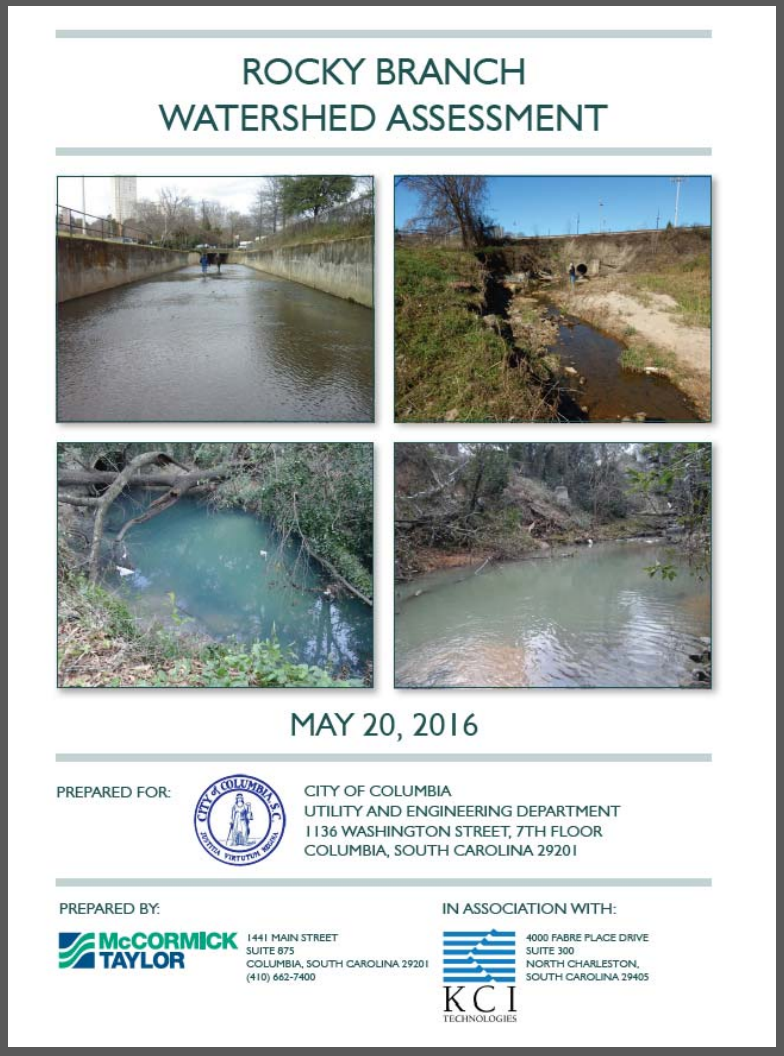
WOOLPERT
ARCHITECTURE | ENGINEERING | GEOSPATIAL

