LILBURN CITY PARK GREEN INFRASTRUCTURE STORMWATER BMP DESIGN

Emma Highfield, EIT (GA) | October 5th, 2022

Gwinnett Water Resources

Lilburn GEORGIA Small town. Big difference.

Geosyntec consultants

Introduction

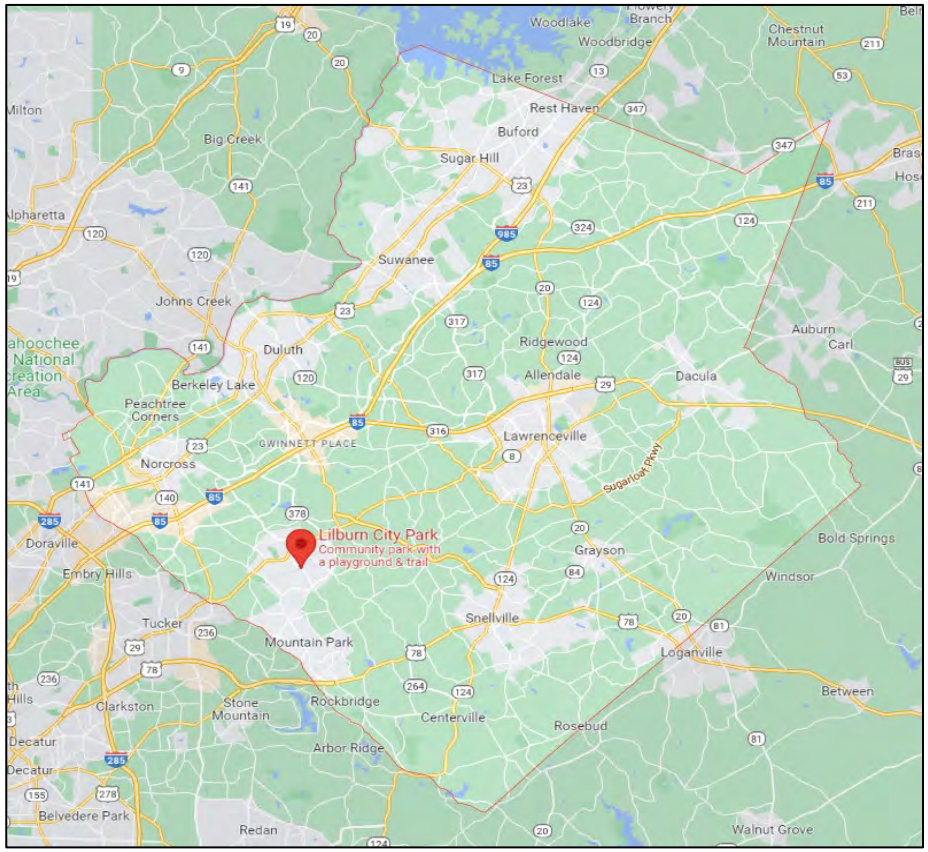
- Gwinnett County
  - 2nd most populous county in Georgia with approximately 1 million residents
  - Operates its own department of water resources, GCDWR, funded by a stormwater utility
  - Committed to increased utilization of Low Impact Development - Green Infrastructure (LID-GI) practices in managing stormwater
  - Has an in-house Watershed Improvement Program (WIP)

Image Source:
https://www.knowatlanta.com/counties/gwinnett

Introduction

- WIP Goals:
  - Protecting and improving the water quality and aquatic habitat in the County's rivers, streams, and other surface water bodies
  - Implementing new and retrofit LID-GI practices
  - Developing design and guidance/performance standards for stormwater best management practices (BMPs)
  - Demonstrating to stakeholders that LID-GI practices are feasible/cost effective

