

STORMWATER REPORT

LEGACY POINTE COTTAGES

LESLIE STREET,
FLAGLER BEACH, FL 32174

FEBRUARY 2023
REVISED OCTOBER 2024



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PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Newkirk Engineering Inc., a corporation authorized as an engineering business, Certificate of Authorization No. 30209, by the State of Florida, Department of Professional Regulation and Board of Professional Engineers. I have reviewed or approved the evaluation, findings, opinions, and conclusions as reported for:

Project: "LEGACY POINTE COTTAGES"

Location: LESLIE STREET,
FLAGLER BEACH, FL 32174

Client: ALT HOMES LLC

I acknowledge that the procedures and references used to develop the results are standard to the professional practice of civil engineering as applied through design standards and criteria set forth by the federal, state and local regulatory agencies as well as professional judgment and experience.

This report has been digitally signed and sealed by Harry Newkirk, PE #62971 on



Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Name: Harry Newkirk,
PE License No: 62971
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INTRODUCTION

The site consists of a vacant wooded parcel on an existing pond in Flagler Beach, Florida, Section 11, Township 12 S, Range 31 E. The project is located at the termination of Leslie Street and Joyce Street on the west side of John Anderson Highway. See **Appendix A** for site location and aerial map.

Propose the development of 22 multifamily units with an associated stormwater management facility. Stormwater management is provided by interconnected exfiltration areas as well as a series of dry retention areas that provide treatment and attenuation for the site. Stormwater calculations are designed for two drainage basins which both have positive outfall to the existing pond on site.

PROJECT SITE DESCRIPTION

Land Coverage

The current land coverage of the site consists of a wooded site with a small portion of paved roadway. The site consists of a pre-development land coverage of mesic flatwoods and post development land coverage of multi-family residential.

Topography

Elevations undulate between EL 6.2 and EL 19.4 across the site. Site runoff drains to the pond on site which is a former borrow pit.

Flood Zone

The property is located within Zone “X”, per FEMA Map Panel No. 12035C0232 E dated June 6th, 2018. See FEMA FIRM map in Appendix A.

Soils

The predominant soil on the project site is (11) Myakka Myakka, wet, fine sands – 0 to 2% slopes. Pre and Post-development flood routing was calculated with a Hydrologic Soil Group rating of C and B respectively. See **Appendix A** for soils map. Seasonal High Groundwater Table was estimated to be at elevation 7.0 based on the Geotechnical Report provided by Universal Engineering Sciences dated 1/14/19.

EXISTING SITE CONDITIONS

The pre-development conditions are broken into two drainage basins based on existing flow patterns from the east and west of the existing pond. The PRE-1 basin drains from the east side of the existing pond and consists of a 2.054-acre drainage basin with 0.060 acres impervious surface, and Time of Concentration of 22.0 minutes. The PRE-2 drainage basin consists of the 0.153-acre portion of the site that drains to the existing pond from the west. The existing site naturally drains to the existing pond where it is then discharged towards the south through a drainage ditch. Runoff flows to the existing pond by a combination of sheet flow and overland flow.

PROPOSED STORMWATER SYSTEM

The subject site is a 3.159-acre parcel that proposes 22 multi-family buildings as well as paving, site grading, and utilities. The stormwater system provides water quality (treatment volume) for 1.766 acre drainage basin with 1.092 acres of impervious surface. The system is designed to treat all runoff with dry retention before discharging to the wet detention area. The required treatment volume for the dry retention and exfiltration system is 0.281 Ac-Ft and 0.281 Ac-Ft is provided. All stormwater runoff will sheet flow to a series of inlets that connect directly to the exfiltration system. The runoff from the exfiltration system is then delivered to a dry retention area with positive outfall to the existing pond. When the stormwater levels in the dry retention areas stage to the elevation of 10.20, the runoff will overtop two (2) 4.5-foot V-Notch weirs and discharge into the existing pond (OFF) to maintain positive outfall.

POSITIVE OUTFALL

Discharge from the stormwater treatment system flows to existing pond on site which was used as a former borrow pit. The runoff then flows south through the drainage ditch and is piped under the adjacent existing apartment complex. The stormwater then flows to the south where it reaches the headwaters of Bulow Creek and discharges to the Halifax River, and eventually the Atlantic Ocean.

ICPR 4 MODEL & OVERALL SYSTEM SUMMARY

The pre-development site conditions consist of two drainage basins, PRE-1 & PRE-2, which both have positive outfall to the existing pond (OFF). The pre-development drainage basins are modeled as a hydrographs and discharge offsite via sheet and overland flows. The PRE-1 drainage basin consists of 2.054 acres with an impervious percentage of 2.9% and a time of concentration of 22.0 minutes and drains to the existing pond and discharges at Node (OFF). The PRE-2 basin consists of 0.153 acres with no impervious surface and is modeled as a hydrograph with a minimum time of concentration of 10.0 minutes discharging to the existing pond.

The post-development flood routing model is comprised of two drainage basins POST-1 and POST-2. The POST-1 basin represents the eastern portion of the site where the impervious improvements will take place. The POST-1 basin drains to the exfiltration chambers and dry pond for treatment. The POST-2 drainage basin consists of 0.153 acres that discharges directly to the receiving pond. Development within the POST-2 basin is limited to a 5' sidewalk and picnic benches, no pavement or other vehicle facilities are proposed. The system maintains positive outfall through a drop structure link (CS-01) with all discharge flowing to the existing pond (OFF).

The design storms are the Mean Annual and 25-year 24-hour storm events utilizing SCSIII-24 FLMOD rainfall distribution. During the design storms the post-development peak discharge rate cannot exceed the pre-development peak discharge rate. The system shall be designed to provide for the appropriate treatment volume of stormwater runoff within 72 hours following a storm event assuming average antecedent moisture conditions with a safety factor of 2.

WATER QUALITY

Water Quality Treatment volume is provided for the post-development basin using dry retention as pre-treatment and exfiltration pursuant to the requirements of SJRWMD as outlined in Chapter 40C-4 and pursuant to the City of Flagler Beach requirements. Treatment volume for the site was governed by OFW requirements and an additional 50% of the required treatment volume was accounted for. The project meets the treatment requirements for discharge to an impaired waterbody and the system is designed to improve water quality before discharge. Appendix C of this report provides the Post-Development Basin Map and the Post-Development stormwater calculations.

EROSION AND SEDIMENT CONTROL PLANS

All pervious surfaces will be planted with trees, shrubs and sodded solid to prevent erosion. All pond slopes and other pervious areas of the property will be sodded solid or seeded and mulched to prevent erosion. A temporary gravel construction entrance will be provided to prevent fines and sands from leaving the site and contaminating adjacent roadways. Silt fence will be installed around the entire site and around inlets during construction to retain sediment on-site and assure that any discharges from the site do not cause or contribute to a violation of state water quality standards.

MAINTENANCE AND OPERATION

Alt Homes LLC will operate and maintain the entire stormwater management system. All roads, drainage, stormwater and utilities located on-site are private ownership and will be maintained and operated by Alt Homes LLC. Stormwater maintenance will include routine mowing of sod within retention ponds and pond side slopes and removal of sediment and debris from inlets and control structures.

ASSUMPTIONS AND REFERENCES USED

- A. S.C.S. Unit Hydrograph Method
- B. SCS III Rainfall Distribution
- C. Universal Engineering Sciences Geotechnical Report
- D. AutoCAD Civil 3D
- E. ICPR 4.07.08
- F. Other references and assumptions listed in the drainage calculations.

SUMMARY OF RESULTS

Calculations indicate that the proposed stormwater treatment system meets the requirements for pollution abatement volume per St. Johns River Water Management, Florida Department of Environmental Protection and City of Flagler Beach Land Development Code. All stormwater runoff is directed into the stormwater treatment system by the conveyance of pavement grades and collection pipe system. The dry retention area treatment volume recovery (EL 10.20) occurs in 24 hours. The post development hydrograph shows that the site discharges less runoff than the pre-development conditions during the mean annual and 25-year, 24-hour storm events. The reduction in stormwater discharge rate and volume ensures that there will be no adverse impacts to surrounding areas. The following conclusions can be made based on the results:

- The Stormwater System is designed to provide treatment and attenuation for OFW requirements.
- Net decreases in discharge rates and volumes are seen for each storm event.
- The calculations indicate that the proposed stormwater treatment system meets the requirements for pollution abatement volume per St. Johns River Water Management, Florida Department of Environmental Protection and City of Flagler Beach Land Development Code.

Design Storm		Rainfall (inches)	Discharge Rate (cfs)	Outflow Volume (ft ³)	Peak Stage (ft)
Mean Annual, 24-Hour	PRE	4.5	2.53	16,223	10.39
	POST		0.17	4,909	
25 Year, 24-Hour	PRE	8.9	7.07	44,888	10.98
	POST		6.36	31,300	

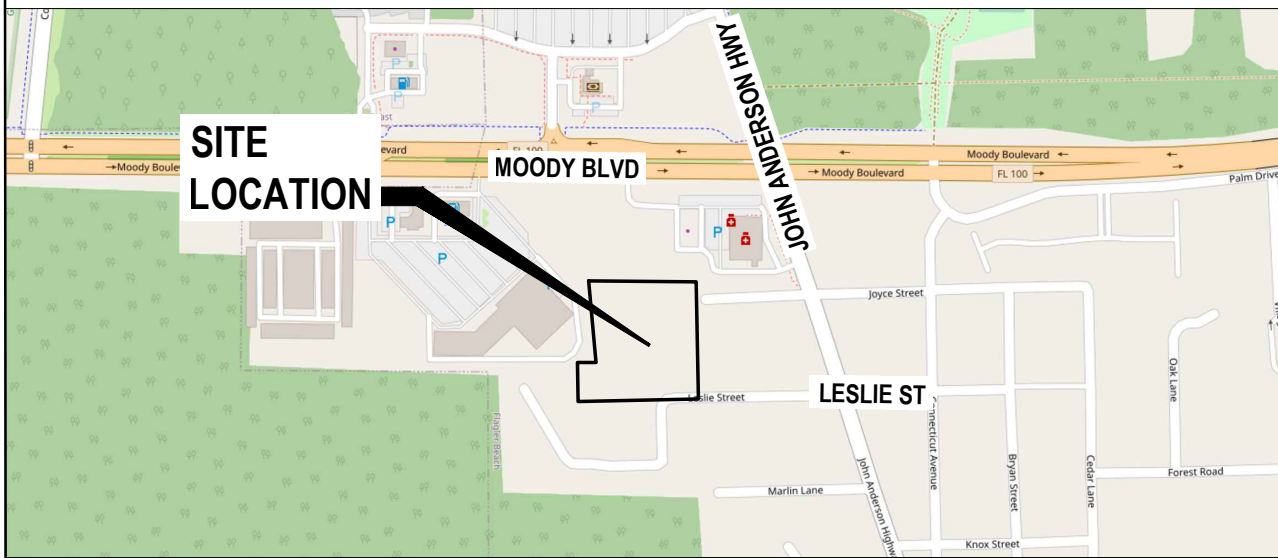
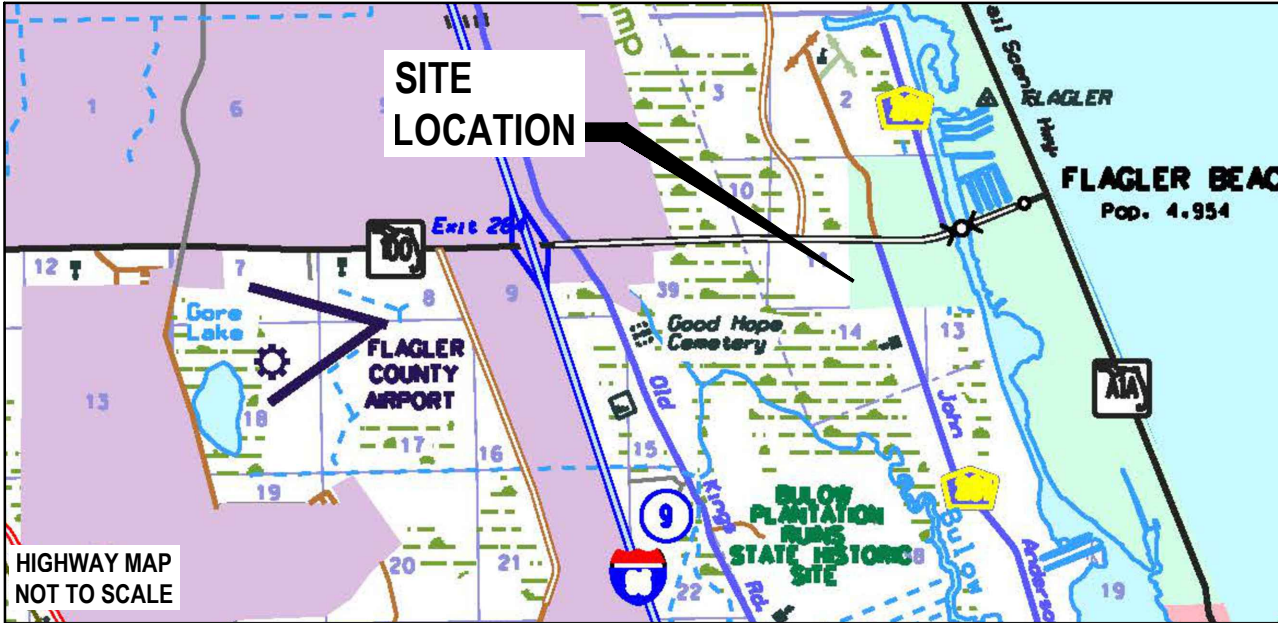
APPENDIX A