Columbia Water
Drinking Water • Wastewater • Stormwater

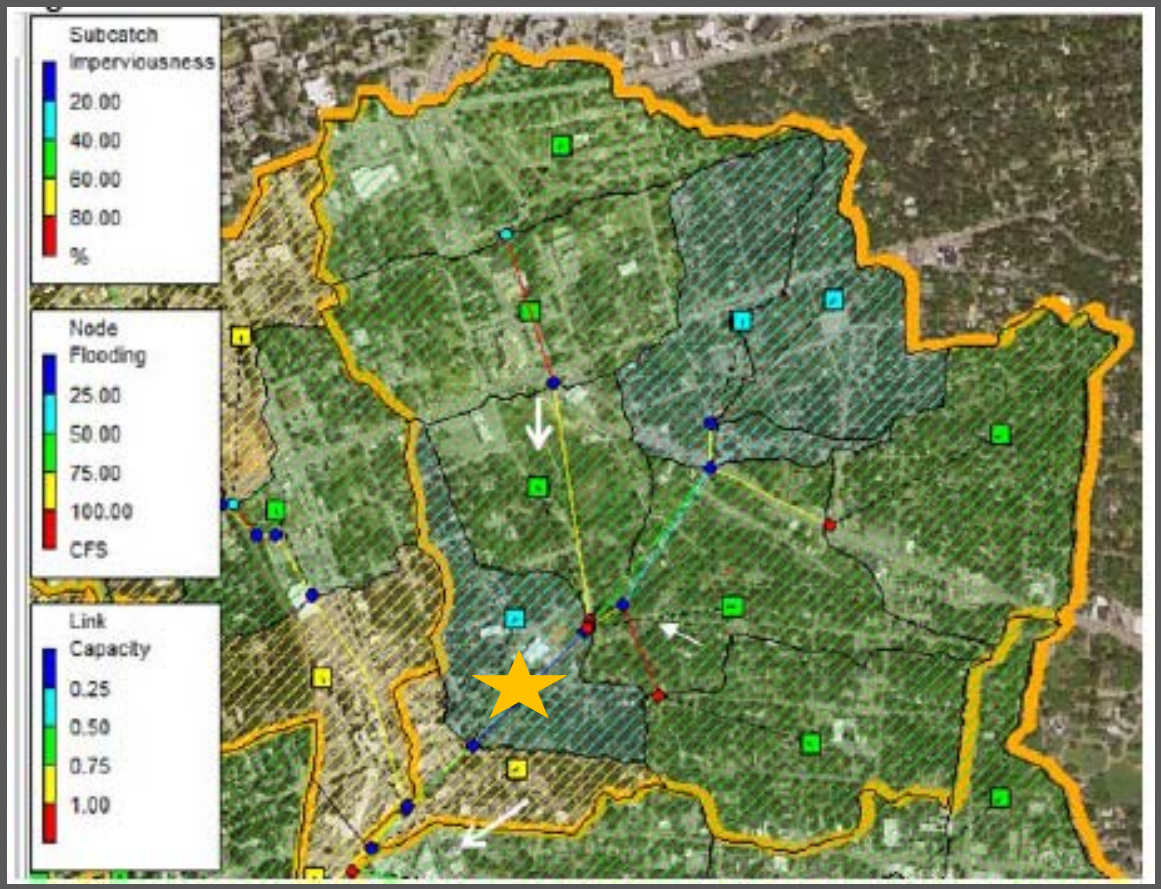
Presenters

Wesley Harrison, PE
City of Columbia, SC

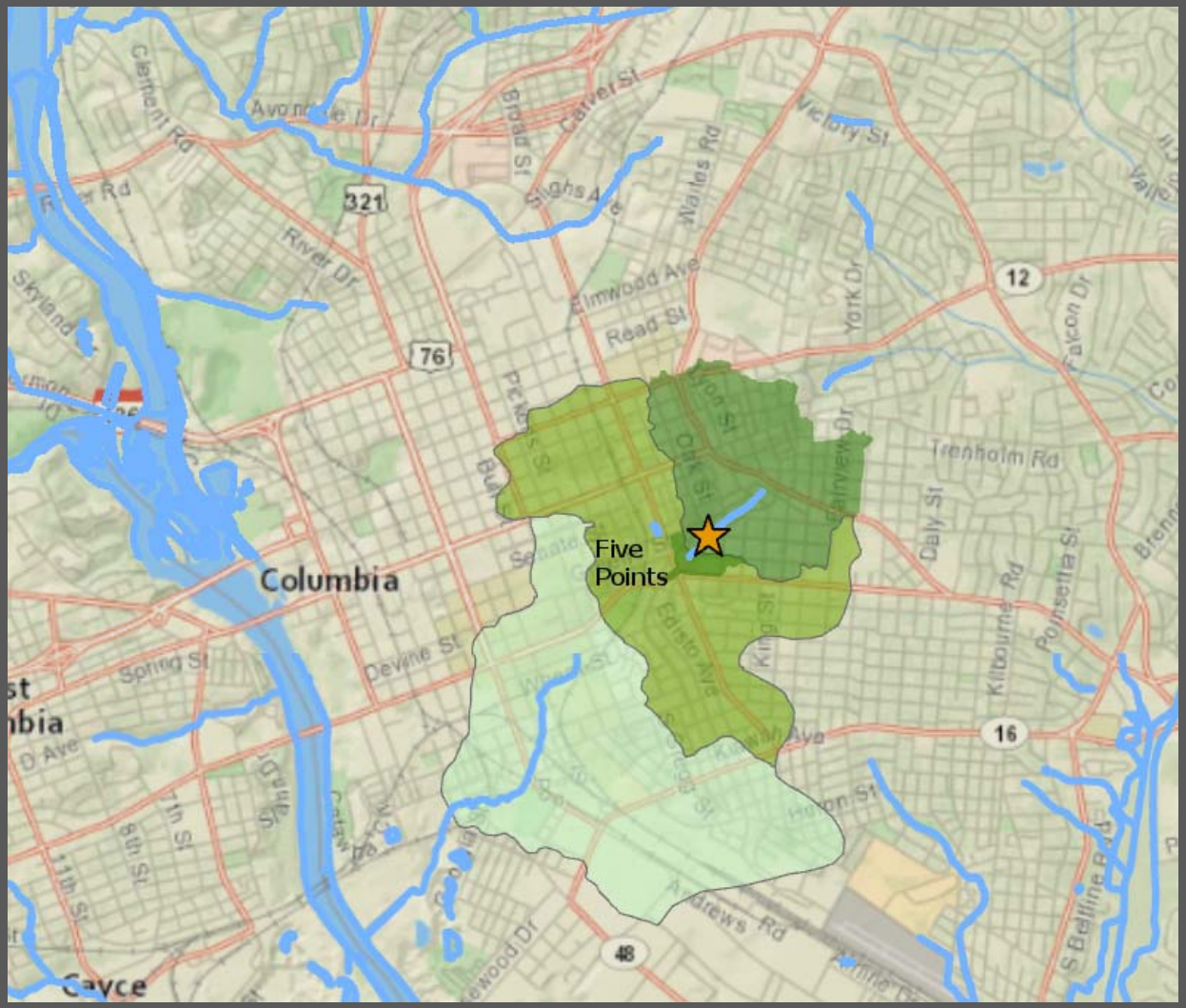
Molly Davis, EIT
Woolpert, Inc.



Rocky Branch Master Plan



SWMM Model of MLK Park Subwatershed



Project Location

- Urban Park
- Upstream of Five Points

https://www.experiencecolumbiasc.com/blog/post/your-guide-to-all-things-green-st-pats-in-five-points/

Park Background

- Popular entertainment spot
- Frequent Flooding

Pot O' Gold Playland at MLK Park
Columbia's Saint Patrick's Day Festival

Flooding at Businesses in Five Points

Photos taken after storm event in August 2016

Flooding at MLK Park

Photos taken after storm event in August 2016

Photo taken in April 2016

Project Overview and Goals

- Increase the stormwater storage capacity within the park
- Slow velocities within Rocky Branch during storm events
- Provide pollutant trapping
- Enhance functionality of park