Overview

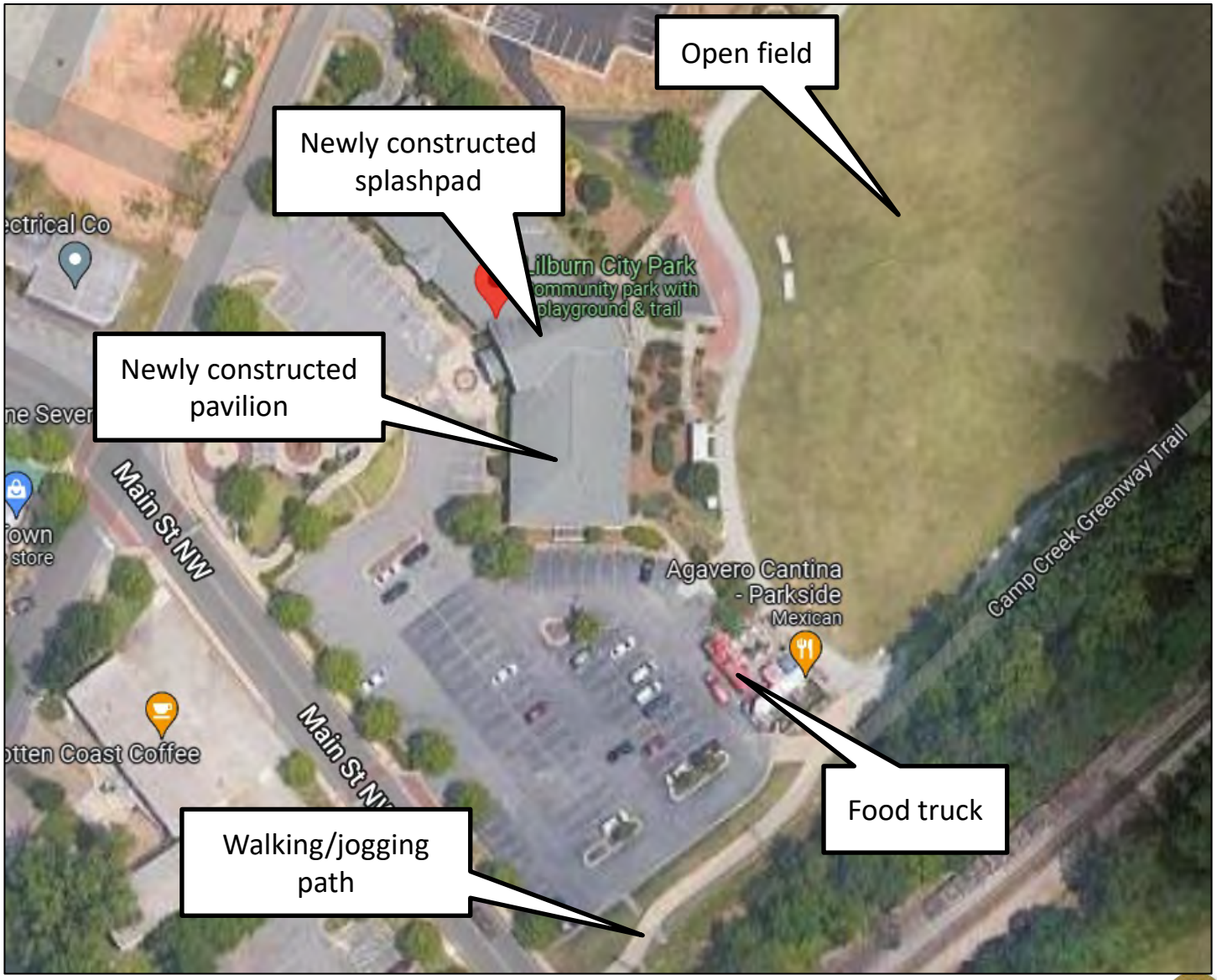


- GCDWR actively working to install LID-GI retrofits at county-owned properties, i.e., parks and libraries
- Multiple consulting firms work with GCDWR under a demand services contract for design and implementation of GI retrofit projects
- Geosyntec has worked with GCDWR on the following LID-GI Stormwater BMP retrofit projects:
  - F. Wayne Hill Operations Center (Buford, GA)
  - Dacula Park (Dacula, GA)
  - Duncan Creek Park and Library (Dacula, GA)
  - Yellow River Water Reclamation Facility (Lilburn, GA)
  - Lilburn City Park (Lilburn, GA)

Project Description

- While City of Lilburn is project owner, GCDWR manages and maintains the City's storm drainage systems
  - Allows City to take advantage of GCDWR's LID-GI BMP retrofits
- Lilburn City Park parcel is approximately 10 acres and provides:
  - Walking/jogging path
  - Playground
  - Open field
  - Semi-permanent food truck
  - Newly constructed pavilion and splash pad

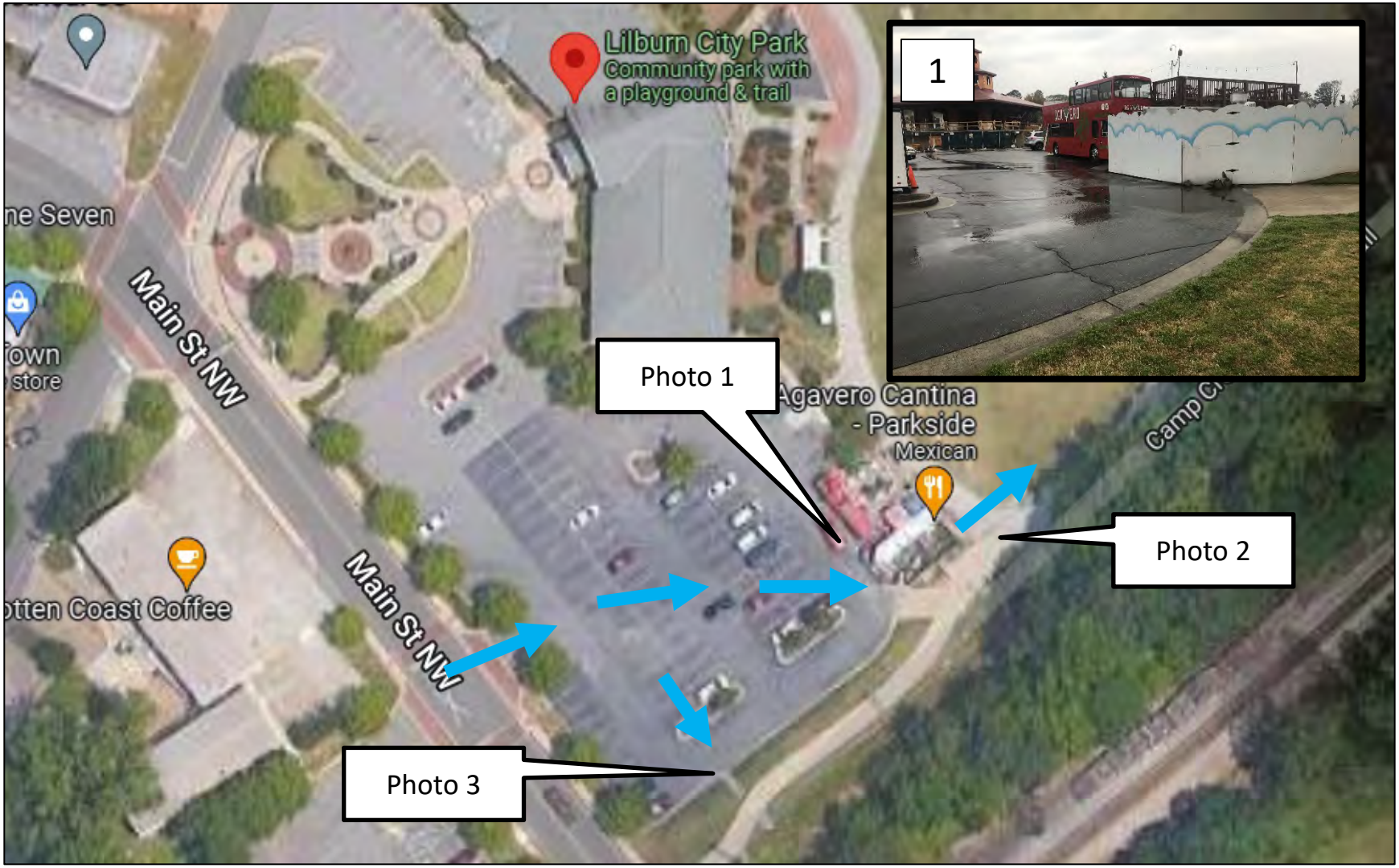
Project Description



Project Description

- Flooding issues at and around the food truck from stormwater run-on into the parking lot
- Sediment accumulation in a concrete flume draining southern portion of parking lot
- City and GCDWR sought to address issues through a combination of grey and green infrastructure