MAPS



AERIAL MAP

SCALE: 1" = 600'



LOCATION MAP

SCALE: 1" = 700'

National Flood Hazard Layer FIRMette



Legend

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	<ul style="list-style-type: none"> 1% Annual Chance Flood Hazard (AE) Zone A1, A2 With BFE or Depth Zone A1, A2, A3, A9 Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	<ul style="list-style-type: none"> 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with depth less than one foot and average depth less than one foot Future Ditch/Drain, 1% Annual Chance Flood Hazard Zone C Area with Reduced Flood Risk due to Levee, See Note, Zone X Area with Flood Risk due to Levee Zone D
OTHER AREAS	<ul style="list-style-type: none"> Area of Minimal Flood Hazard Zone E Effective 10 MRA Area of Unaccomplished Flood Hazard Zone G
GENERAL STRUCTURES	<ul style="list-style-type: none"> Channel, Culvert, or Storm Sewer Levee, Dike, or Retention Wall
OTHER FEATURES	<ul style="list-style-type: none"> Cross Sections with 1% Annual Chance Water Surface Elevation Coastal Transects Base Flood Elevation Date (BFE) Limit of Study Jurisdiction Boundary Coastal Transect Boundary Profile Elevation Hydrographic Feature
MAP PANELS	<ul style="list-style-type: none"> Digital Data Available No Digital Data Available Unmapped <p>The pin displayed on the maps is an approximate point selected by the user and does not represent an authoritative geographic location.</p>

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

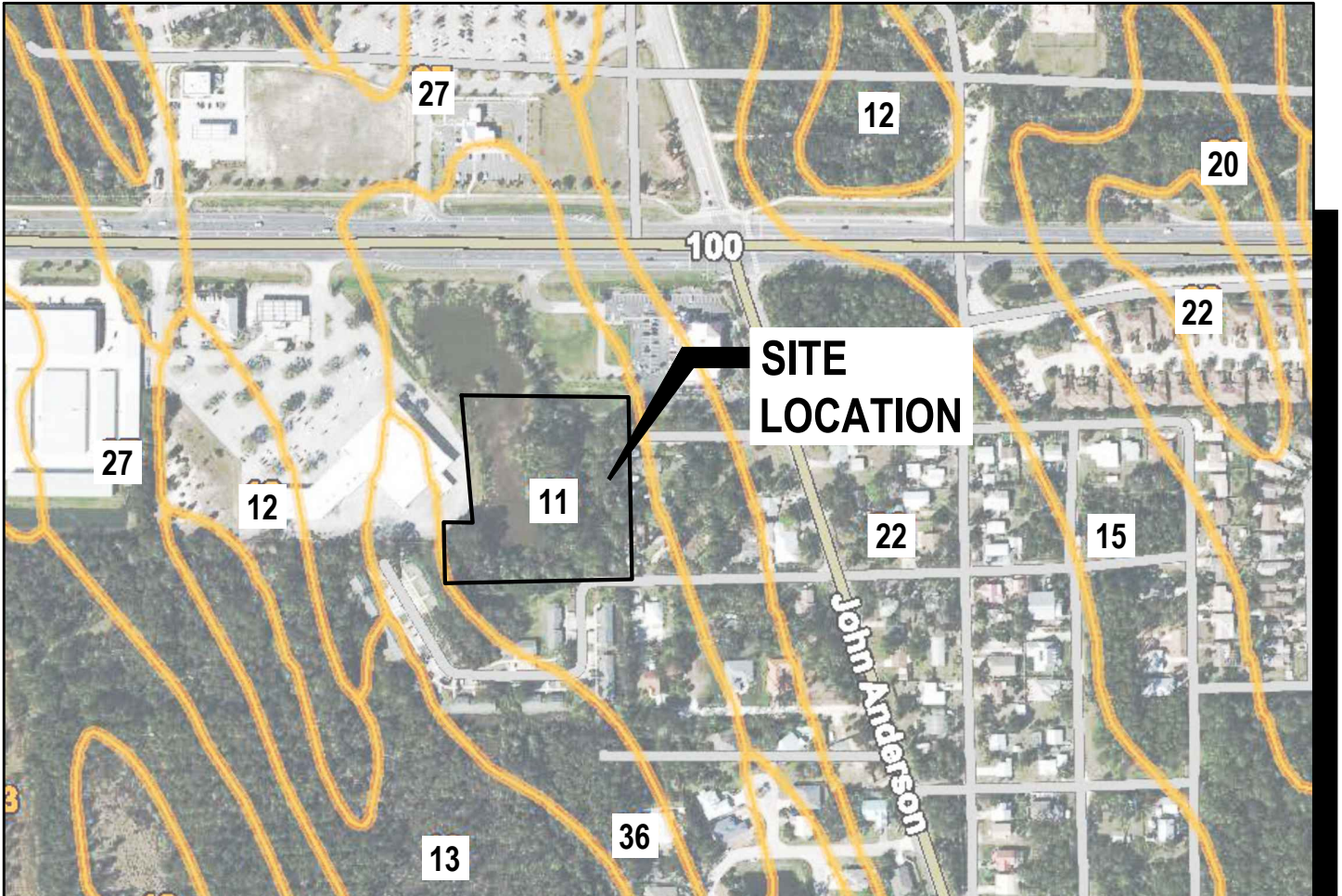
The flood hazard information is derived directly from the digital flood maps and is not derived from FEMA. This map was updated on 11/15/2023 at 3:01 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if it contains any of the following map elements on this page: basemap imagery, flood zone labels, legend, scale bar, map projection data, coordinate identifiers, FIRM panel numbers, and FIRM effective date. Map images for cartographic and informational purposes cannot be used for regulatory purposes.

FLOOD ZONE MAP

PANEL NO. 12035C0232 E
FLOOD ZONE "X"

SCALE: 1" = 600'



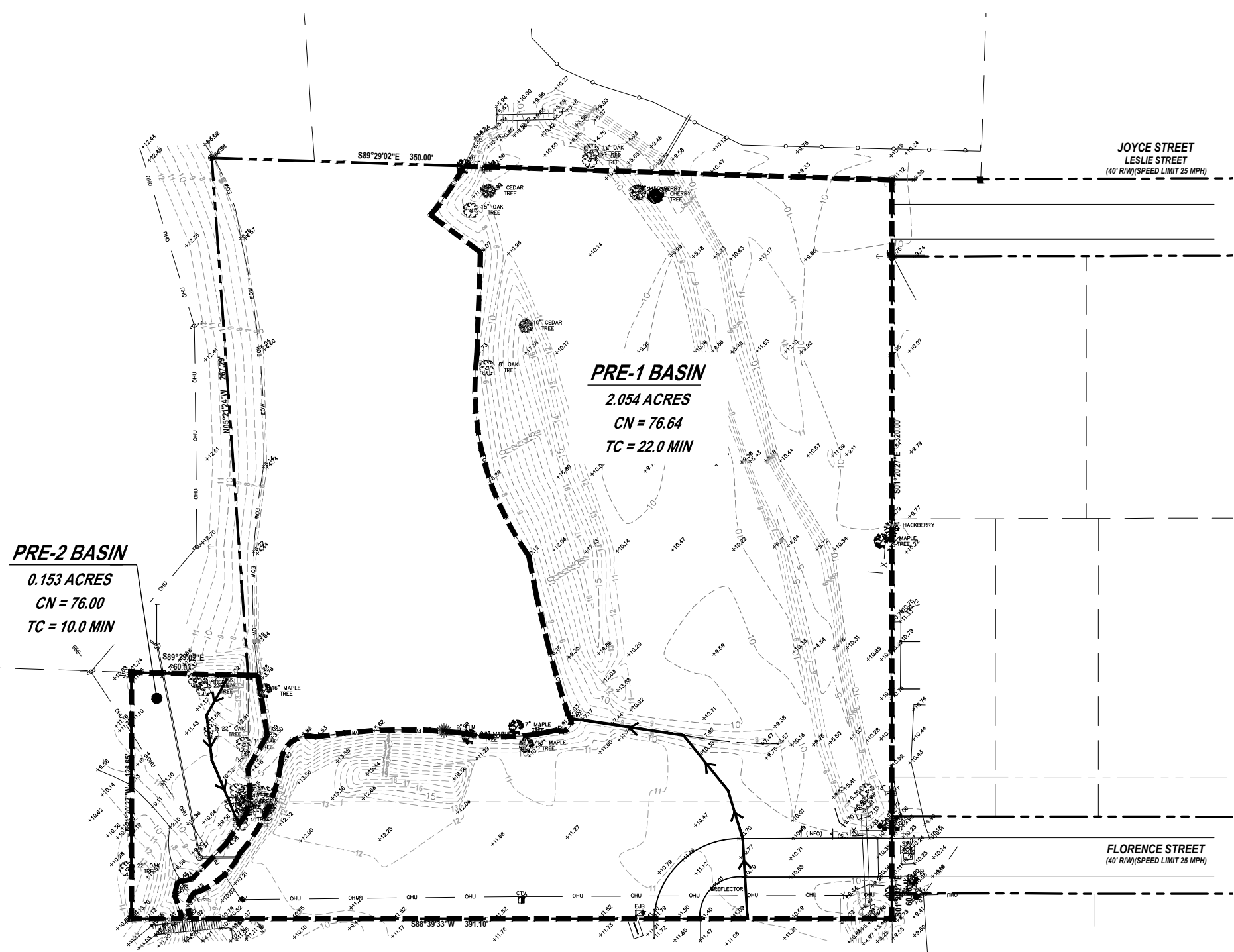
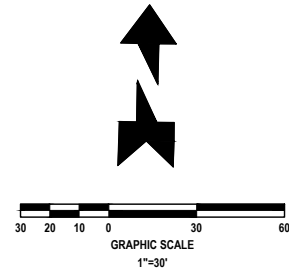
SOILS MAP