Pre-construction Conditions – April 2016

Pre-construction Conditions – December 2017

Design Considerations

Design

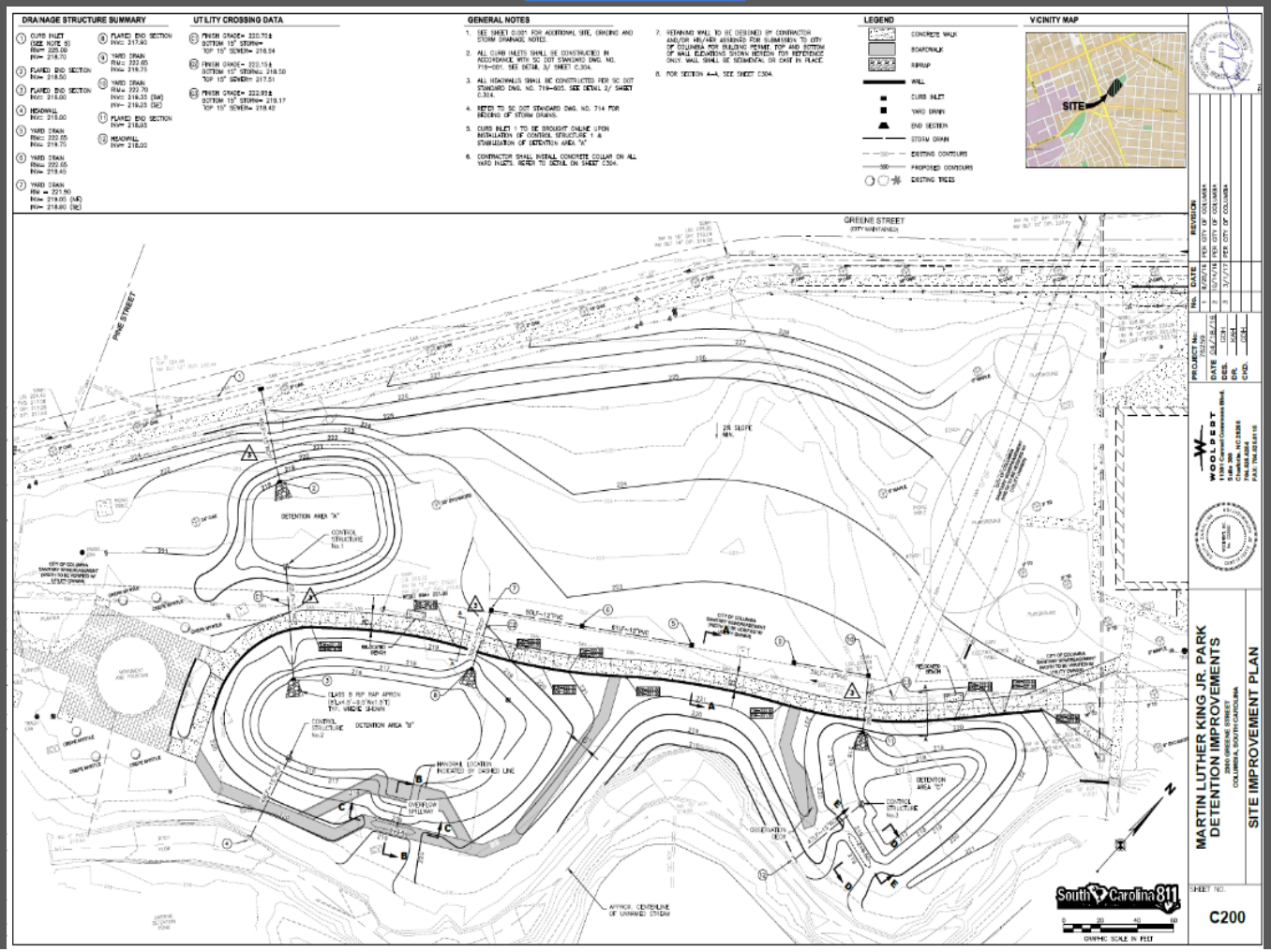

DRAINAGE STRUCTURE SUMMARY
UTILITY CROSSING DATA
GENERAL NOTES
LEGEND
VICINITY MAP
SITE
GREENE STREET
PINE STREET
DETENTION AREA "A"
DETENTION AREA "B"
MARTIN LUTHER KING JR. PARK
DETENTION IMPROVEMENTS
2900 GREENE STREET
COLUMBIA, SOUTH CAROLINA
SITE IMPROVEMENT PLAN
SHEET NO.
C200
South Carolina 811

Photo taken March 2019

Design

- Detention areas to increase storage volume and reduce flooding
  - 1.6 acre-ft increase in storage capacity for a 2 year, 24 hour storm (Small summer shower)
  - 2.06 acre-ft increase in storage capacity for a 10 year, 24 hour storm