Project Description



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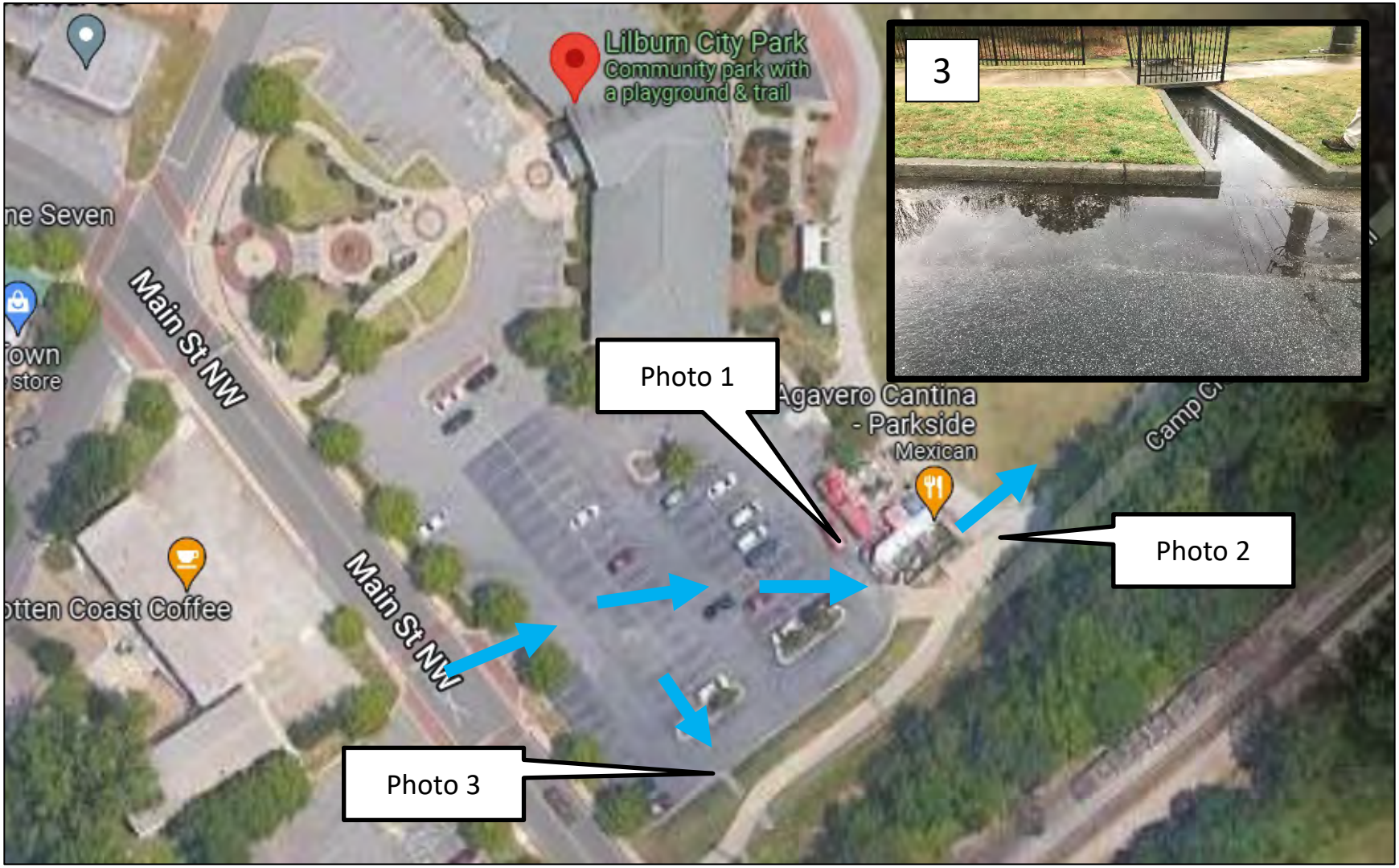


Feasibility Study

Proposed Pervious Concrete Area #1

Proposed Pervious Concrete Area #2

Proposed Bioretention Area

PERVIOUS CONCRETE #1
SLOPED-BOTTOM
GRAVEL RESERVOIR
2-FT MIN. THICK
AREA = 1,286 SF

CATCH BASIN TIE-IN
INV IN = 880.37

37 LF OF 18"
RCP @ 1.2%

MANHOLE
RIM EL = 887.66
INV IN (A) = 880.81
INV IN (B) = 883.66
INV OUT = 880.81

90 LF OF 6" PVC
PIPE @ 2.0%

6" CONCRETE
STRIP (TYP)

6" PVC
PERFORATED PIPE

66 LF OF
18" RCP
@ 1.2%

GRATE INLET
RIM EL = 886.66
INV IN (A) = 881.61
INV IN (B) = 882.69
INV OUT = 881.61

6" PVC
PERFORATED
PIPE

36 LF OF 4" PVC
PIPE @ 1.0%

PERVIOUS CONCRETE #1
DRAINAGE AREA = 8,424 SF
IMPERVIOUS AREA = 7,832 SF
PERVIOUS AREA = 592 SF
BMP AREA = 3,220 SF

PERVIOUS CONCRETE #1
FLAT-BOTTOM GRAVEL
RESERVOIR
ELEV = 885.04
AREA = 1,934 SF

PERVIOUS CONCRETE #2
SLOPED-BOTTOM
GRAVEL
RESERVOIR
EL = 883.79
AREA = 2,740 SF

6" CONCRETE
STRIP (TYP)

6" CONCRETE
CURB (TYP)

OVERFLOW
INV OUT = 881

92 LF OF 6" PVC
PIPE @ 1.2%

BIORETENTION AREA
BOTTOM ELEV = 885.89
TOP ELEV = 886.64
PONDING AREA = 653 SF

BIORETENTION AREA
DRAINAGE AREA = 4,482 SF
IMPERVIOUS AREA = 3,048 SF
PERVIOUS AREA = 1,434 SF
BMP AREA = 1,339 SF

3-FT WIDE CURB
CUT WEIR (TYP OF 3)

NOTES:

1. TOPOGRAPHY AND BACKGROUND SITE *PLANIMETRICS FROM TOPOGRAPHIC* SURVEY OF LILBURN CITY PARK PREPARED BY COLUMBIA ENGINEERING, DATED 4/30/21.