SCALE: 1" = 500'

SOIL TYPES: (11)MYAKKA-MYAKKA, WET, FINE SANDS, 0 TO 2 PERCENT SLOPES

APPENDIX B

PRE-DEVELOPMENT CALCULATIONS



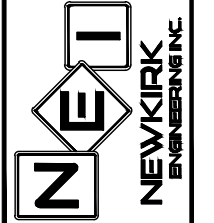
LEGEND

	BASIN LINE
	PARCEL LINE
	TOC

REVISIONS

DATE	DESCRIPTION

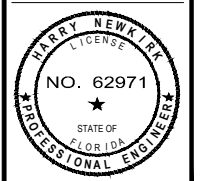
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 L.C. # 2013
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**PRE DEVELOPMENT
 BASIN MAP
 LEGACY APARTMENTS**
 LESLIE STREET
 FLAGLER BEACH, FL 32136

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PROJECT No: 2023-17
 DATE: MARCH 2023
 DESIGN BY: HHN
 DRAWN BY: NWS
 CHECKED BY: HHN
 SCALE: 1" = 30'
 DRAWING NUMBER

PRE



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PRE-DEVELOPMENT

TIME OF CONCENTRATION CALCULATIONS

BASIN: PRE-1

Sheet Flow

Tt = Travel time (min)			
s = slope	s =	0.00980 ft/ft	
L = Flow length (ft)	L =	100 ft	
n = Manning's Roughness Coefficient	n =	0.4 Woods (Light Underbrush)	
P2 = 2-year/24-hour rainfall (in)	P2 =	5.5 in	
	EL 2 =	11.04 Upstream Invert	
	EL 1 =	10.06 Downstream Invert	
	Tt =	21.8 min	

$$s = \frac{EL_2 - EL_1}{L}$$

$$Tt = \frac{(.0007(nL)^{0.8}(60))}{(\sqrt{P2} * s^{0.4})}$$

Overland Flow

Tt = Travel time (min)			
s = slope	s =	0.07190 ft/ft	
L = Flow length (ft)	L =	63 ft	
V = Velocity (ft/s)	V =	4.33 ft/s	Unpaved
	EL 2 =	10.06 Upstream Invert	
	EL 1 =	5.53 Downstream Invert	
	Tt =	0.2 min	

$$V_{Paved} = 20.3282s^{-5}$$

$$Tt = \frac{L}{60V}$$

Open Channel Flow

Tt = Travel time (min)			
s = slope (ft/ft)	s =	ft/ft	
L = Flow length (ft)	L =	0 ft	
n = Manning's Roughness Coefficient	n =	0	
a = Area	a =	0 sf	
p = Wetted perimeter	p =	0 ft	
R = Hydraulic radius (a/p)	R =	0.00 ft	
V = Velocity (ft/s)	V =	0.00 ft/s	
	EL 2 =	0.0 Upstream Invert	
	EL 1 =	0.0 Downstream Invert	
	Tt =	0.0 min	
	Tc =	22.0 min	

$$V = \frac{1.486 R^{\frac{2}{3}} s^{0.5}}{n}$$

$$Tt = \frac{L}{60V}$$



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BASIN: PRE-2

Sheet Flow

Tt = Travel time (min)			
s = slope	s =	0.15562 ft/ft	
L = Flow length (ft)	L =	73 ft	
n = Manning's Roughness Coefficient	n =	0.40 Woods (Light Underbrush)	
P2 = 2-year/24-hour rainfall (in)	P2 =	5.5 in	
	EL 2 =	16.32 Upstream Invert	
	EL 1 =	4.96 Downstream Invert	
	Tt =	5.6 min	

$$s = \frac{EL_2 - EL_1}{L}$$

$$Tt = \frac{(.0007(nL)^{0.8}(60))}{(\sqrt{P2} * s^{0.4})}$$

Overland Flow

Tt = Travel time (min)			
s = slope	s =	ft/ft	
L = Flow length (ft)	L =	0 ft	
V = Velocity (ft/s)	V =	0.00 ft/s	Unpaved
	EL 2 =	0.00 Upstream Invert	
	EL 1 =	0.00 Downstream Invert	
	Tt =	0.0 min	

$$V_{paved} = 20.3282s^{.5}$$

$$V_{unpaved} = 16.1345s^{.5}$$

$$Tt = \frac{L}{60V}$$

Open Channel Flow

Tt = Travel time (min)			
s = slope (ft/ft)	s =	ft/ft	
L = Flow length (ft)	L =	0 ft	
n = Manning's Roughness Coefficient	n =	0 0	
a = Area	a =	0 sf	
p = Wetted perimeter	p =	0 ft	
R = Hydraulic radius (a/p)	R =	ft	
V = Velocity (ft/s)	V =	0.00 ft/s	
	EL 2 =	0.0 Upstream Invert	
	EL 1 =	0.0 Downstream Invert	
	Tt =	0.0 min	
	Tc =	5.6 min	

$$V = \frac{1.486 R^{\frac{2}{3}} s^{.5}}{n}$$

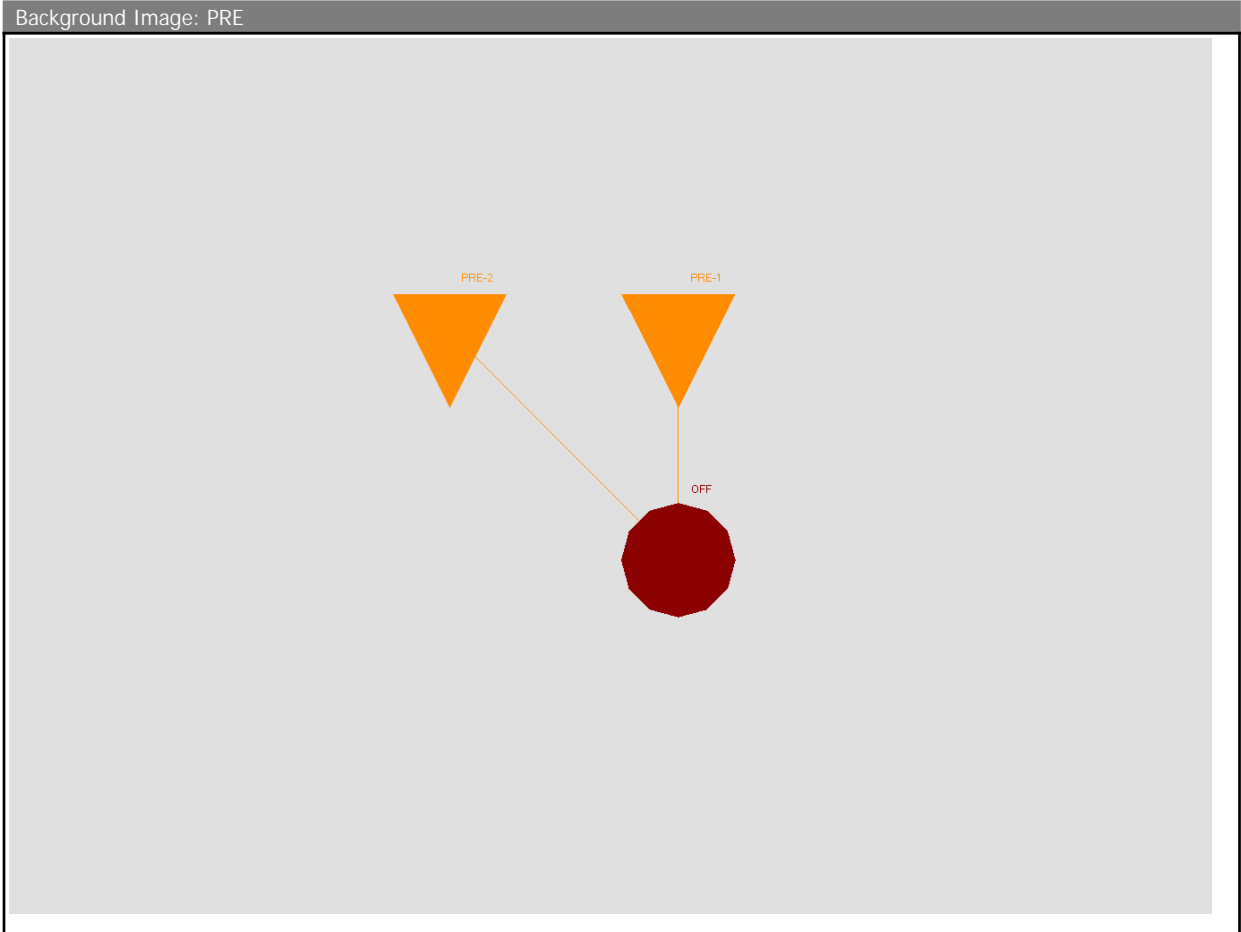
$$Tt = \frac{L}{60V}$$

PRE-DEVELOPMENT HYDROGRAPH WORKSHEET

BASIN NAME	BASIN ACRES	PERVIOUS		DCIA IMPERVIOUS		NON DCIA IMPERVIOUS		WET POND NWL		WETLAND		COMPOSITE CN	NON DCIA CN
		ACRES	CN	ACRES	CN	ACRES	CN	ACRES	CN	ACRES	CN		
PRE-1	2.054	1.994	76.00		98.0	0.060	98.0		100.0		93.0	76.64	76.64
PRE-2	0.153	0.153	76.00		98.0		98.0		100.0		93.0	76.00	76.00
TOTAL	2.207	2.147	76.00		98.0	0.060	98.0		100.0		93.0	76.60	76.60

PRE-DEVELOPMENT						
BASIN NAME	SOIL TYPE	DESCRIPTION	CONDITION	HYDRAULIC GROUP	AREA (AC)	CN
PRE-1	11 MYAKKA-MYAKKA, WET, FINE SANDS, 0	WOODS-GRASS	FAIR	C	2.054	76
	11 MYAKKA-MYAKKA, WET, FINE SANDS, 0	WOODS-GRASS	FAIR	C	0.153	76
TOTAL					2.207	76.00

SOURCES: SCS SOILS SURVEY FOR FLAGLER COUNTY, FLORIDA
 SCS TR 55, Agricultural Lands, Woods



Simple Basin: PRE-1

Scenario: Scenario1
Node: OFF
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 22.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0
Area: 2.0540 ac
Curve Number: 76.0
% Impervious: 2.90
% DCIA: 0.00
% Direct: 0.00
Rainfall Name:

Comment:

Simple Basin Runoff Summary [Scenario1]

Basin Name	Sim Name	Max Flow [cfs]	Time to Max Flow [hrs]	Total Rainfall [in]	Total Runoff [in]	Area [ac]	Equivalent Curve Number	% Imperv	% DCIA
PRE-1	01_MA_24H	2.51	12.1833	4.50	2.16	2.0540	76.5	2.90	0.00
PRE-1	02_25Y_24H	7.01	12.1667	8.85	5.98	2.0540	76.5	2.90	0.00