During Construction

Photo taken May 2018

Photo taken September 2018

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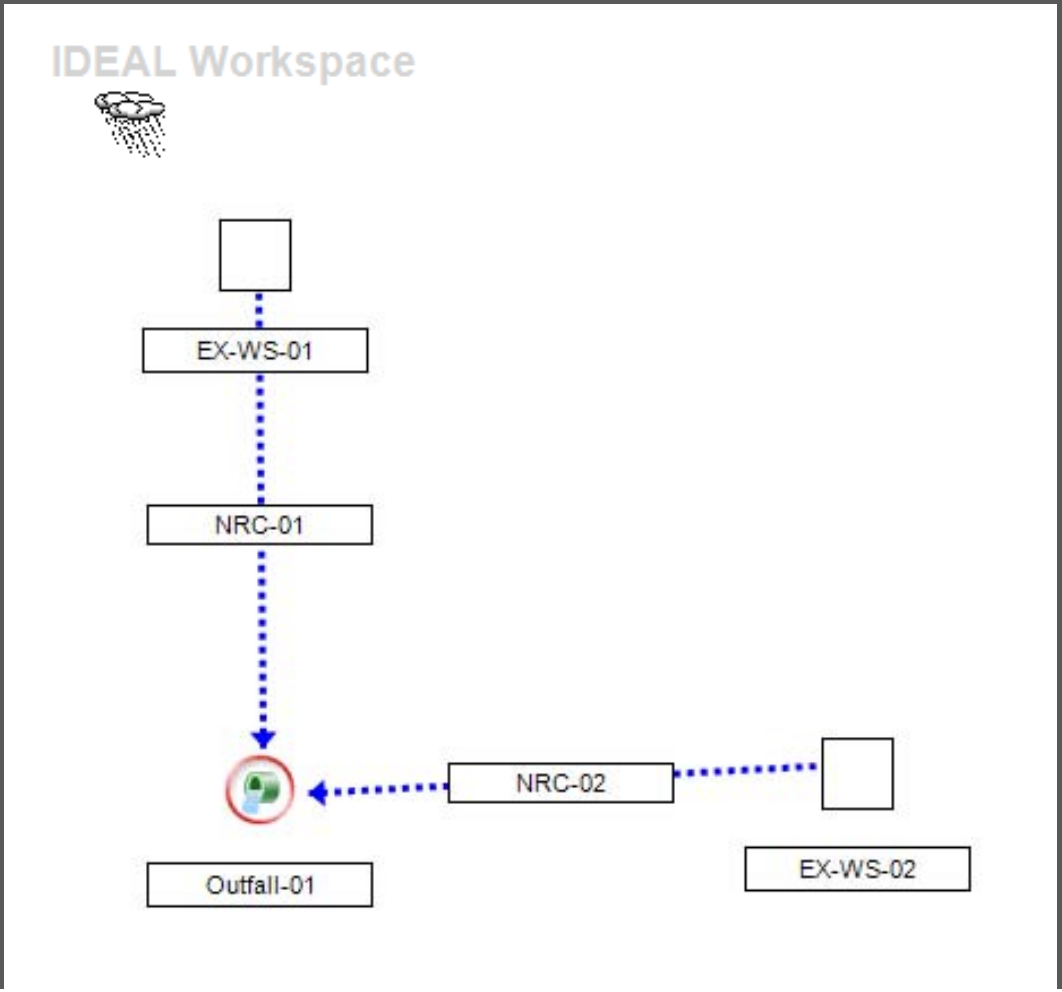
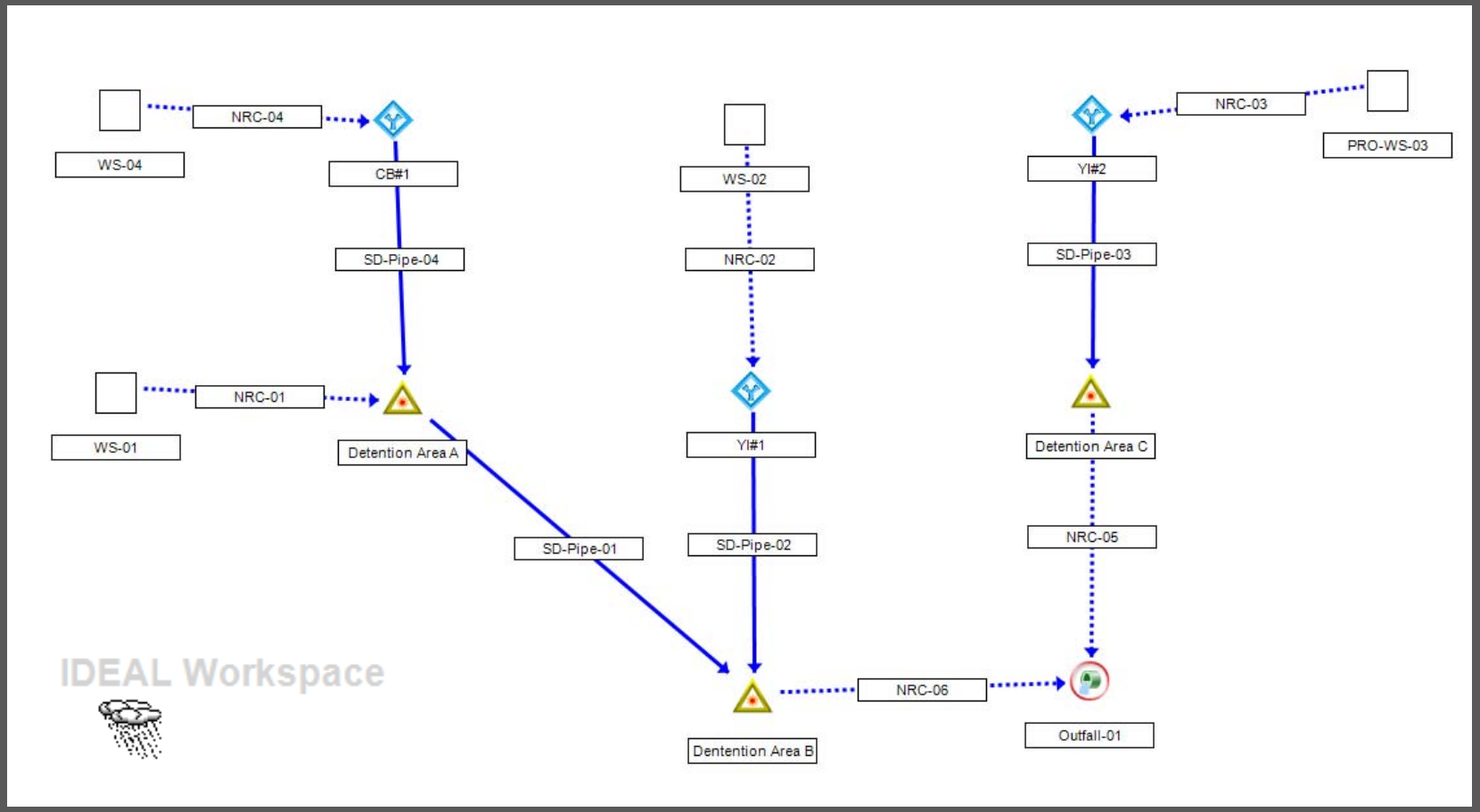
Final Design

Vegetative Plantings

IDEAL Model – Pre-Construction Conditions



IDEAL Model – Post Construction Conditions



Water Quality Benefits

OVERALL EFFICIENCY FOR ANNUAL STORM LOADINGS				
POLLUTANT	EXISTING	PROPOSED	POLLUTANT REMOVAL	EFFICIENCY (%)
Sediment (lbs)	297.6	12.1	285.5	95.9%
Nitrogen (lbs)	5.154	0.434	4.720	91.6%
Phosphorus (lbs)	0.6693	0.0589	0.6104	91.2%
Bacterial (cfu)	2.507E+11	1.451E+10	2.362E+11	94.2%

Functionality

- New path through park
- Greater access to Rocky Branch

Photo taken March 2019

Educational Component

https://www.pinterest.com/pin/474003929511520898/

Wetlands: Nature's Sponge and Filter

Helping to Protect the City's Rivers, Lakes, and Streams

How do wetlands work?