LEGEND

PROPOSED PERVIOUS CONCRETE (FLAT-BOTTOM)

PROPOSED PERVIOUS CONCRETE (SLOPED-BOTTOM)

PROPOSED BIORETENTION AREA

DRAINAGE AREA BOUNDARY

APPROXIMATE PHOTO LOCATION AND ORIENTATION

N

SCALE IN FEET

NOT FOR CONSTRUCTIO

Geotechnical Survey – Infiltration Rates

- Geotechnical survey performed by United Consulting
- Geosyntec initially modeled BMPs with no anticipated infiltration in subgrade soils
- Results indicated subgrade below BMPs will have some infiltration

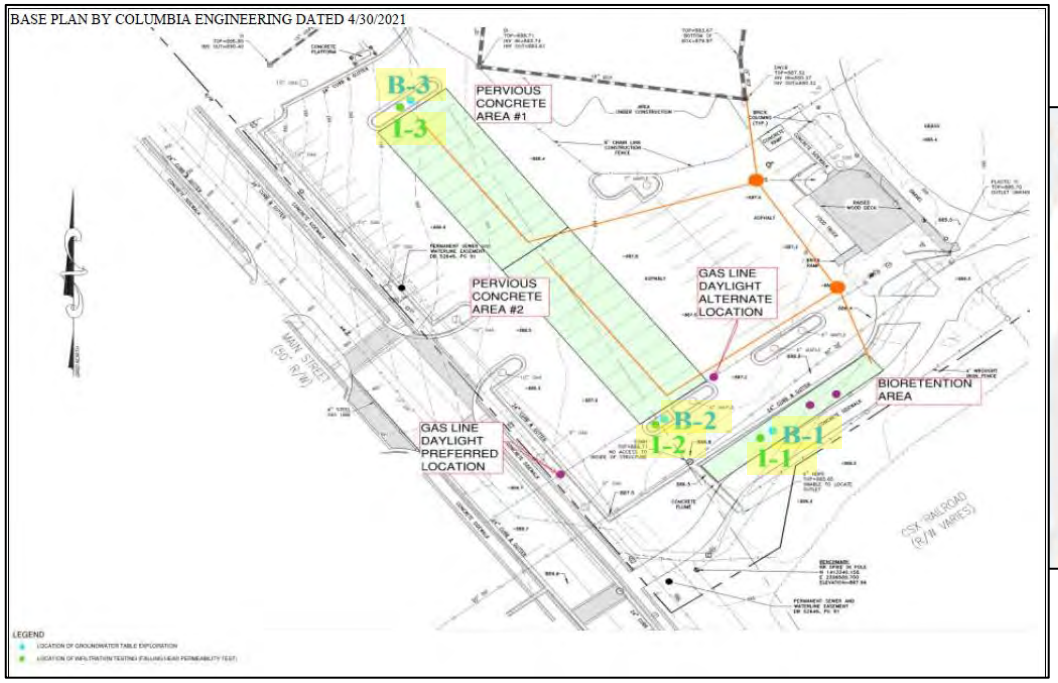
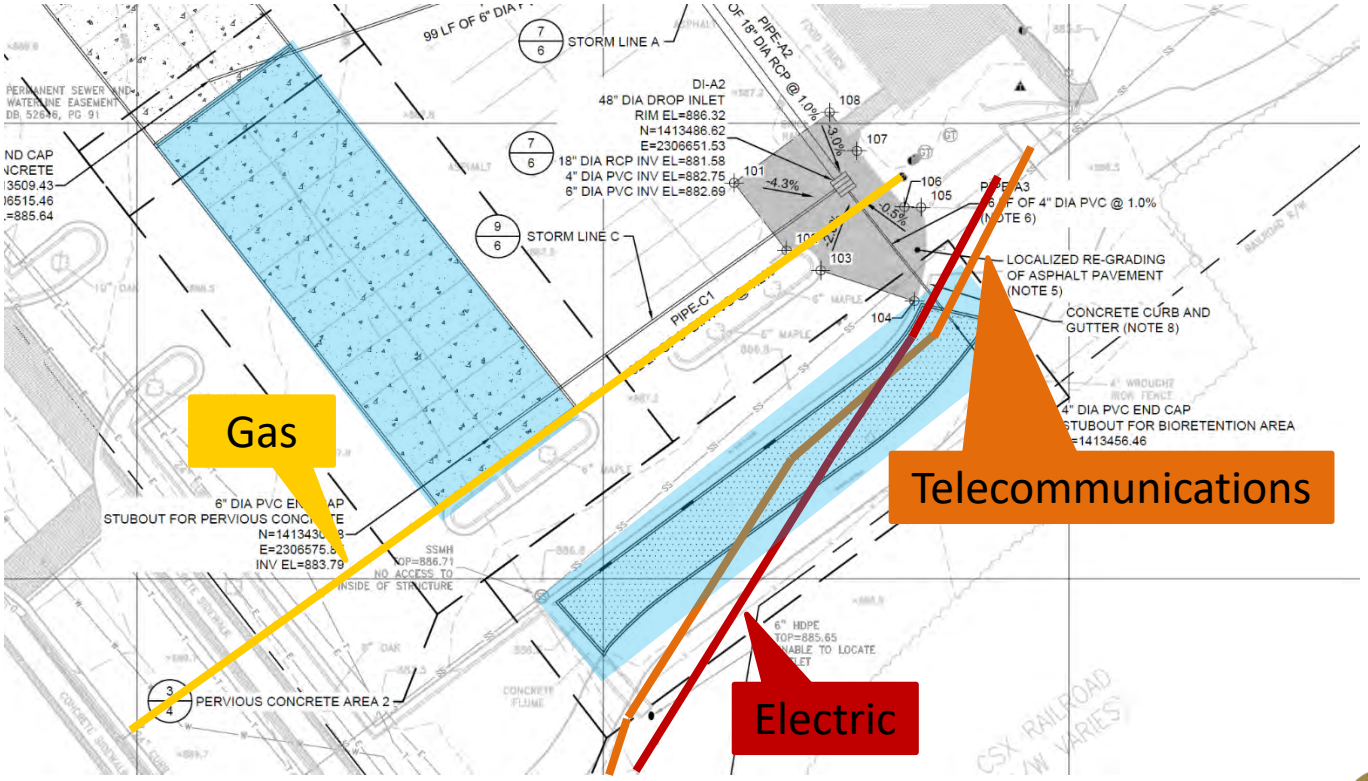