Simple Basin Mass Balance Summary [Scenario1]

Basin Name	Sim Name	Total Rainfall	Total Irrigation	Total Runoff	Total ET	Total Initial Abst	Total Recharge	Change Soil Storage
PRE-1 [in]	01_MA_24H	4.50	0.00	2.16	0.00	0.00	0.00	2.34
PRE-1 [ft3]	01_MA_24H	33552	0	16109	0	0	0	17443
PRE-1 [ac-ft]	01_MA_24H	0.77	0.00	0.37	0.00	0.00	0.00	0.40
PRE-1 [in]	02_25Y_24H	8.85	0.00	5.98	0.00	0.00	0.00	2.87
PRE-1 [ft3]	02_25Y_24H	65986	0	44568	0	0	0	21418
PRE-1 [ac-ft]	02_25Y_24H	1.51	0.00	1.02	0.00	0.00	0.00	0.49

Simple Basin: PRE-2

Scenario: Scenario1
 Node: OFF
 Hydrograph Method: NRCS Unit Hydrograph
 Infiltration Method: Curve Number
 Time of Concentration: 10.0000 min
 Max Allowable Q: 0.00 cfs
 Time Shift: 0.0000 hr
 Unit Hydrograph: UH323
 Peaking Factor: 323.0
 Area: 0.0153 ac
 Curve Number: 76.0
 % Impervious: 0.00
 % DCIA: 0.00
 % Direct: 0.00
 Rainfall Name:

Comment:

Simple Basin Runoff Summary [Scenario1]

Basin Name	Sim Name	Max Flow [cfs]	Time to Max Flow [hrs]	Total Rainfall [in]	Total Runoff [in]	Area [ac]	Equivalent Curve Number	% Imperv	% DCIA
PRE-2	01_MA_24H	0.03	12.0500	4.50	2.13	0.0153	76.0	0.00	0.00
PRE-2	02_25Y_24H	0.07	12.0333	8.85	5.93	0.0153	76.0	0.00	0.00

Simple Basin Mass Balance Summary [Scenario1]

Basin Name	Sim Name	Total Rainfall	Total Irrigation	Total Runoff	Total ET	Total Initial Abst	Total Recharge	Change Soil Storage
PRE-2 [in]	01_MA_24H	4.50	0.00	2.13	0.00	0.00	0.00	2.37
PRE-2 [ft3]	01_MA_24H	250	0	118	0	0	0	132
PRE-2 [ac-ft]	01_MA_24H	0.01	0.00	0.00	0.00	0.00	0.00	0.00
PRE-2 [in]	02_25Y_24H	8.85	0.00	5.93	0.00	0.00	0.00	2.92
PRE-2 [ft3]	02_25Y_24H	492	0	330	0	0	0	162
PRE-2 [ac-ft]	02_25Y_24H	0.01	0.00	0.01	0.00	0.00	0.00	0.00

Node: OFF

Scenario: Scenario1
 Type: Time/Stage
 Base Flow: 0.00 cfs
 Initial Stage: 6.20 ft
 Warning Stage: 0.00 ft
 Boundary Stage:

Comment:

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
OFF	01_MA_24H	0.00	6.20	0.0000	2.53	0.00	0
OFF	02_25Y_24H	0.00	6.20	0.0000	7.07	0.00	0

Node Mass Balance Condensed [Scenario1]

Node Name	Sim Name	Total Inflow [ft3]	Total Outflow [ft3]	Stored Volume (Flow Based) [ft3]
OFF	01_MA_24H	16223	0	16223
OFF	02_25Y_24H	44888	0	44888

Simulation: 01_MA_24H

Scenario: Scenario1
 Run Date/Time: 2/1/2023 1:18:14 PM
 Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	24.0000

	Hydrology [sec]	Surface Hydraulics [sec]
Min Calculation Time:	60.0000	0.1000
Max Calculation Time:		30.0000

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:

 Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
 Extern Hydrograph Set:
 Curve Number Set:

 Green-Ampt Set:
 Vertical Layers Set:
 Impervious Set:

Tolerances & Options

Time Marching: SAOR	IA Recovery Time: 24.0000 hr
Max Iterations: 6	
Over-Relax Weight 0.5 dec	
Fact:	
dZ Tolerance: 0.0010 ft	Smp/Man Basin Rain Global

Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft
Edge Length Option: Automatic

Opt:

Rainfall Name: ~FLMOD
Rainfall Amount: 4.50 in
Storm Duration: 24.0000 hr
Dfit Damping (1D): 0.0050 ft
Min Node Srf Area 100 ft2
(1D):
Energy Switch (1D): Energy

Comment:

Simulation: 02_25Y_24H

Scenario: Scenario1
 Run Date/Time: 2/1/2023 1:18:19 PM
 Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	24.0000

	Hydrology [sec]	Surface Hydraulics [sec]
Min Calculation Time:	60.0000	0.1000
Max Calculation Time:		30.0000

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:

Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:

Extern Hydrograph Set:

Curve Number Set:

Green-Ampt Set:

Vertical Layers Set:

Impervious Set:

Tolerances & Options

Time Marching: SAOR
 Max Iterations: 6
 Over-Relax Weight: 0.5 dec
 Fact:
 dZ Tolerance: 0.0010 ft

IA Recovery Time: 24.0000 hr

Smp/Man Basin Rain: Global

Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft
Edge Length Option: Automatic

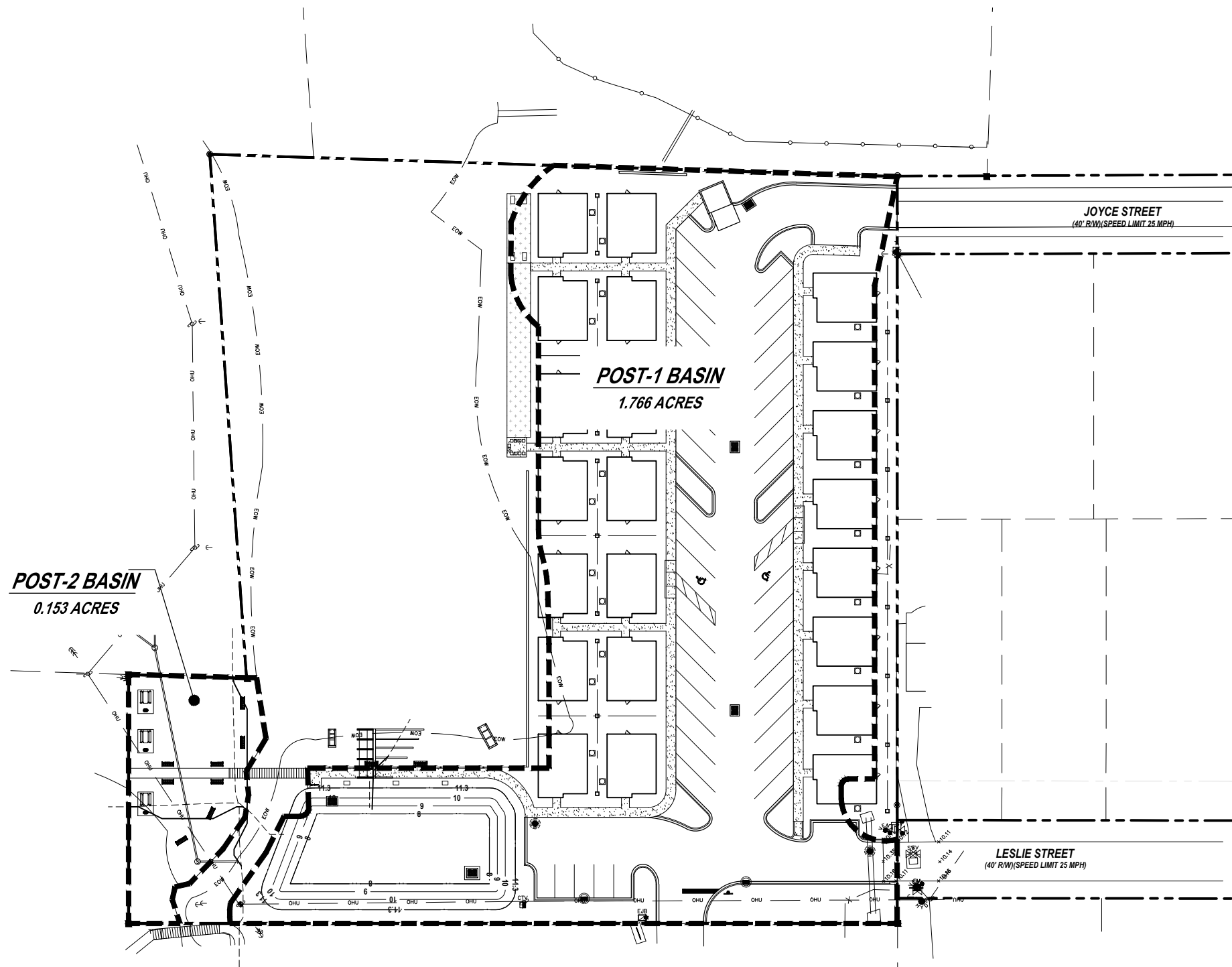
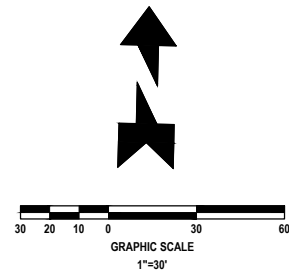
Opt:

Rainfall Name: ~FLMOD
Rainfall Amount: 8.85 in
Storm Duration: 24.0000 hr
Dflt Damping (1D): 0.0050 ft
Min Node Srf Area 100 ft2
(1D):
Energy Switch (1D): Energy

Comment:

APPENDIX C

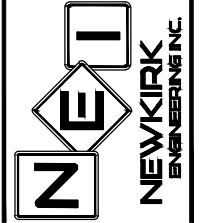
POST-DEVELOPMENT CALCULATIONS



LEGEND
 --- BASIN LINE
 - - - - - PARCEL LINE

REVISIONS	
DATE	DESCRIPTION

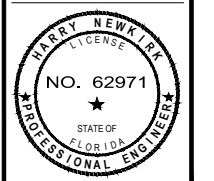
1230 North US1, Suite 3
 Omond Beach, Florida 32174
 Phone (386) 872-7794
 www.Newkirk-Engineering.com
 L.C. # 2800384
 C.A. # 30209
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 Civil Engineering,
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**POST DEVELOPMENT
 BASIN MAP
 LEGACY APARTMENTS**
 LESLIE STREET
 FLAGLER BEACH, FL 32136