Wetlands are areas of land saturated with water either permanently or seasonally. The water is often groundwater, seeping up from an aquifer or spring. Wetlands are delineated by looking at 3 factors: ***hydrology***, ***plants***, and ***soil***. Wetlands provide many services. They filter pollutants from stormwater runoff, store water, and offer critical habitat for many plants and animals. They can be found along the ***boundaries of streams, lakes, ponds*** or even in ***large shallow holes*** that fill up with rainwater. ***Freshwater wetlands*** may stay wet all year long, or the water may evaporate during the dry season. The diagram shows the various types of vegetation associated with wetlands areas.

Zone 1

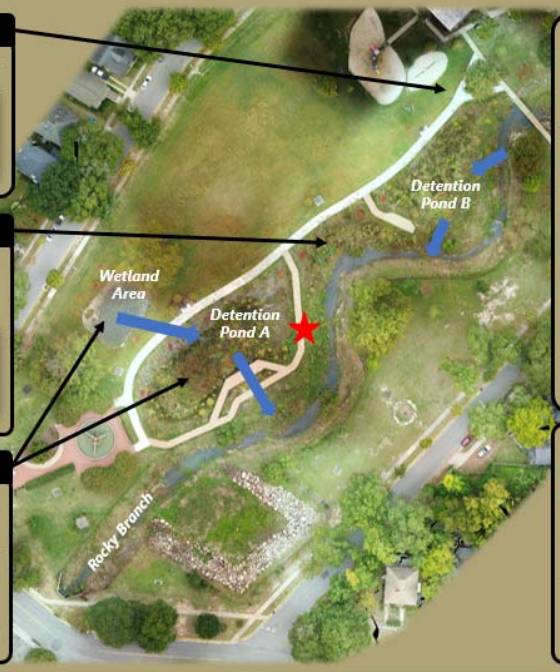
Upland vegetation is semi-wet and capable of surviving in an elevation of 1 foot above the normal pool.

Zone 2 & 3

Floodplain vegetation and ***streambank vegetation*** are key to streambank stabilization. These zones are subject to variable flooding, so vegetation can thrive in up to 4 feet of water and saturated soil conditions.

Zone 4

Wetland vegetation is typically not planned or planted. These plants will begin to colonize naturally in many locations and can sustain depths of up to 6 feet.



What do the park detention ponds do?

- To address these flooding issues in Five Points and enhance the appearance and purpose of the park, the City constructed "off-line" dry detention area to assist with storm water attenuation.
- The goal is to increase the overall storage capacity within the park, slow the velocities within the stream during storm events, and provide for pollutant trapping within the new storage areas.
- The detention area was also designed to be aesthetically pleasing and to enhance the purpose of the park.
- Rainfall runoff flows into the Wetland Area on the west side of the park where pollutants such as nitrogen and phosphorous are removed by the plants. Water then travels through an underground pipe into Detention Pond A where further pollutant settling occurs.
- During heavy rain events flood waters from Rocky Branch flows into Detention Ponds A and B helping to alleviate flooding downstream.

Why are native species important?

- Planting native species restores the availability of endangered species
- Introducing non-native species can decrease the biodiversity of an ecosystem
- Birds and other wildlife have evolved to depend on certain native species
- Native plants require less fertilizer, pesticides and even water!

Growing conditions right here in Columbia are perfect for these plants to thrive!