Table 1 – Summary of Infiltration Rates

Boring Number	Depth (feet)	Average Infiltration rate in/hr (ft/day)	Soil Description	Comment
B-1	2.5	Took 26 gal in one hour	Sand-significant gravel clayey, some silt, trace mica and root hair	Infiltration rate is not reliable due to significant gravel from about 1.5 to below 2.5 feet
B-1	5	0.24 (0.48)	Sand-clayey, some silt, trace mica and roots	-
B-2	2.5	0.07 (0.14)	Sand-clayey, some silt, trace mica, gravel, and wood fragments	-
B-2	5	0.26 (0.52)	Sand- some clay and silt, trace gravel and root hair	-
B-3	2.5	0.03 (0.06)	Sand-some silt and clay, trace	-
B-3	5	0.06 (0.12)	Sand-some silt and clay, trace	-

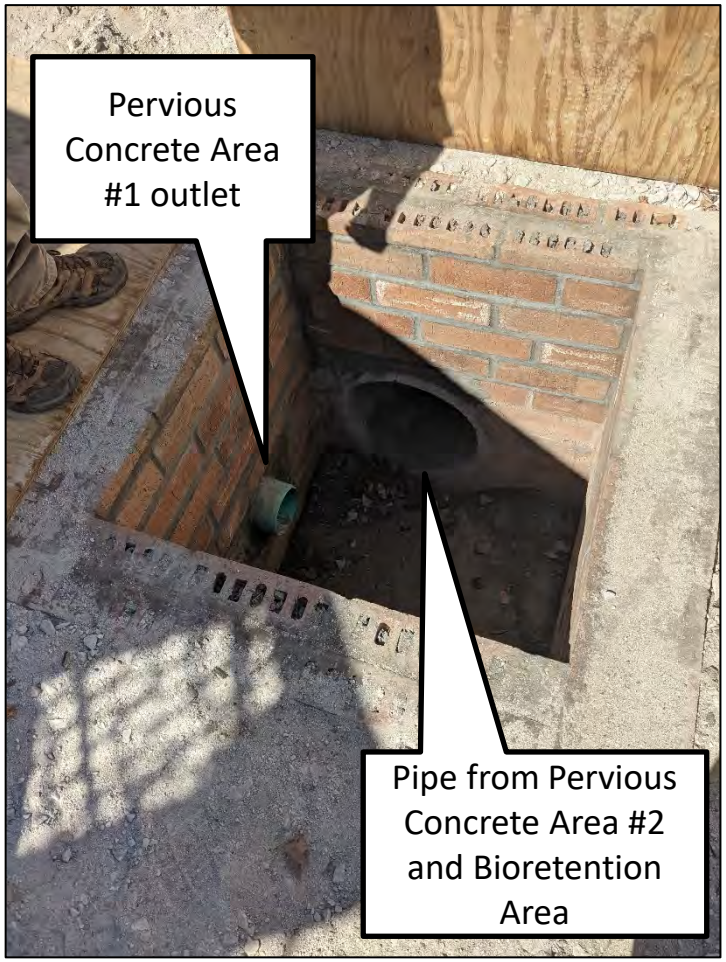
Geotechnical Survey – Utility Conflicts

- Discovered utility conflicts at Pervious Concrete Area #2 and Bioretention Area
- In response, adjusted footprints and depths of respective BMPs