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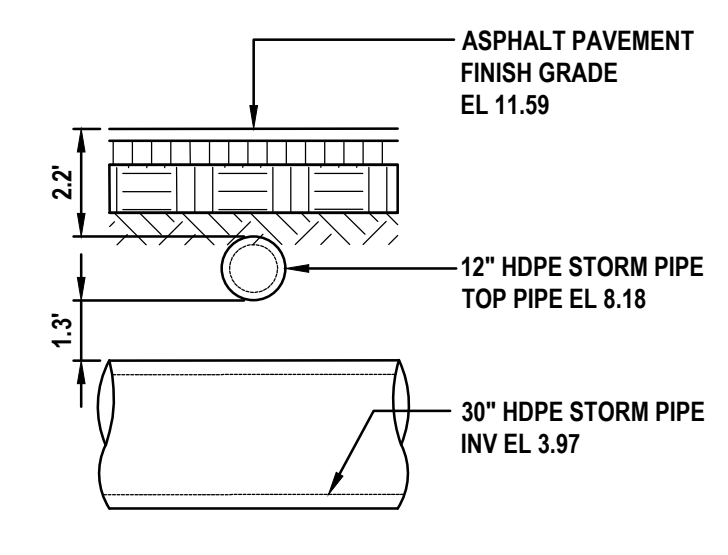
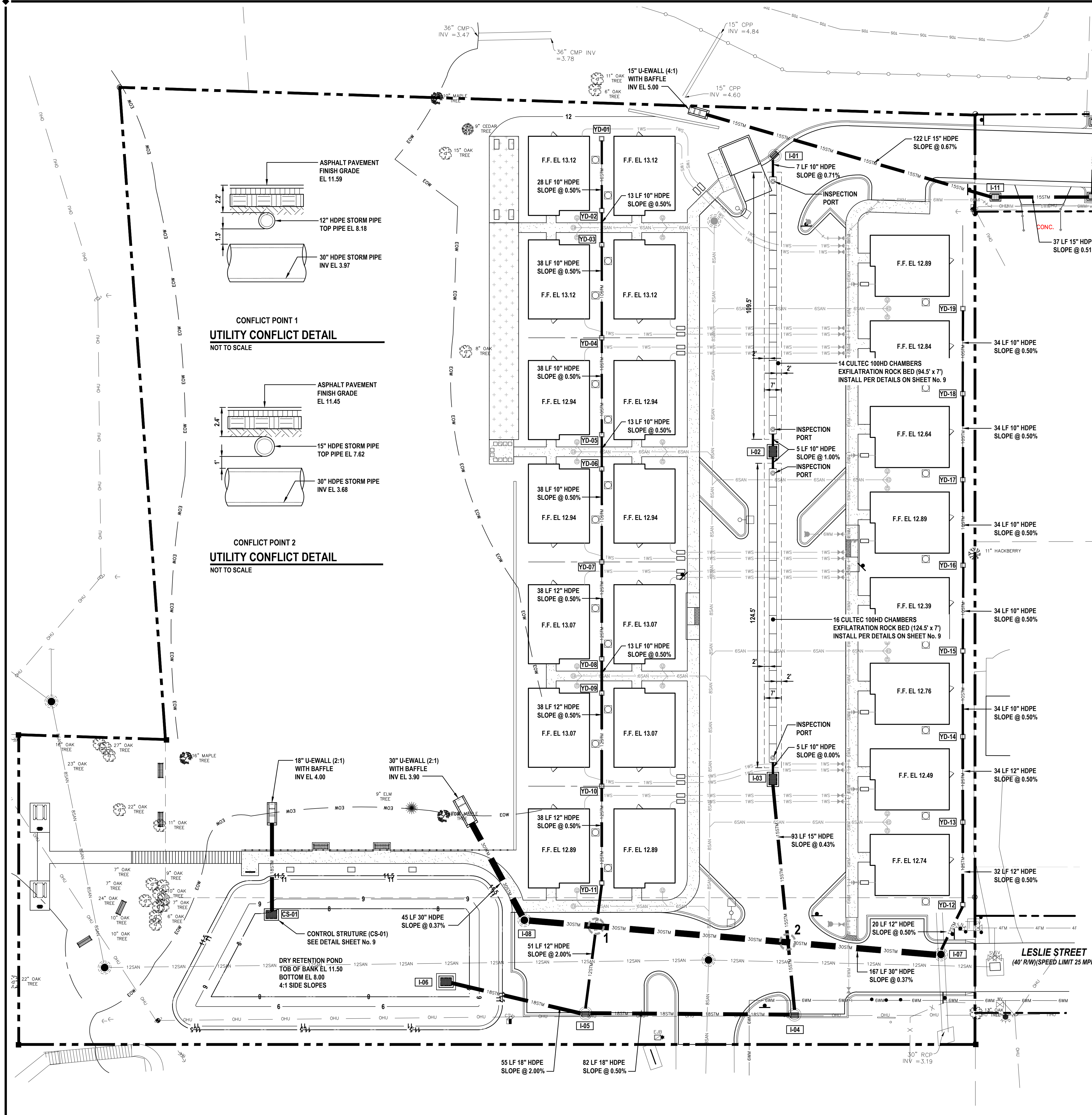
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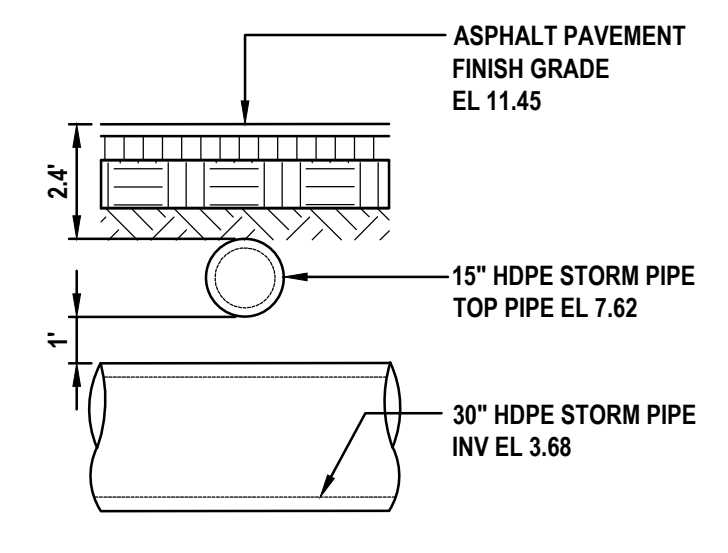
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PROJECT No:	2023-17
DATE:	MARCH 2023
DESIGN BY:	HHN
DRAWN BY:	NWS
CHECKED BY:	HHN
SCALE:	1" = 30'
DRAWING NUMBER	

POST



**CONFLICT POINT 1
UTILITY CONFLICT DETAIL**
NOT TO SCALE



**CONFLICT POINT 2
UTILITY CONFLICT DETAIL**
NOT TO SCALE

DRAINAGE STRUCTURE NOTES:

- SEE SHEET No. 9 FOR STORM STRUCTURE SCHEDULE AND CONTROL STRUCTURE DETAIL.
- ROUND STRUCTURE BOTTOMS ARE FDOT ALTERNATE 'A'.
- SQUARE / RECTANGULAR STRUCTURE BOTTOMS ARE FDOT ALTERNATE 'B'.
- 4'-0" DIAMETER AND SMALLER AND 3'-6" SQUARE STANDARD STRUCTURE BOTTOMS ARE FDOT TYPE DESIGNATED 'P' LARGER STANDARD STRUCTURE BOTTOMS ARE DESIGNATED TYPE 'J'.
- ALL STRUCTURES SHALL HAVE A 12" SUMP.
- NO WEEP HOLES ALLOWED.
- CONTRACTOR SHALL WORK WITH STRUCTURE FABRICATOR TO DETERMINE ADEQUATE STRUCTURE BOTTOM SIZE FOR THE PROPOSED PIPE SIZES AND ANGLES.

SUMMARY OF DRAINAGE:

THE MINIMUM WATER QUALITY TREATMENT VOLUME REQUIRED IS THE GREATER OF 0.5-INCHES OF RUNOFF OVER THE DRAINAGE RETENTION AREA OR 1.25-INCHES OVER THE IMPERVIOUS SURFACE. STORMWATER TREATMENT IS PROVIDED BY DRY RETENTION. AN ADDITIONAL 0.5-INCH IS ADDED TO THE REQUIRED TREATMENT VOLUME FOR AN ONLINE SYSTEM. THE STORMWATER SYSTEM DISCHARGES TO AN OFW, THEREFORE AN ADDITIONAL 50% IS ADDED TO THE REQUIRED TREATMENT VOLUME. THE TREATMENT SYSTEM IS DESIGNED TO ENSURE THE POST DEVELOPMENT DISCHARGE RATE AND VOLUME DOES NOT EXCEED THE PRE-DEVELOPMENT RATE AND VOLUME FOR THE MEAN ANNUAL, 25 YEAR-24 HOUR, AND 100 YEAR-24 HOUR STORM EVENTS.

Design Storm	Rainfall (inches)	Discharge Rate (cfs)	Outflow Volume (ft ³)	Peak Stage (ft)
Mean Annual, 24-Hour	PRE	4.5	16,223	10.39
	POST	0.17	4,909	
25 Year, 24-Hour	PRE	8.9	44,888	10.98
	POST	6.36	31,300	

EXFILTRATION NOTES:

- CULTEC CONTACTOR 100 HD STORM CHAMBERS TO BE INSTALLED PER CULTEC DETAILS AND MANUFACTURER SPECIFICATIONS (SEE DETAILS ON SHEET No. 10). CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY ENGINEER OF RECORD PRIOR TO CONSTRUCTION.
- CONTRACTOR TO PROVIDE SHOP DRAWING OF CLASS 1 AND CLASS 2 NON-WOVEN FILTER FABRIC.
- SELECT BACKFILL SHALL CONSIST OF WELL-GRADED ROCK, OR ROCK AND COARSE SAND FILL. FILL HAVING A HIGH PROPORTION OF SAND AND/OR FINES WILL NOT BE ACCEPTED. BACKFILL SHALL BE COMPACTED BY MECHANICAL TAMPERS TO 98% MAX. DENSITY (AASHTO T-180). CALICAREOUS MATERIAL IS PROHIBITED.
- TRENCH MATERIAL SHALL CONSIST OF 1.5-INCH TO 3-INCH ANGULAR COARSE AGGREGATE MEETING F.D.O.T. SECTION 901 AND ASTM C-33 AND SHALL BE WASHED, AND FREE OF DELETERIOUS MATERIAL. CRUSHED RECYCLED CONCRETE IS ACCEPTABLE.
- STONE SHALL BE CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION 1.5-INCHES TO 3-INCHES WITH A 50% VOID RATIO. CONTRACTOR TO PROVIDE SHOP DRAWING TO ENGINEER OF RECORD PRIOR TO CONSTRUCTION.
- AFTER AGGREGATE HAS BEEN PLACED TO DESIRED ELEVATION, WASH DOWN WITH CLEAR WATER TO ALLOW FOR INITIAL SETTLEMENT. IF SETTLEMENT OCCURS ADD ADDITIONAL AGGREGATE TO REQUIRED ELEVATION.
- AGGREGATE SHALL BE COMPACTED IN TWO LIFTS, THE FIRST PRIOR TO PLACING PIPE, AND THE SECOND AFTER THE TOP AGGREGATE IS PLACED WITH MECHANICAL TAMPERS. DO NOT COMPACT WITH VIBRATORY ROLLERS.
- TRENCH TO BE CONSTRUCTED AND ADHERED TO OSHA'S TRENCH SAFETY CODE. CONTRACTOR SHALL TAKE PRECAUTIONS TO PREVENT CONTAMINATION OF THE TRENCH BY FOREIGN MATERIAL.
- INSPECTION PORT TO BE INSTALLED ON EACH CULTEC CONTACTOR 100 HD TERMINAL END CAP AND MIDDLE POINT ON LONG RUNS. (SEE INSPECTION PORT DETAIL SHEET No. 9).
- OPERATION, INSPECTION AND MAINTENANCE TO BE PERFORMED PER GUIDELINES PROVIDED ON SHEET No. 10.