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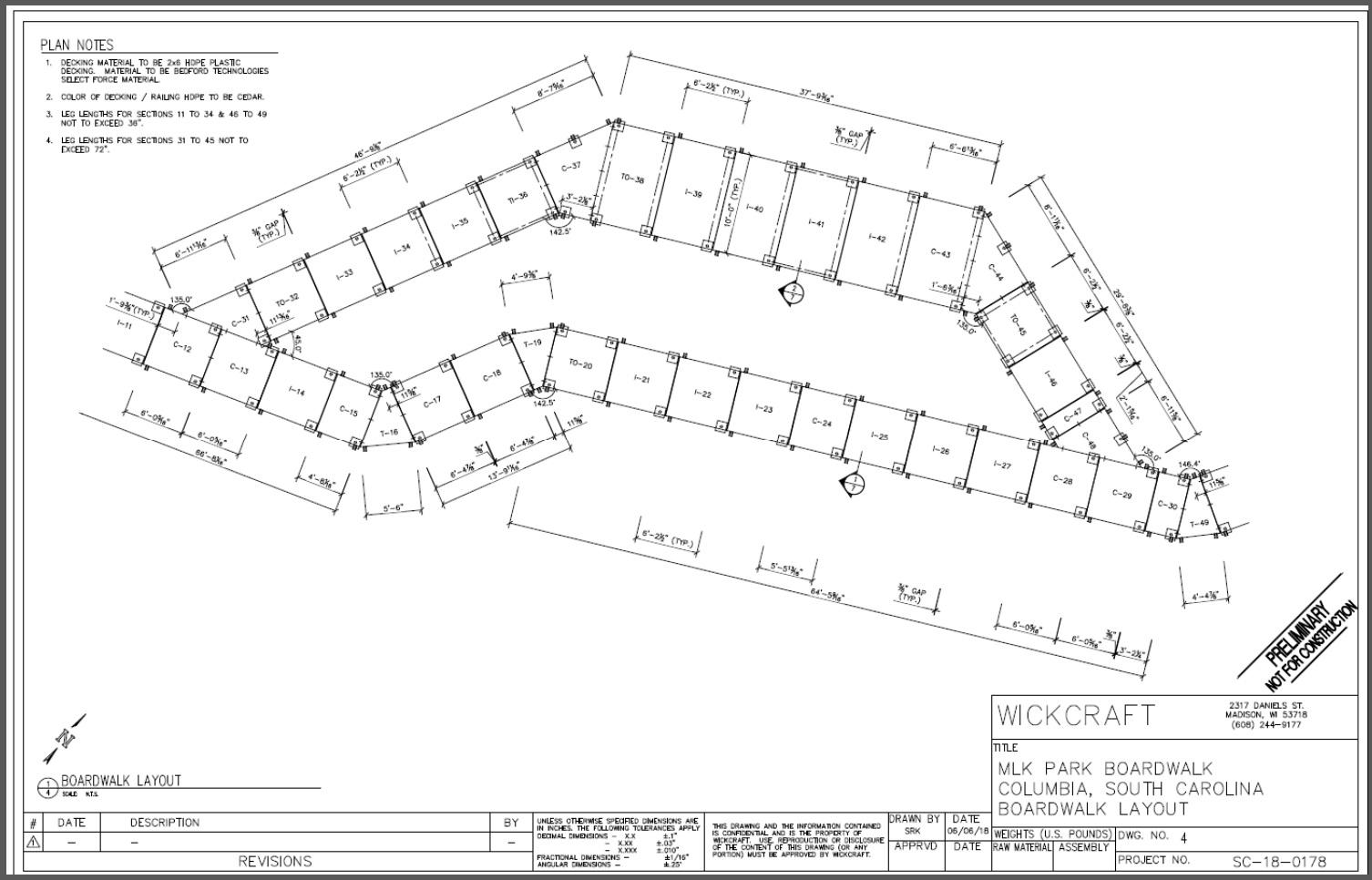
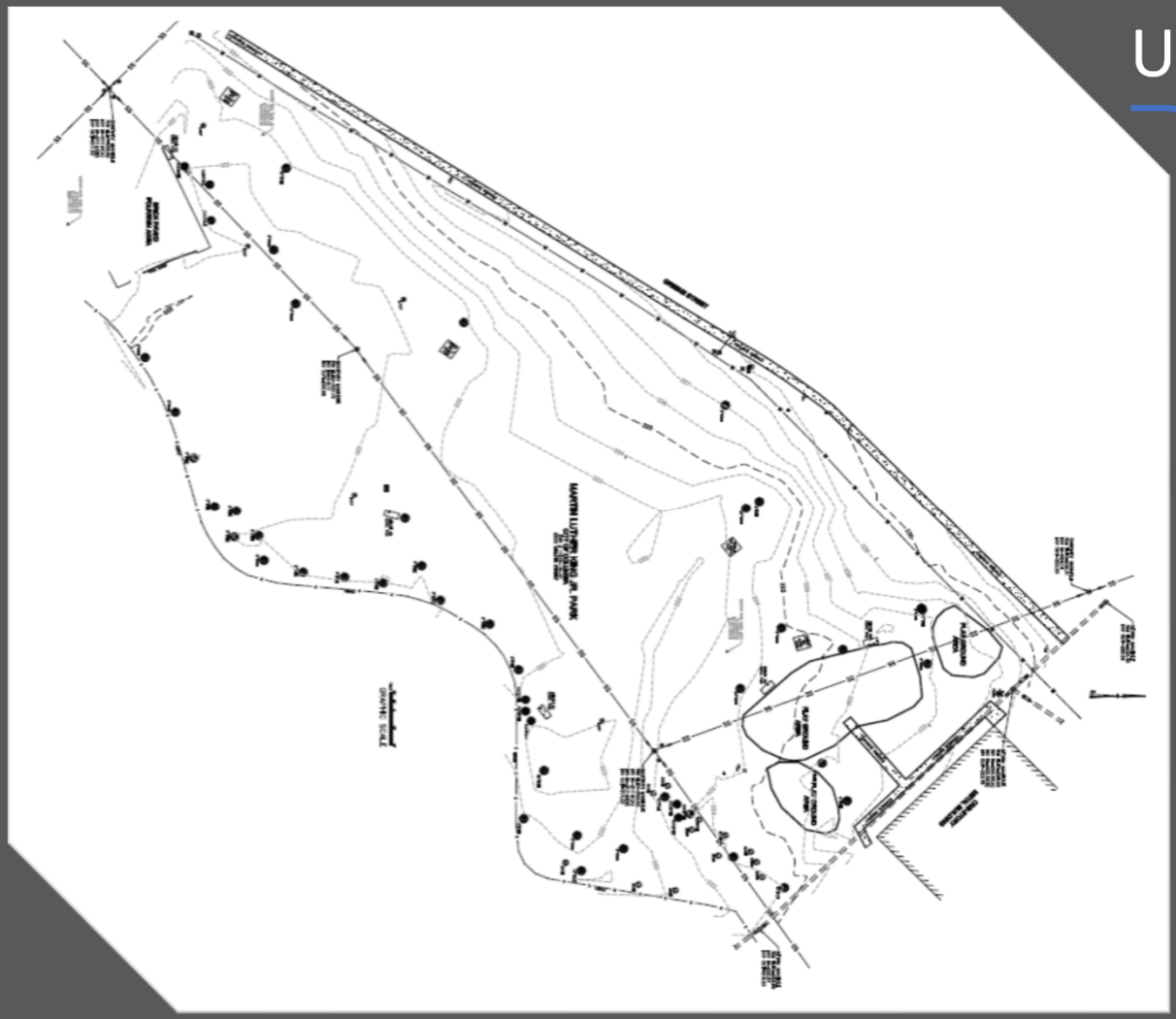
Unique Design Considerations