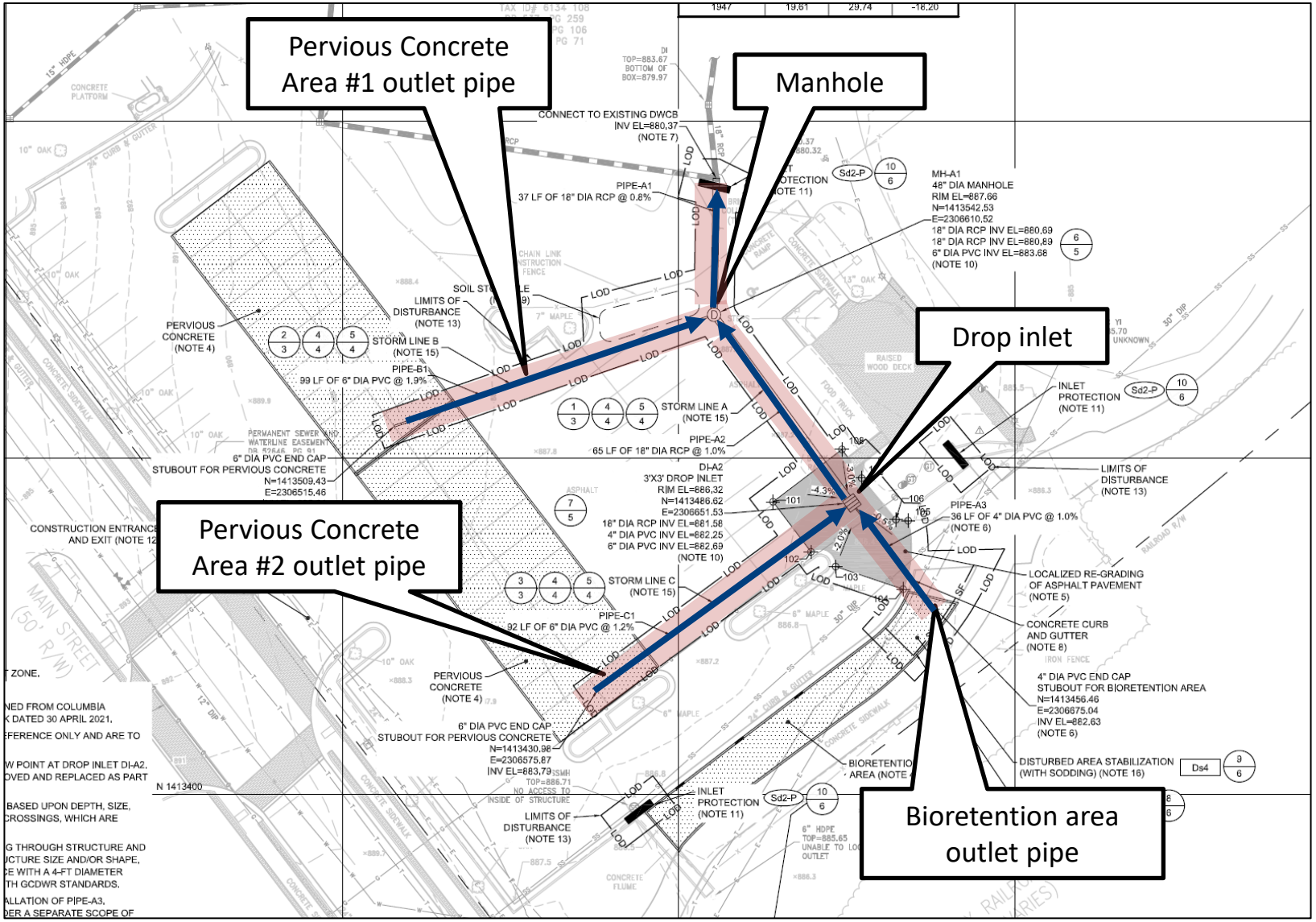


Design & Construction - Project Schedule

- Design and construction for grey infrastructure completed separately to minimize disruption to parking lot
  - Geosyntec prepared 30% and 100% design drawings
  - Construction completed between September and November 2021
  - BMP outlet pipes also installed during this time
- Geosyntec prepared 30%, 60%, 90%, and 100% design drawings for green infrastructure
  - Construction completed between February and May 2022



Design & Construction - Project Schedule



Design & Construction - Technical Challenges and Lessons Learned

Unknown Soil Conditions

- Unfavorable soil conditions discovered during grey infrastructure installation
  - Non-suitable materials and debris mixed into soil
- Revised backfilling approach to ensure pipes would be atop suitable soils and stone
  - Over-excavated trench and filled with additional aggregate

Minimizing Disruptions

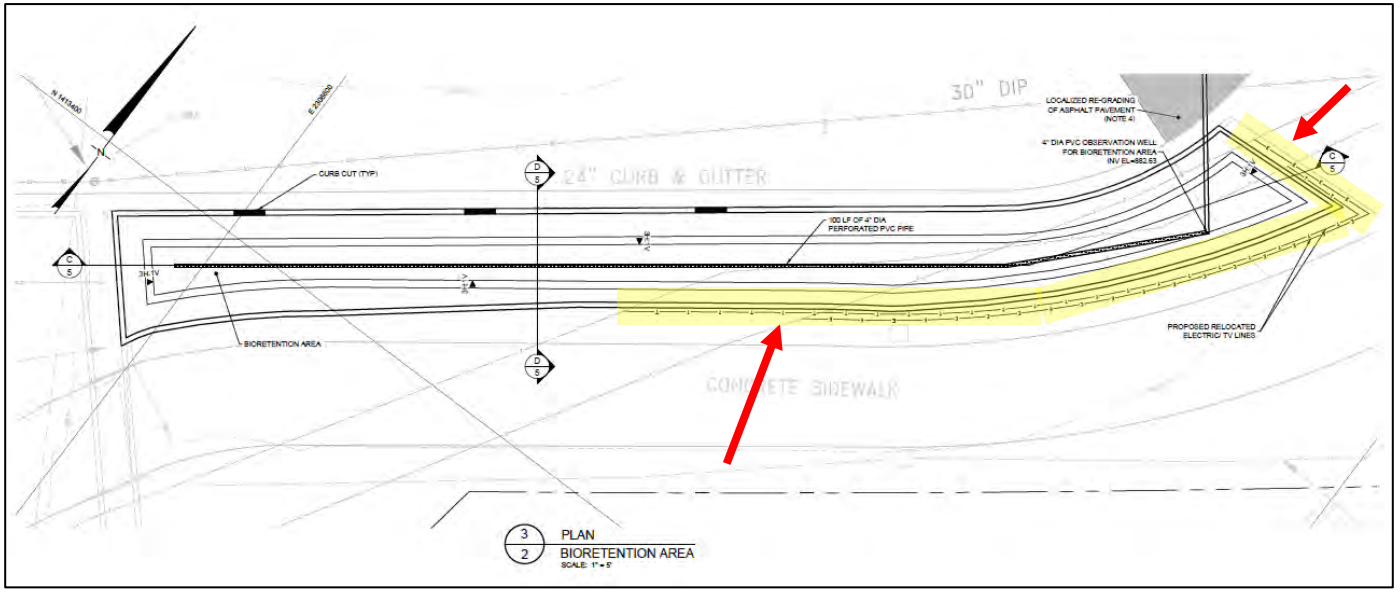
- Park hosts several public events throughout the year
- Aimed to complete construction prior to nicer weather of spring and summer when Park usage would increase
- Event schedule shared with contractors upfront so that construction footprint would be minimized when events occurred
- Kept Lilburn informed of construction status

2022 EVENT SCHEDULE

Event Name	Event Date	Time	Location
Lilburchaun Parade	3/12/22	3-5pm	Lilburn City Park
Spring Cornhole League	3/24/22	6:45-9pm	Lilburn City Park
Spring Cornhole League	3/31/22	6:45-9pm	Lilburn City Park
Spring Cornhole League	4/14/22	6:45-9pm	Lilburn City Park
Spring Cornhole League	4/21/22	6:45-9pm	Lilburn City Park
Great American Cleanup	4/23/22	8am-11am	City Hall Parking lot
Spring Cornhole League	4/28/22	6:45-9pm	Lilburn City Park
Spring Cornhole League	5/5/22	6:45-9pm	Lilburn City Park
Food Truck Tuesday	5/10/22	6pm - 9pm	Lilburn City Park
Spring Cornhole League	5/12/22	6:45-9pm	Lilburn City Park
Community Yard Sale	5/14/22	9am - 1pm	Railroad parking lot
Spring Cornhole League	5/19/22	6:45pm-9pm	Lilburn City Park
Rock the Park	6/4/22	7 - 9:30 pm	Lilburn City Park
Summer Cornhole League	6/9/22	6-8pm	Lilburn City Park
Food Truck Tuesday	6/14/22	6pm - 9:00pm	Lilburn City Park
Summer Cornhole League	6/16/22	6-8pm	Lilburn City Park
Summer Cornhole League	6/23/22	6-8pm	Lilburn City Park
Summer Cornhole League	6/30/22	6-8pm	Lilburn City Park
Sparkle in the Park	7/4/22	5:30pm -10pm	Lilburn City Park
Summer Cornhole League	7/7/22	6-8pm	Lilburn City Park
Food Truck Tuesday	7/12/22	6pm - 9pm	Lilburn City Park
Summer Cornhole League	7/14/22	6-8pm	Lilburn City Park
Summer Cornhole League	7/21/22	6-8pm	Lilburn City Park
Summer Cornhole League	7/28/22	6-8pm	Lilburn City Park
National Night Out	8/2/22	6-8:30pm	Lilburn City Park
Food Truck Tuesday	8/9/22	6pm -9pm	Lilburn City Park
Fall Cornhole League	9/1/22	6-8pm	Lilburn City Park
Rock the Park	9/10/22	7pm - 9:30pm	Lilburn City Park
Food Truck Tuesday	9/13/22	6pm - 9pm	Lilburn City Park
Fall Cornhole League	9/8/22	6-8pm	Lilburn City Park
Fall Cornhole League	9/15/22	6-8pm	Lilburn City Park
Community Yard Sale	9/24/22	9am -1pm	Railroad parking lot
Fall Cornhole League	9/22/22	6-8pm	Lilburn City Park
Fall Cornhole League	9/29/22	6-8pm	Lilburn City Park

Relocating Utilities

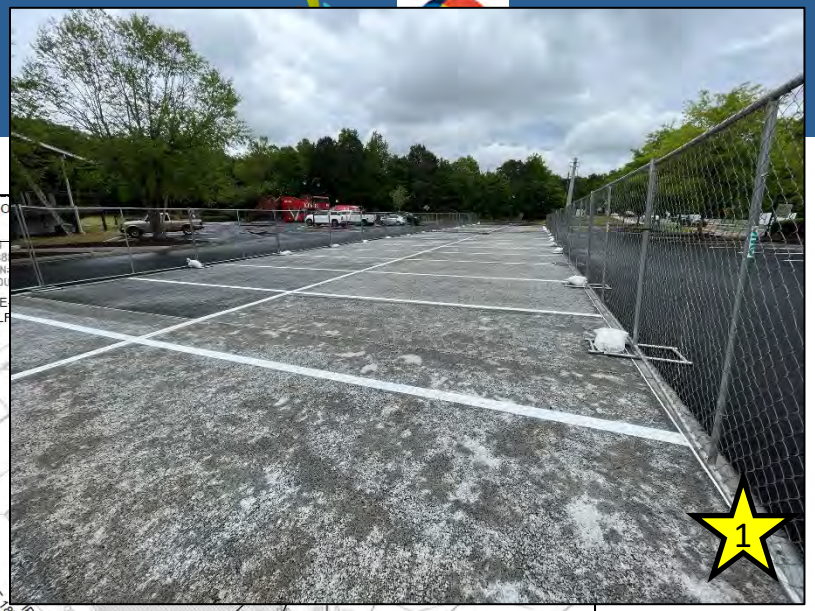
- As discovered during geotechnical investigation, telecommunication and electric lines located in bioretention area footprint
- Coordinating with utilities to relocate lines involved determining utility ownership and scheduling relocation



Quality Control

- High demand for concrete and limited supply of materials and drivers
- Delays between pervious concrete deliveries led to quality concerns regarding some of the pervious concrete panels
- Replaced panels identified with concerns
- Will monitor performance of other panels during high-traffic period of summer

Post-Construction



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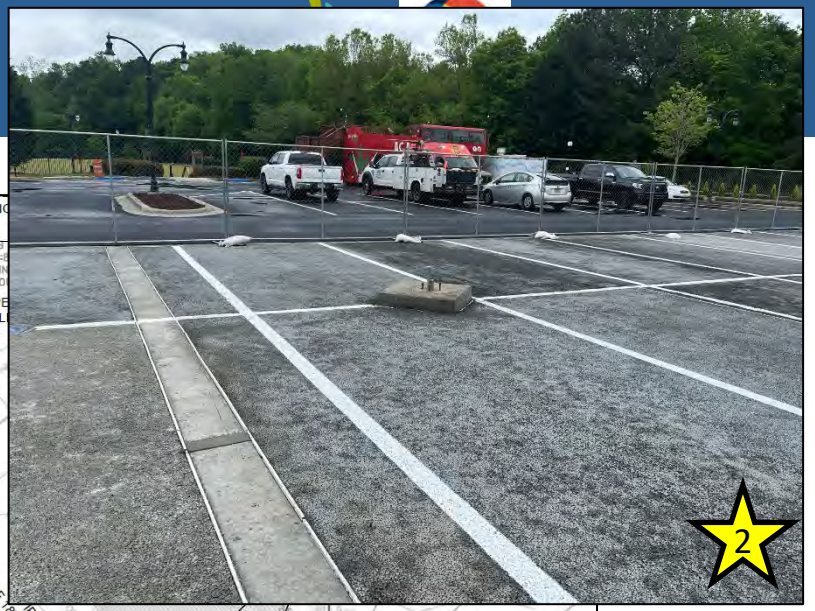
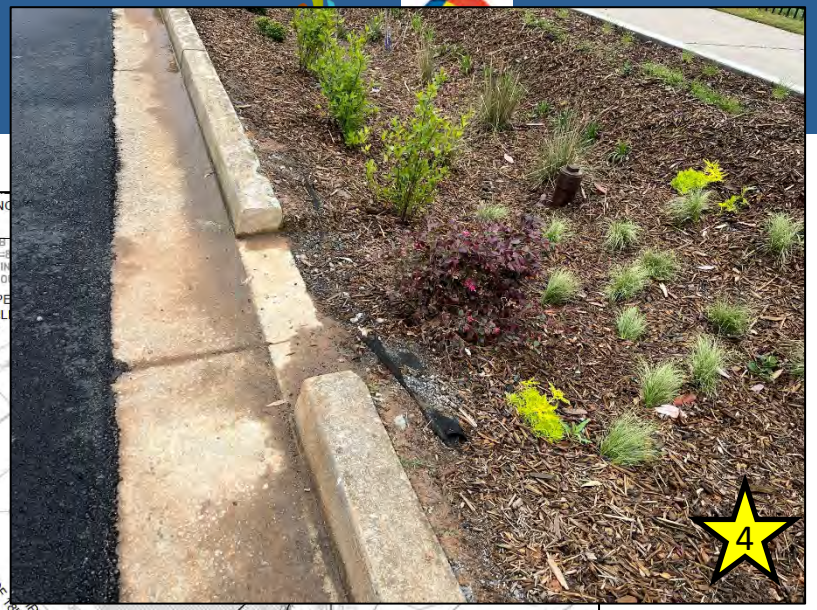


Post-Construction

PROPOSED LIGHT POLE (TYP) (BY CITY'S ELECTRICAL CONTRACTOR)
PROPOSED ELECTRIC LINE (TYP) (BY CITY'S ELECTRICAL CONTRACTOR)
MH-A1
48" DIA MANHOLE
RIM EL=887.66
N=1413542.53
E=2306610.52
18" DIA RCP INV EL=880.69
18" DIA RCP INV EL=880.89
6" DIA PVC INV EL=883.68
INV EL = 880.37 (NOTE 7)
18" RCP
STORM LINE B
PIPE-B1
99 LF OF 6" DIA PVC @ 1.9%
STORM LINE A
65 LF OF 18" DIA RCP @ 1.0%
PIPE-A2
DI-A2
3'X3' DROP INLET
RIM EL=886.32
N=1413486.62
E=2306651.53
18" DIA RCP INV EL=881.58
4" DIA PVC INV EL=882.25
6" DIA PVC INV EL=882.69
STORM LINE C
PIPE-C1
92 LF OF 6" DIA PVC @ 1.2%
50 LF OF 6" DIA PERFORATED PVC @ 0.5%
6" DIA PVC OBSERVATION WELL FOR PERVIOUS CONCRETE
N=1413509.43
E=2306515.46
INV EL=885.64
CONSTRUCTION ENTRANCE AND EXIT (NOTE 8)
60 LF OF 6" DIA PERFORATED PVC @ 0.5%
6" DIA PVC OBSERVATION WELL FOR PERVIOUS CONCRETE
N=1413430.98
E=2306575.87
INV EL=883.79
PERVIOUS CONCRETE AREA 2
LIMIT OF DISTURBANCE (NOTE 9)
INLET PROTECTION (NOTE 7)
INLET PROTECTION (NOTE 7)
PIPE-A3
36 LF OF 4" DIA PVC @ 1.0% (NOTE 6)
LOCALIZED RE-GRADING OF ASPHALT PAVEMENT (NOTE 5)
CONCRETE HEADER CURB
4" DIA PVC OBSERVATION WELL FOR BIORETENTION AREA
N=1413456.46
E=2306675.04
INV EL=882.63
(NOTE 6)
RELOCATED ELECTRICAL LINE (BY CITY'S ELECTRICAL CONTRACTOR)
RELOCATED TELECOMMUNICATIONS LINE (BY UTILITY PROVIDER)
SILT FENCE - SENSITIVE AREAS (NOTE 7)
CURB CUT (TYP)
105 LF OF 4" DIA PERFORATED PVC @ 0.5%
DISTURBED AREA STABILIZATION (WITH SODDING) (NOTE 12)
PERMANENT SEWER AND WATERLINE EASEMENT DB. 52646, PG. 91
4" STEEL GAS LINE
N 1413400
1
2
3
4
5
6
7

Post-Construction



Post-Construction

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STORM LINE B
PIPE-B1
99 LF OF 6" DIA PVC @ 1.9%
STORM LINE A
50 LF OF 6" DIA PERFORATED PVC @ 0.5%
6" DIA PVC OBSERVATION WELL FOR PERVIOUS CONCRETE
N=1413509.43
E=2306515.46
INV EL=885.64
DI-A2
3'X3' DROP INLET
RIM EL=886.32
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18" DIA RCP INV EL=881.58
4" DIA PVC INV EL=882.25
6" DIA PVC INV EL=882.69
65 LF OF 18" DIA RCP @ 1.0%
PIPE-A2
INLET PROTECTION (NOTE 7)
INLET PROTECTION (NOTE 7)
PIPE-A3
36 LF OF 4" DIA PVC @ 1.0% (NOTE 6)
STORM LINE C
PIPE-C1
92 LF OF 6" DIA PVC @ 1.2%
LOCALIZED RE-GRADING OF ASPHALT PAVEMENT (NOTE 5)
CONCRETE HEADER CURB
4" DIA PVC OBSERVATION WELL FOR BIORETENTION AREA
N=1413456.46
E=2306675.04
INV EL=882.63
(NOTE 6)
RELOCATED ELECTRICAL LINE (BY CITY'S ELECTRICAL CONTRACTOR)
RELOCATED TELECOMMUNICATIONS LINE (BY UTILITY PROVIDER)
SILT FENCE - SENSITIVE AREAS (NOTE 7)
105 LF OF 4" DIA PERFORATED PVC @ 0.5%
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6" DIA PVC OBSERVATION WELL FOR PERVIOUS CONCRETE
N=1413430.98
E=2306575.87
INV EL=883.79
PERVIOUS CONCRETE AREA 2
LIMIT OF DISTURBANCE (NOTE 9)
N 1413400
18" RCP
4.3%
3.0%
2.0%
1
2
3
4
5
6
7

Post-Construction

Post-Construction

Bioretention Area Inspection and Maintenance Form					
Date and Time of Inspection					
Weather at Time of Inspection					
Date of Last Rainstorm Event					
Total Rainfall (in)					
Maintenance Item	Condition				Comment
	Good	Marginal	Poor	N/A*	
General Inspection					
Access to the site is adequately maintained for inspection and maintenance.					
Area is clean (trash, debris, grass clippings, etc. are removed).					
Inlet Structure					
Drainage ways (overland flow and curb cut inlets) to the bioretention area are free of trash, debris, large branches, etc.					
No evidence of gullies, rills or excessive erosion around the curb cut inlets or overland flow entry points.					
Main Treatment					
Main treatment area of bioretention area of trash, debris, and sediment.					
No evidence of long-term ponding or standing water in ponding area of the bioretention area (examples include stains, odors, mosquito larvae, etc.).					
Bioretention area seems to be working properly and there is no settling within or around the structures in it.					

- Review of as-built drawings by Contractor
- Final site walk with submittal of punch list to GCDWR
- Assistance with project closeout documents as requested
- Preparation of Operation and Maintenance and Water Quality Monitoring Plans

Acknowledgements

- *James Pendleton*, Engineer II/Project Manager, GCDWR
- *Charles Crowell*, former Stormwater Section Manager, GCDWR
- A&S Paving
- Clean Water Consultants
- City of Lilburn
- *Jared Eubanks*, Contract Manager/Project Director/Engineer of Record
- *Victoria Cheplak*, Principal Engineer and QA/QC Manager

Thank you for attending!

Questions?