GENERAL DRAINAGE NOTES:

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO DRAINAGE SYSTEM AND SHALL RESTORE ANY DAMAGED STRUCTURES.
- ALL PIPE FROM THE BUILDING DRAINS SHALL BE PVC SDR 35 OR SMOOTH INTERIOR HDPE.
- ALL STORM PIPE SHALL BE CONSTRUCTED OF HDPE (SIC) PIPE WITH CERTIFIED WATERTIGHT JOINTS BY THE MANUFACTURER. ACCEPTABLE HDPE PIPE SHALL BE HANCOR SUR-LOK WT, ADS SERIES 35, ADS N-12 WITH WT JOINT OR EQUAL. ALTERNATE STORM PIPE MATERIAL IS RCP PER FDOT SPECIFICATIONS.
- THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF ALL MATERIAL AND STRUCTURES TO THE ENGINEER (NEWKIRK ENGINEERING, INC.) FOR APPROVAL PRIOR TO THE PRECONSTRUCTION MEETING. WASH DOWN WITH CLEAR WATER TO PREVENT SOIL INTRUSION. THE FABRIC SHALL BE PERIODICALLY CLEANED OF SAND & DEBRIS FABRIC SHALL REMAIN IN PLACE UNTIL PAVING IS COMPLETE.
- ALL EXISTING STRUCTURES, UNLESS OTHERWISE NOTED TO REMAIN, FENCING TREES, & ETC., WITHIN THE CONSTRUCTION AREA SHALL BE REMOVED AND DISPOSED OF OFFSITE.
- ALL DRAINAGE STRUCTURES SHALL BE PRE-CAST PER FDOT SPECIFICATIONS.
- ALL DRAINAGE STRUCTURES AND STORM SEWER PIPES SHALL MEET HEAVY DUTY TRAFFIC (H20) LOADING AND BE INSTALLED ACCORDINGLY PER FDOT STANDARD SPECIFICATIONS AND MANUFACTURER SPECIFICATIONS RESPECTIVELY.
- ALL DRAINAGE STRUCTURES AND PIPES SHALL BE CLEANED OF SAND AT THE LAST STAGE OF CONSTRUCTION PRIOR TO THE FINAL INSPECTION.
- ALL STORM INLET GRATES SHALL BE STEEL (TRAFFIC RATED).

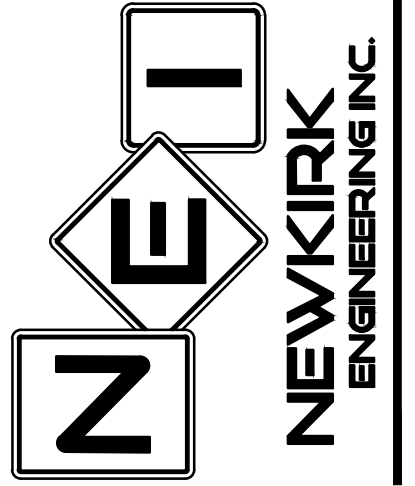
HDPE PIPE MINIMUM SLOPE REQUIREMENTS

PIPE SIZE (IN)	SELF-CLEANSING VELOCITY (FPS)	MANNINGS (N)	RADIUS (FT)	CROSS-SECTIONAL AREA (FT ²)	WETTED PERIMETER (FT)	MINIMUM SLOPE (FT/FT)
12	3.0	0.012	0.5	0.78538	1.1415	0.0036
15	3.0	0.012	0.6	1.22715	3.9269	0.0027
18	3.0	0.012	0.8	1.76709	4.7123	0.0021
24	3.0	0.012	1.0	3.14150	6.2830	0.0015
30	3.0	0.012	1.3	4.90859	7.8538	0.0011

REVISIONS

DATE	DESCRIPTION

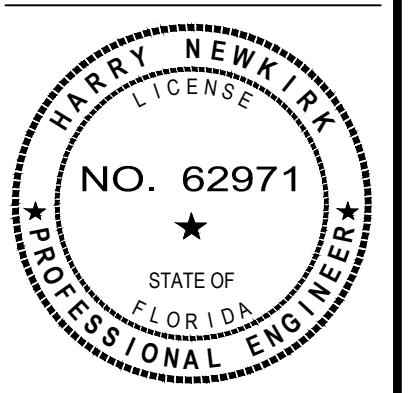
1230 North US1, Suite 3
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DRAINAGE PLAN
LEGACY POINTE COTTAGES
LESLIE STREET
FLAGLER BEACH, FL 32136

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PROJECT No: 2023-17
DATE: OCTOBER 2024
DESIGN BY: HHN
DRAWN BY: NWS
CHECKED BY: HHN
SCALE: 1" = 20'
DRAWING NUMBER



NEWKIRK ENGINEERING, INC.

CIVIL ENGINEERING - TRANSPORTATION - CEI - LANDSCAPE ARCHITECTURE
 1230 N US HWY 1, SUITE 3, ORMOND BEACH, FLORIDA 32174 386-872-7794

POST-DEVELOPMENT CALCULATIONS											
BASIN	BASIN ACRES	PERVIOUS		DCIA IMPERVIOUS		NON DCIA IMPERVIOUS		WET POND NWL / WETLAND		COMPOSITE CN	NON DCIA CN
		ACRES	CN	ACRES	CN	ACRES	CN	ACRES	CN		
POST-1	1.766	0.674	61.00	0.569	98.00	0.523	98.00		100.00	83.89	77.18
POST-2	0.153	0.141	61.00			0.012	98.00		100.00	64.01	64.01
TOTAL	1.919	0.674	61.00	0.569	98.00	0.523	98.00		100.00	77.19	68.41

POST-DEVELOPMENT						
BASIN NAME	SOIL TYPE	DESCRIPTION	CONDITION	HYDRAULIC GROUP	AREA (AC)	CN
POST	11 MYAKKA-MYAKKA, WET, F	URBAN OPEN	GOOD	B	2.054	61.00
	11 MYAKKA-MYAKKA, WET, F	URBAN OPEN	GOOD	B	0.166	61.00
	TOTAL					2.220

DCIA IMP	DIRECT	IMP
%	%	%
32.2%		61.9%

Treatment Volume Calculations		
SJRWMD Dry Retention Pond		
A. 0.5"	of runoff over drainage basin	0.074 Ac-Ft
B. Impervious area x	1.25" (excluding pond)	0.114 Ac-Ft
	+ Additional 0.5" Over Site Area	0.187 Ac-Ft
C. + 50% required treatment volume for OFW		0.281 Ac-Ft
D. Total Required Treatment Volume		0.281

Dry Retention & Exfiltration					
Stage (MSL)	Area (SF)	Area (Ac)	Volume		Notes
			(Ac-ft)	(CF)	
8.00	4,298	0.099	0.000	0	Top of Bank
9.00	5,535	0.127	0.113	4,922	
10.00	6,750	0.155	0.254	11,064	
11.00	7,174	0.165	0.414	18,034	
11.50	7,705	0.177	0.500	21,758	

	Stage (Ft)	Area (Ac)	Volume (Ac-Ft)
Control Elevation	10.20	0.157	0.286
1/2 Treatment Volume	9.20	0.132	0.141
Treatment Volume	10.17	0.157	0.281

Check for Skimmer						
Impervious Area Overall =	$\frac{1.104}{1.766}$	Ac	=	62.51%	>	50% Skimmer Required

Dry Retention Pond

Stage (MSL)	Area (SF)	Area (Ac)	Volume		Notes
			(Ac-ft)	(CF)	
8.00	3,446	0.079	0.000	0	
9.00	4,580	0.105	0.092	4,008	
10.00	5,827	0.134	0.212	9,213	
11.00	7,174	0.165	0.361	15,725	
11.50	7,705	0.177	0.447	19,450	Top of Bank



Project Information: _____
Date: _____

Number of Rows-	2	units
Total number of chambers -	30	units
HVLV SFCx2 Feed Connectors -	0	units
Stone Void -	50	%
Stone Base -	6	inches
Stone Above Units -	6	inches
Area -	1636.00	ft ²
Base of Stone Elevation-	8.00	ft

[Click for Metric](#)

957.57 Min. Area Required

Note: Min. Area required is based on
12" around the system and typ. spacing

CULTEC Contactor 100HD Incremental Storage Volumes

Height of System	Chamber Volume	HVLV SFCx2		Cumulative Storage Volume	Total Cumulative Storage Volume	Elevation
		Feed Connector Volume	Stone Volume			
in	ft ³	ft ³	ft ³	ft ³	ft ³	ft
24.5	0.000	0.000	68.17	68.17	1882.65	10.04
23.5	0.000	0.000	68.17	68.17	1814.48	9.96
22.5	0.000	0.000	68.17	68.17	1746.31	9.88
21.5	0.000	0.000	68.17	68.17	1678.15	9.79
20.5	0.000	0.000	68.17	68.17	1609.98	9.71
19.5	0.000	0.000	68.17	68.17	1541.81	9.63
18.5	0.023	0.000	34.07	34.09	1473.65	9.54
18	5.424	0.000	65.45	70.88	1439.55	9.50
17	15.142	0.000	60.60	75.74	1368.67	9.42
16	24.860	0.000	55.74	80.60	1292.94	9.33
15	31.414	0.000	52.46	83.87	1212.34	9.25
14	35.934	0.000	50.20	86.13	1128.47	9.17
13	39.324	0.000	48.50	87.83	1042.33	9.08
12	41.584	0.000	47.37	88.96	954.50	9.00
11	43.392	0.000	46.47	89.86	865.55	8.92
10	45.878	0.000	45.23	91.11	775.68	8.83
9	45.878	0.000	45.23	91.11	684.58	8.75
8	45.878	0.000	45.23	91.11	593.47	8.67
7	50.398	0.000	42.97	93.37	502.37	8.58
6	0.000	0.000	68.17	68.17	409.00	8.50
5	0.000	0.000	68.17	68.17	340.83	8.42
4	0.000	0.000	68.17	68.17	272.67	8.33
3	0.000	0.000	68.17	68.17	204.50	8.25
2	0.000	0.000	68.17	68.17	136.33	8.17
1	0.000	0.000	68.17	68.17	68.17	8.08



NEWKIRK ENGINEERING, INC.