- Boardwalk
- Staking/anchoring to prevent boardwalk from washing downstream





Unique Design Considerations

- Existing sanitary sewer line running through the park

Photo taken April 2016

Photo taken June 2019 at the SCAWPA Conference

Award Winner

- South Carolina American Public Works Association Project of the Year Award Winner

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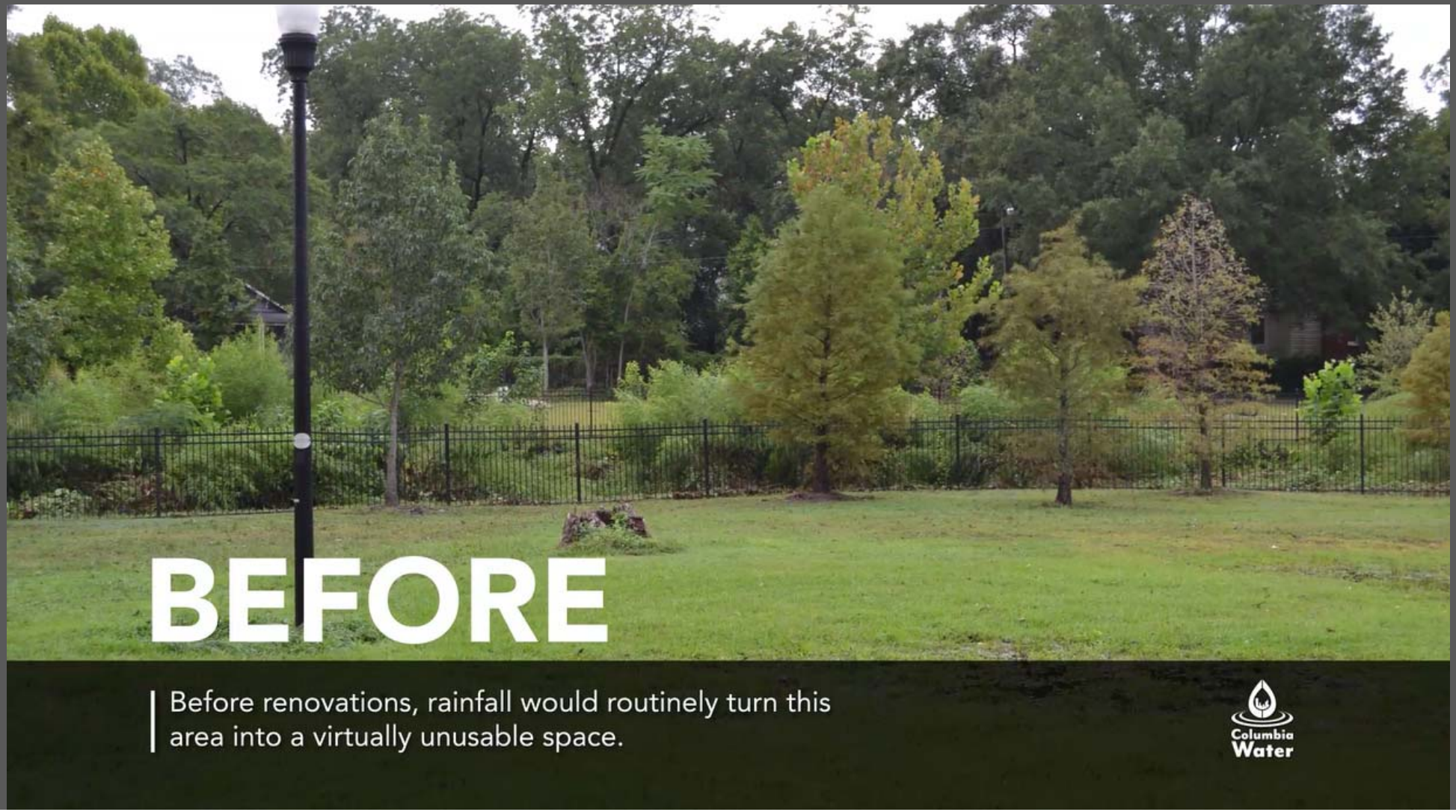

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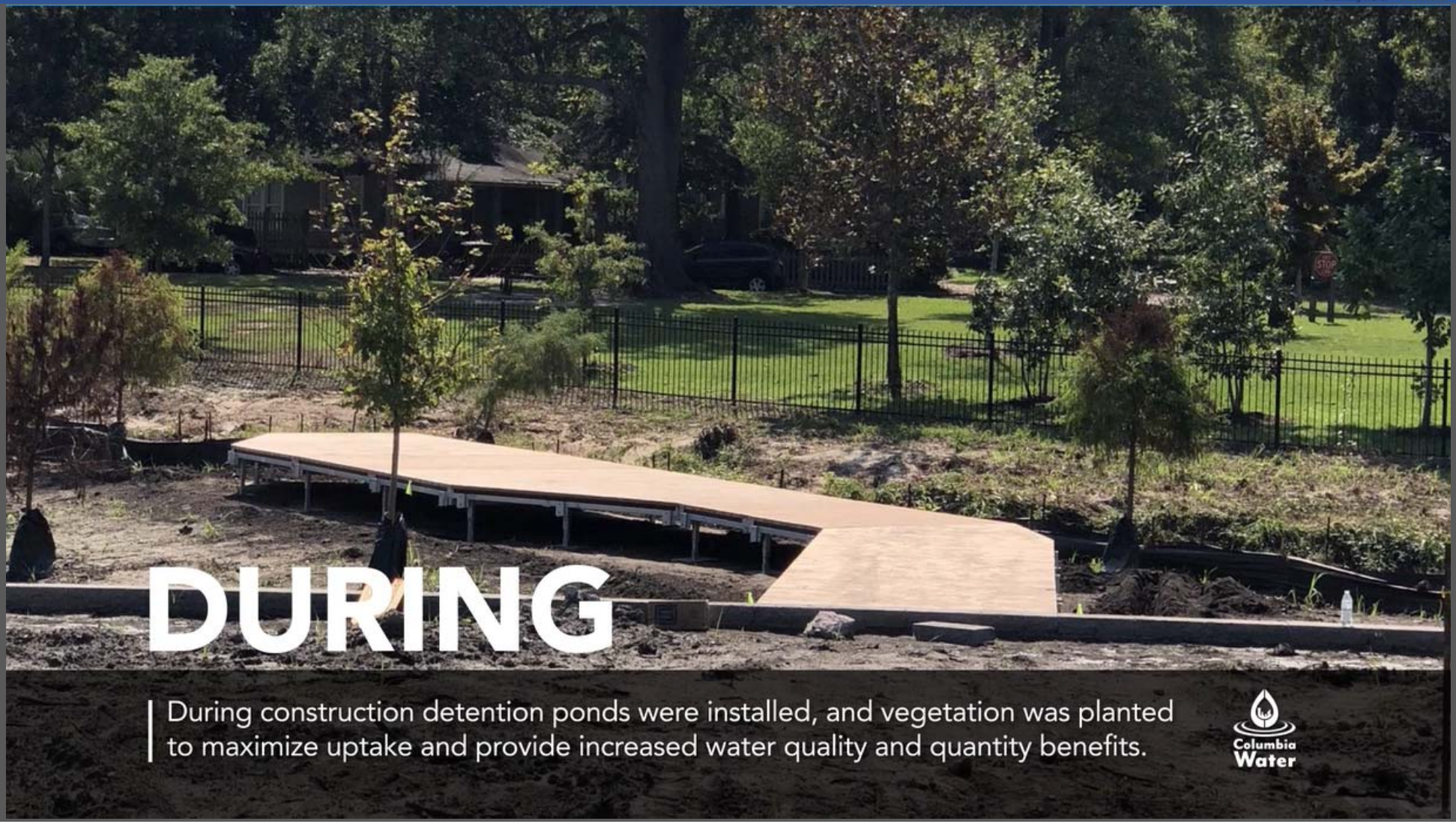

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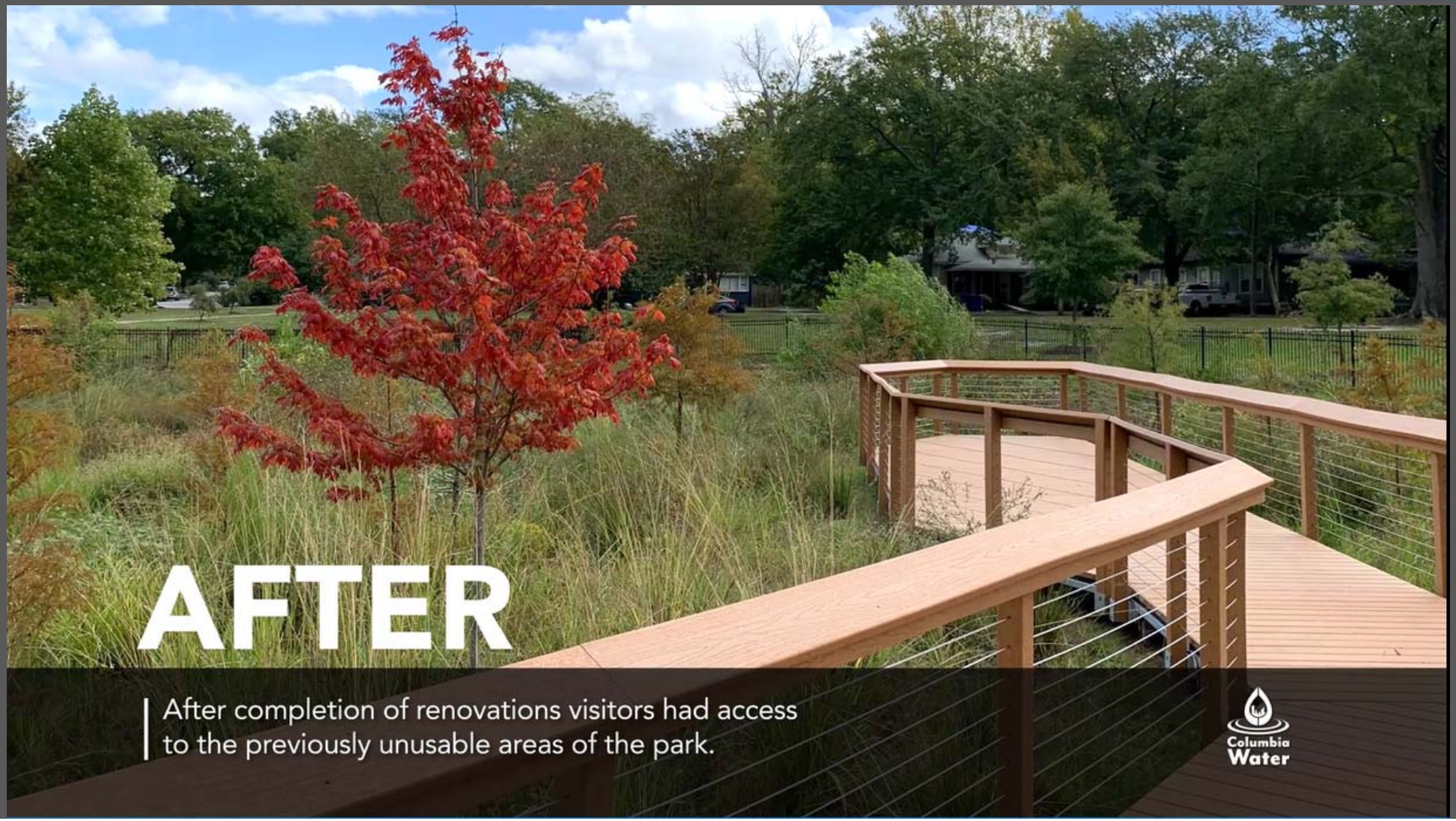

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Questions?