CIVIL ENGINEERING - TRANSPORTATION - CEI - LANDSCAPE ARCHITECTURE

1230 N US HWY 1, SUITE 3, ORMOND BEACH, FLORIDA 32174 386-872-7794

POND BORING ANALYSIS

Boring	Boring Top Elevation (ft)	Depth to Water (ft)	Seasonal High Water Elevation (ft)
B-1	10.6	4.5	7.1
B-2	10.1	4.0	7.1
B-3	10.2	4.0	7.2
B-4	10.0	4.0	7.0
B-5	10.7	4.5	7.2
B-6	12.5	7.5	6.0
P-1	11.2	5.0	7.2
P-2	9.5	3.0	7.5
Average			7.0

Test Location	Vertical Percolation (ft/day)	Horizontal Percolation (ft/day)	Aquifer Base (EL)
P-1	8.78	20.19	-4.4
P-2	12.60	9.87	-4.9
Average	10.69	15.03	-4.7
FOS = 2	5.35	7.52	

Soil Porosity 25%



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Weighted Vertical Percolation Calculations

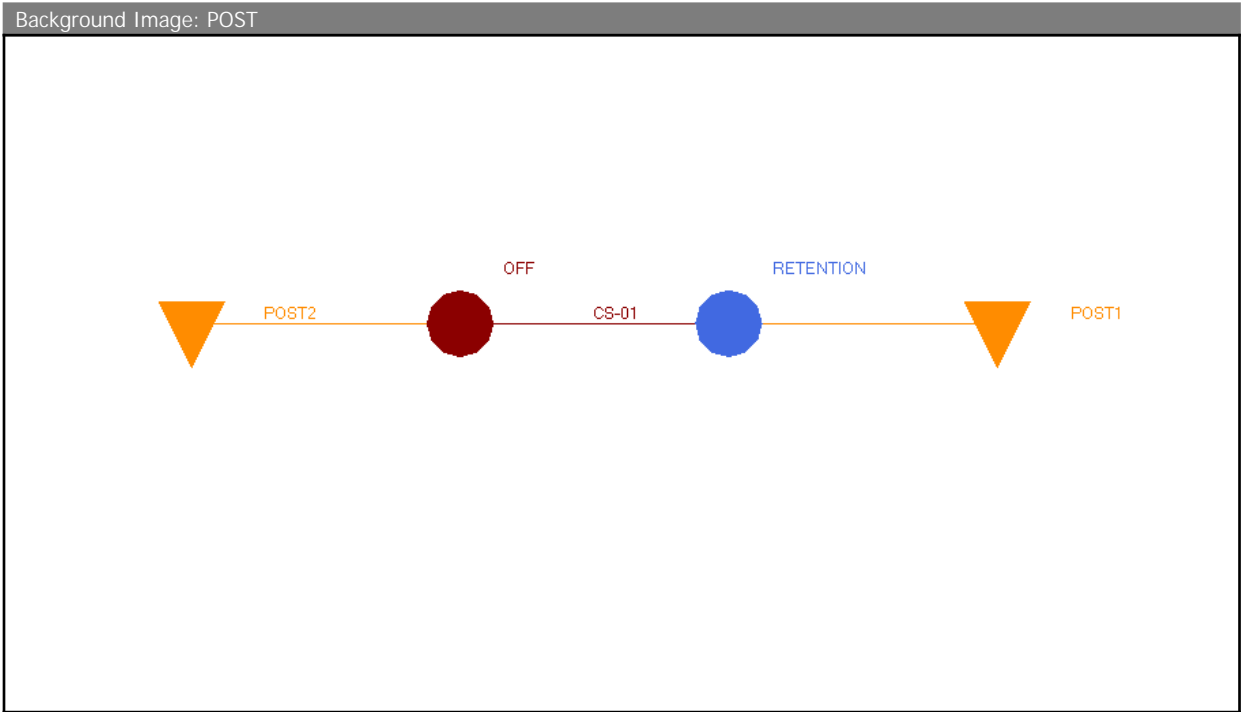
$$P-1 = \frac{0.30 \text{ ft (12.6 fpd)} + 1.7 \text{ ft (8.1 fpd)}}{2.0 \text{ ft}} = 8.78 \text{ fpd}$$

$$P-2 = \frac{2.0 \text{ ft (12.6 fpd)}}{2.0 \text{ ft}} = 12.6 \text{ fpd}$$

Weighted Horizontal Percolation Calculations

$$P-1 = \frac{1.59 \text{ ft (25.2 fpd)} + 2.5 \text{ ft (12.15 fpd)} + 5.0 \text{ ft (18.9 fpd)} + 5.0 \text{ ft (25.2 fpd)} + 5.0 \text{ ft (18.9 fpd)}}{19.09 \text{ ft}} = 20.19 \text{ fpd}$$

$$P-1 = \frac{3.79 \text{ ft (25.2 fpd)} + 17 \text{ ft (6.45 fpd)}}{20.79 \text{ ft}} = 9.87 \text{ fpd}$$



Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Alert Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
OFF	01_MA_24HR	0.00	0.00	6.20	0.0000	0.17	0.00	0
OFF	02_25Y_24H	0.00	0.00	6.20	0.0000	6.36	0.00	0

Node Mass Balance Condensed [Scenario1]

Node Name	Sim Name	Total Inflow [ft3]	Total Outflow [ft3]	Stored Volume (Flow Based) [ft3]
OFF	01_MA_24HR	4909	0	4909
OFF	02_25Y_24H	31300	0	31300

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Alert Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
RETENTION	01_MA_24H R	11.50	0.00	10.39	0.0010	3.47	0.17	6920
RETENTION	02_25Y_24 H	11.50	0.00	10.98	0.0010	8.54	6.00	7179

Node: OFF

Scenario: Scenario1
 Type: Time/Stage
 Base Flow: 0.00 cfs
 Initial Stage: 6.20 ft
 Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft
 Boundary Stage:

Comment:

Node: RETENTION

Scenario: Scenario1
 Type: Stage/Area
 Base Flow: 0.00 cfs
 Initial Stage: 8.00 ft
 Warning Stage: 11.50 ft
 Alert Stage: 0.00 ft

Stage [ft]	Area [ac]	Area [ft2]
8.00	0.0990	4312
9.00	0.1270	5532
10.00	0.1550	6752
11.00	0.1650	7187
11.50	0.1770	7710

Comment:

Drop Structure Link: CS-01	Upstream Pipe	Downstream Pipe
Scenario: Scenario1	Invert: 4.50 ft	Invert: 4.00 ft
From Node: RETENTION	Manning's N: 0.0120	Manning's N: 0.0120
To Node: OFF	Geometry: Circular	Geometry: Circular
Link Count: 1	Max Depth: 1.50 ft	Max Depth: 1.50 ft

Pipe Flow Direction: Both	Bottom Clip	
Solution: Combine	Default: 0.00 ft	Default: 0.00 ft
Increments: 0	Op Table:	Op Table:
Pipe Count: 1	Ref Node:	Ref Node:
Damping: 0.0000 ft	Manning's N: 0.0000	Manning's N: 0.0000
Length: 27.00 ft	Top Clip	
FHWA Code: 0	Default: 0.00 ft	Default: 0.00 ft
Entr Loss Coef: 0.00	Op Table:	Op Table:
Exit Loss Coef: 0.00	Ref Node:	Ref Node:
Bend Loss Coef: 0.00	Manning's N: 0.0000	Manning's N: 0.0000
Bend Location: 0.00 dec		
Energy Switch: Energy		

Pipe Comment:

Weir Component	
Weir: 1	Bottom Clip
Weir Count: 2	Default: 0.00 ft
Weir Flow Direction: Both	Op Table:
Damping: 0.0000 ft	Ref Node:
Weir Type: Sharp Crested Vertical	Top Clip
Geometry Type: V-Notch Up	Default: 0.00 ft
Invert: 10.20 ft	Op Table:
Control Elevation: 10.20 ft	Ref Node:
Max Depth: 1.03 ft	Discharge Coefficients
Max Width: 4.50 ft	Weir Default: 3.200
	Weir Table:
	Orifice Default: 0.600
	Orifice Table:

Weir Comment: TYPE E

Weir Component	
Weir: 2	Bottom Clip
Weir Count: 1	Default: 0.00 ft
Weir Flow Direction: Both	Op Table:
Damping: 0.0000 ft	Ref Node:
Weir Type: Horizontal	Top Clip
Geometry Type: Rectangular	Default: 0.00 ft
Invert: 11.40 ft	Op Table:
Control Elevation: 11.40 ft	Ref Node:
Max Depth: 13.50 ft	Discharge Coefficients
Max Width: 15.00 ft	Weir Default: 3.200
Fillet: 0.00 ft	Weir Table:
	Orifice Default: 0.600
	Orifice Table:

Weir Comment: TYPE E GRATE

Drop Structure Comment:

Simple Basin: POST1

Scenario: Scenario1
Node: RETENTION
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0
Area: 1.7660 ac
Curve Number: 61.0
Ia/S: 0.00
% Impervious: 61.86
% DCIA: 32.23
% Direct: 0.00
Rainfall Name:

Comment:

Simple Basin: POST2

Scenario: Scenario1
Node: OFF
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH323
Peaking Factor: 323.0
Area: 0.1530 ac
Curve Number: 61.0
Ia/S: 0.00
% Impervious: 0.71
% DCIA: 0.00
% Direct: 0.00
Rainfall Name:

Comment:

Simulation: 01_MA_24HR

Scenario: Scenario1
Run Date/Time: 10/7/2024 10:36:06 AM
Program Version: StormWise 4.08.03

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	24.0000

	Hydrology [sec]	Surface Hydraulics [sec]
Min Calculation Time:	60.0000	0.1000
Max Calculation Time:		30.0000

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:

Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:

Extern Hydrograph Set:

Curve Number Set:

Green-Ampt Set:

Vertical Layers Set:

Impervious Set:

Tolerances & Options

Time Marching: SAOR
 Max Iterations: 6
 Over-Relax Weight: 0.5 dec
 Fact:
 dZ Tolerance: 0.0010 ft
 Max dZ: 1.0000 ft
 Link Optimizer Tol: 0.0001 ft

IA Recovery Time: 24.0000 hr
 Ia/S: 0.20 dec
 Smp/Man Basin Rain Opt: Global
 Rainfall Name: ~FLMOD
 Rainfall Amount: 4.50 in

Storm Duration: 24.0000 hr
 Dflit Damping (1D): 0.0050 ft
 Min Node Srf Area 100 ft2
 (1D):
 Energy Switch (1D): Energy

Comment:

Simulation: 02_25Y_24H

Scenario: Scenario1
 Run Date/Time: 10/7/2024 10:36:09 AM
 Program Version: StormWise 4.08.03

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	24.0000

	Hydrology [sec]	Surface Hydraulics [sec]
Min Calculation Time:	60.0000	0.1000
Max Calculation Time:		30.0000

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:

 Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
 Extern Hydrograph Set:
 Curve Number Set:

Green-Ampt Set:
Vertical Layers Set:
Impervious Set:

Tolerances & Options

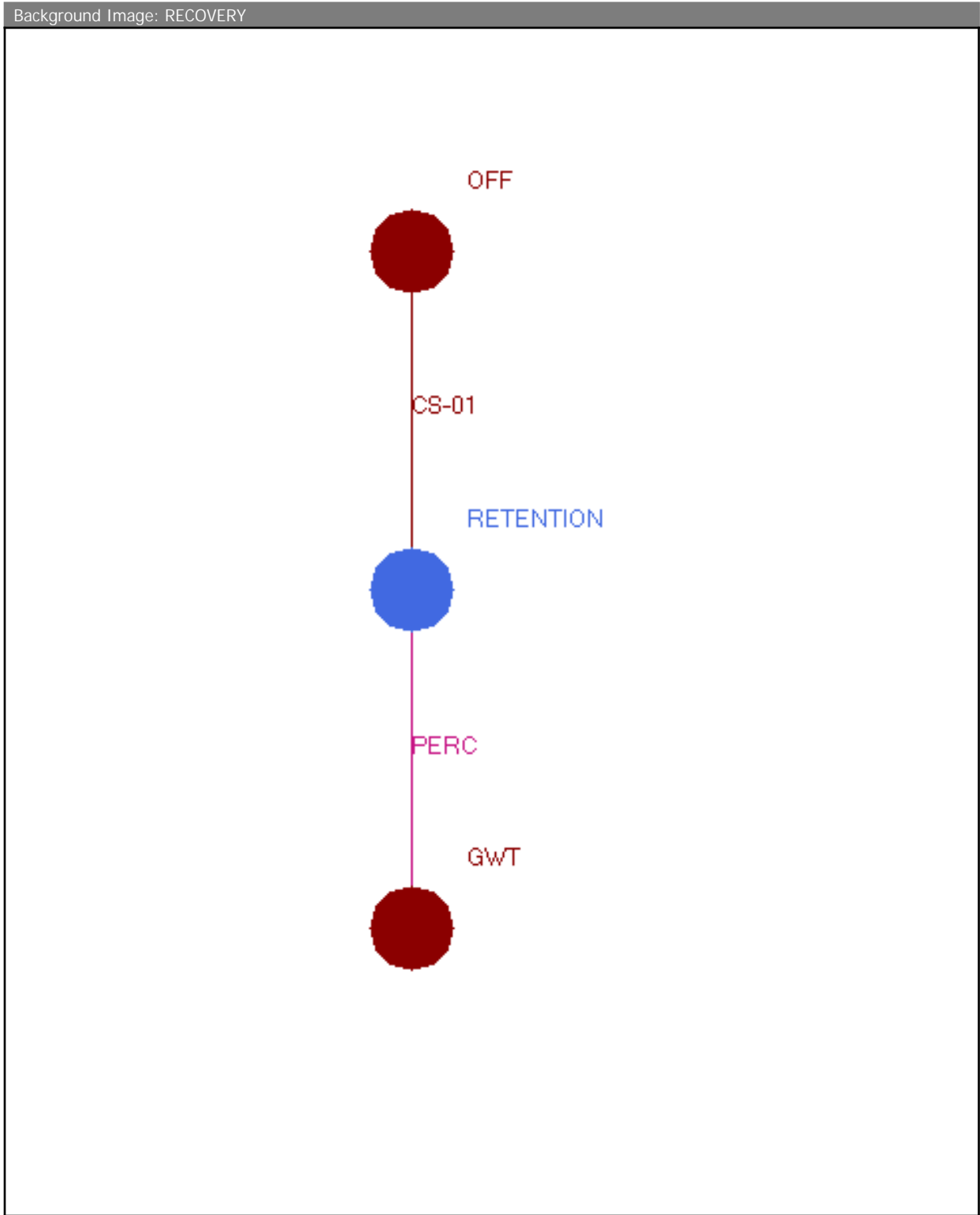
Time Marching: SAOR
Max Iterations: 6
Over-Relax Weight 0.5 dec
Fact:
dZ Tolerance: 0.0010 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft

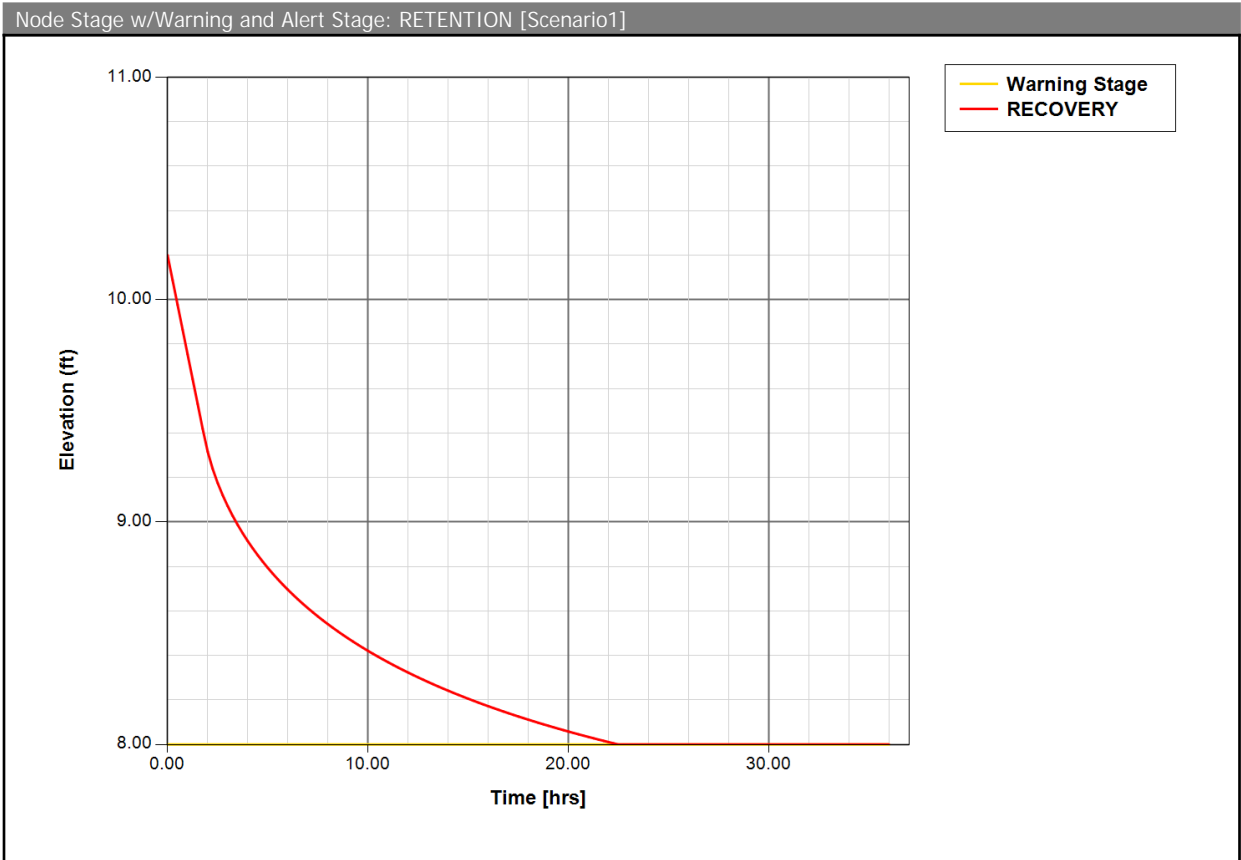
IA Recovery Time: 24.0000 hr
Ia/S: 0.20 dec
Smp/Man Basin Rain Global
Opt:
Rainfall Name: ~FLMOD
Rainfall Amount: 8.85 in
Storm Duration: 24.0000 hr
Dflt Damping (1D): 0.0050 ft
Min Node Srf Area 100 ft2
(1D):
Energy Switch (1D): Energy

Comment:

APPENDIX D

RECOVERY





Node: GWT

Scenario: Scenario1
 Type: Time/Stage
 Base Flow: 0.00 cfs
 Initial Stage: 7.00 ft
 Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft
 Boundary Stage:

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	7.00
0	0	0	36.0000	7.00

Comment:

Node: OFF

Scenario: Scenario1

Type: Time/Stage
 Base Flow: 0.00 cfs
 Initial Stage: 6.20 ft
 Warning Stage: 0.00 ft
 Alert Stage: 0.00 ft
 Boundary Stage:

Comment:

Node: RETENTION

Scenario: Scenario1
 Type: Stage/Area
 Base Flow: 0.00 cfs
 Initial Stage: 10.20 ft
 Warning Stage: 8.00 ft
 Alert Stage: 0.00 ft

Stage [ft]	Area [ac]	Area [ft2]
8.00	0.0990	4312
9.00	0.1270	5532
10.00	0.1550	6752
11.00	0.1650	7187
11.50	0.1770	7710

Comment:

Drop Structure Link: CS-01		Upstream Pipe	Downstream Pipe
Scenario:	Scenario1	Invert: 4.50 ft	Invert: 4.00 ft
From Node:	RETENTION	Manning's N: 0.0120	Manning's N: 0.0120
To Node:	OFF	Geometry: Circular	Geometry: Circular
Link Count:	1	Max Depth: 1.50 ft	Max Depth: 1.50 ft
Pipe Flow Direction:	Both	Bottom Clip	
Solution:	Combine	Default: 0.00 ft	Default: 0.00 ft
Increments:	0	Op Table:	Op Table:
Pipe Count:	1	Ref Node:	Ref Node:
Damping:	0.0000 ft	Manning's N: 0.0000	Manning's N: 0.0000
Length:	27.00 ft	Top Clip	
FHWA Code:	0	Default: 0.00 ft	Default: 0.00 ft
Entr Loss Coef:	0.00	Op Table:	Op Table:
Exit Loss Coef:	0.00	Ref Node:	Ref Node:
Bend Loss Coef:	0.00	Manning's N: 0.0000	Manning's N: 0.0000
Bend Location:	0.00 dec		
Energy Switch:	Energy		

Pipe Comment:

Weir Component	
Weir: 1	Bottom Clip
Weir Count: 2	Default: 0.00 ft
Weir Flow Direction: Both	Op Table:
Damping: 0.0000 ft	Ref Node:
Weir Type: Sharp Crested Vertical	Top Clip
Geometry Type: V-Notch Up	Default: 0.00 ft
Invert: 10.20 ft	Op Table:
Control Elevation: 10.20 ft	Ref Node:
Max Depth: 1.03 ft	Discharge Coefficients
Max Width: 4.50 ft	Weir Default: 3.200
	Weir Table:
	Orifice Default: 0.600
	Orifice Table:

Weir Comment: TYPE E

Weir Component	
Weir: 2	Bottom Clip
Weir Count: 1	Default: 0.00 ft
Weir Flow Direction: Both	Op Table:
Damping: 0.0000 ft	Ref Node:
Weir Type: Horizontal	Top Clip
Geometry Type: Rectangular	Default: 0.00 ft
Invert: 11.40 ft	Op Table:
Control Elevation: 11.40 ft	Ref Node:
Max Depth: 13.50 ft	Discharge Coefficients
Max Width: 15.00 ft	Weir Default: 3.200
Fillet: 0.00 ft	Weir Table:
	Orifice Default: 0.600
	Orifice Table:

Weir Comment: TYPE E GRATE

Drop Structure Comment:

Percolation Link: PERC	
Scenario: Scenario1	Surface Area Option: Vary Based on Stage/Area Table
From Node: RETENTION	Vertical Flow Termination: Horizontal Flow Algorithm
To Node: GWT	Perimeter 1: 950.00 ft
Link Count: 1	Perimeter 2: 1545.00 ft
Flow Direction: Both	Perimeter 3: 4711.00 ft
Aquifer Base Elevation: -4.70 ft	Distance P1 to P2: 50.00 ft
Water Table Elevation: 7.00 ft	Distance P2 to P3: 450.00 ft
Annual Recharge Rate: 0 ipy	# of Cells P1 to P2: 10
Horizontal Conductivity: 15.030 fpd	# of Cells P2 to P3: 45
Vertical Conductivity: 10.690 fpd	
Fillable Porosity: 0.250	

Layer Thickness: 1.00 ft

Comment:

Simulation: RECOVERY

Scenario: Scenario1
 Run Date/Time: 10/7/2024 10:46:49 AM
 Program Version: StormWise 4.08.03

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	36.0000

	Hydrology [sec]	Surface Hydraulics [sec]
Min Calculation Time:	60.0000	0.1000
Max Calculation Time:		30.0000

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	15.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:

 Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
 Extern Hydrograph Set:
 Curve Number Set:

 Green-Ampt Set:
 Vertical Layers Set:
 Impervious Set:

Tolerances & Options

Time Marching: SAOR
Max Iterations: 6
Over-Relax Weight 0.5 dec
Fact:
dZ Tolerance: 0.0010 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft

IA Recovery Time: 24.0000 hr
Ia/S: 0.20 dec
Smp/Man Basin Rain Global
Opt:
Rainfall Name: ~FLMOD
Rainfall Amount: 0.00 in
Storm Duration: 36.0000 hr
Dflt Damping (1D): 0.0050 ft
Min Node Srf Area 100 ft2
(1D):
Energy Switch (1D): Energy

Comment: