

**STORMWATER MANAGEMENT REPORT FOR:
CRESTVIEW (FKA WATERBROOKE PHASE 5)**

262 LOT SINGLE FAMILY SUBDIVISION

Prepared for:

City of Clermont, FL
400 12th Street
Clermont, FL 34711

&

St. Johns River Water Management District
Maitland Service Center
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(407) 659-4800



Prepared by:

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John Wohlfarth, P.E.
Florida Registration No. 73803
Date: May 31, 2018

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1.0 Project Narrative:

Permitted Phase 5

The master drainage system for the Waterbrooke subdivision was originally permitted by SJRWMD as permit 146214-1 in June 15, 2016 and modified as permit 146214-2 on November 21, 2017. The supporting documents in the appendix are from the modified permit.

The permitted phase 5 subdivision consist of 273 single family homes and the associated roadways and infrastructure. The permitted basin has a total area of 77.19 acres and an assumed impervious area of 37.63 acres. The impervious area is based on the basin map and curve number calculations from permit 146214-2, the single family portion of the basin is 55.05 acres @ 65% impervious and the amenity portion is 6.17 acres @ 30% impervious. All treatment and attenuation are provided by the land locked SMA-SOUTH outfall. Please see appendix E & F for the permitted basin map and curve number calculations. Below is a summary of the permitted peak stage of the outfall, please see appendix G for the peak stage report from the permitted calculations.

- SMA-SOUTH peak stage for second 25 year 96 hour storm.
91.45 NGVD 1929 – 90.57 NAVD 1988

Proposed Phase 5:

The proposed site will consist of a 262 single family home residential subdivision and the associated roadway and infrastructure, the proposed phase 5 basin will have the same area of 77.19 acres as the permitted basin. The project will have an impervious area of 31.70 acres which is 5.93 acres less than the permitted condition. There is an offsite commercial basin to the northwest that is part of master drainage permit and drains into the phase 5 basin, the area for the offsite basin is 5.12 acres with a permitted impervious area of 80%. This area will be collected by the proposed drainage system which discharges to the SMA-SOUTH landlocked outfall which is consistent with the permit. There is also a large offsite basin to the south that drains into phase 5, this basin will be intercepted by way of a drainage ditch and routed around the site and discharged to SMA-SOUTH with a large spreader swale. Please see appendix D for the proposed curve number calculations.

Summary:

- Basin area remains the same and Impervious area decreased by 5.93 area.
- Onsite basin area 77.19 acres, applicant owned property 64.04 the remaining 13.15 acres is the 170' wide power easement.
- The proposed improvements will not increase in the peak stages of the outfall SMA-SOUTH.

APPENDIX A

AERIAL MAP



PINE VALLEY BLVD

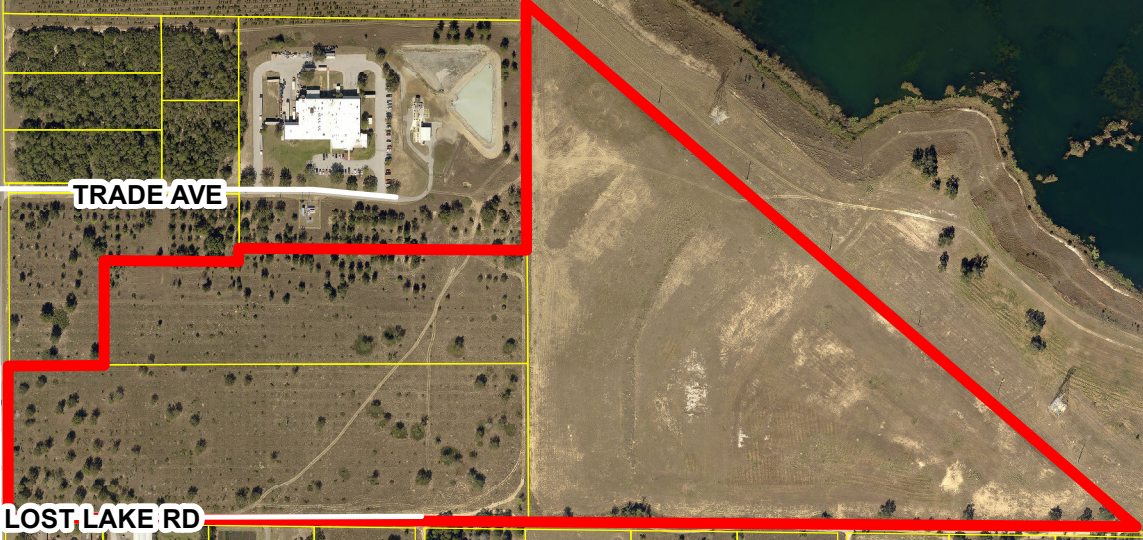
HANCOCK RD

SCOTTISH PINE LN

TRADE AVE

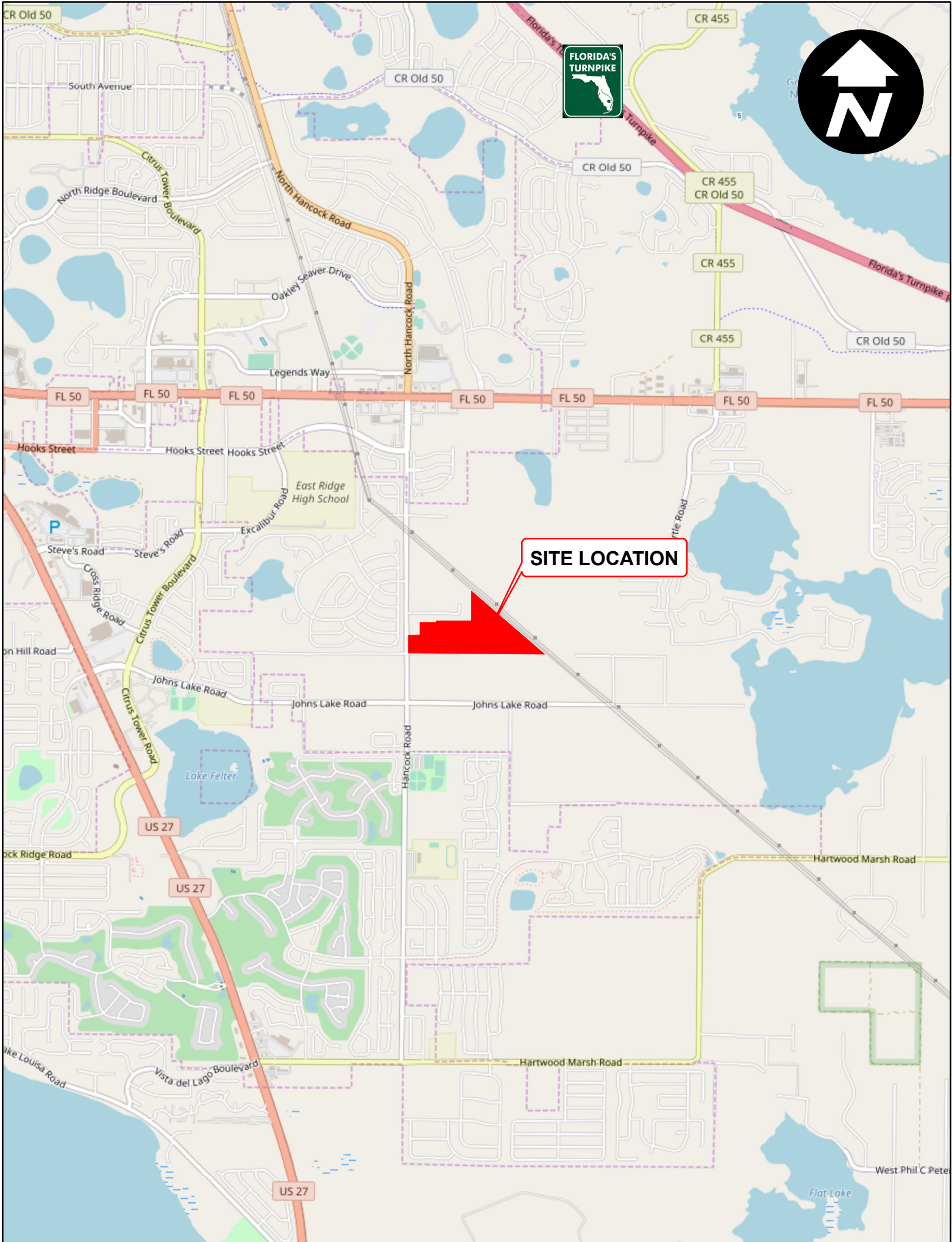
LOST LAKE RD

JOHNS LAKE RD



APPENDIX B

LOCATION MAP

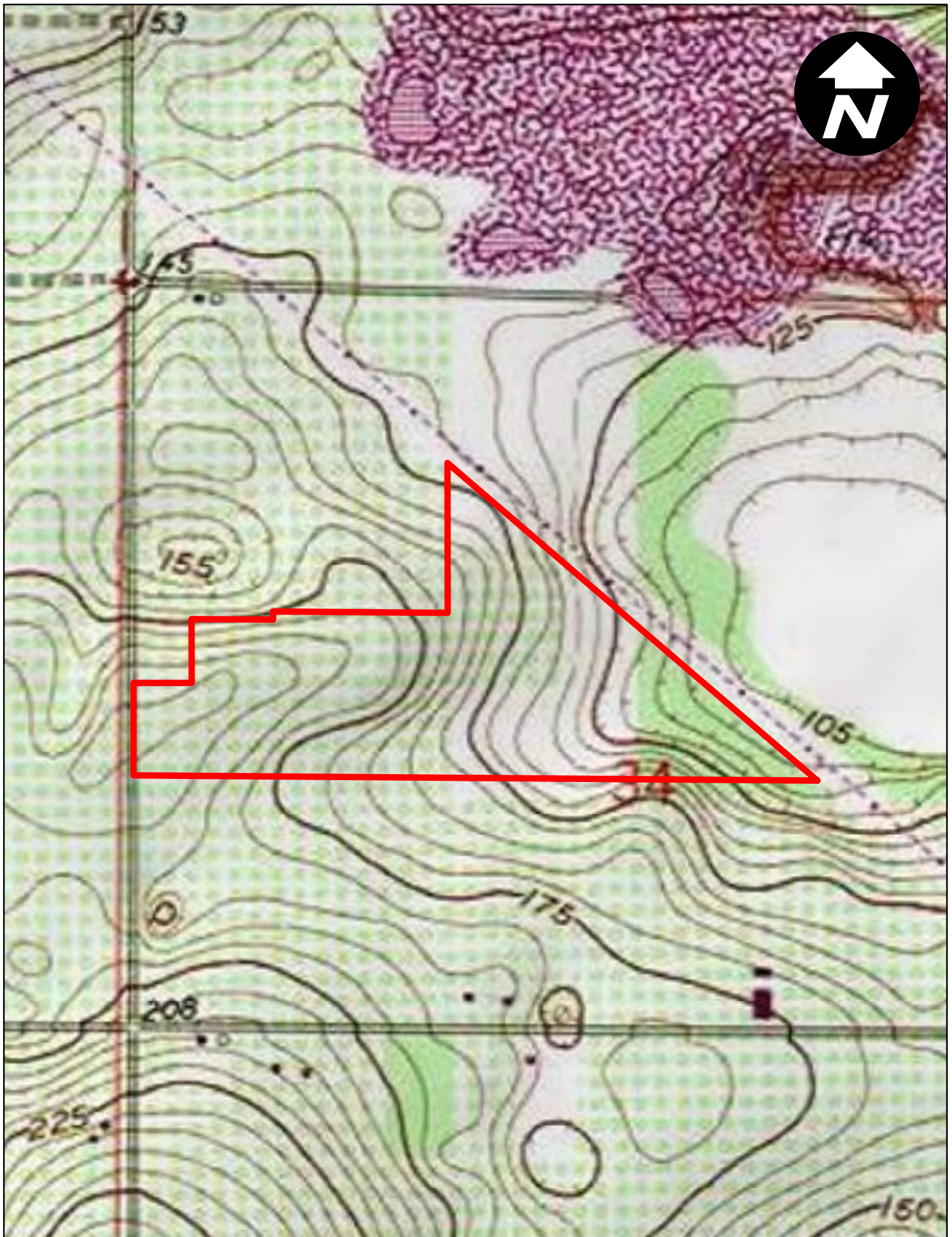


SITE LOCATION

CR Old 50
South Avenue
Citrus Tower Boulevard
North Ridge Boulevard
North Hancock Road
Oakley Seaver Drive
Legends Way
FL 50
Hooks Street
Steve's Road
Cross Ridge Road
Johns Lake Road
Lake Felter
US 27
Hartwood Marsh Road
West Phil C Peter
Flat Lake

APPENDIX C

USGS MAP



APPENDIX D

PROPOSED CURVE NUMBER CALCULATIONS



APPIAN ENGINEERING, LLC

2221 Lee Road Suite 17, Winter Park, FL 32789

(407) 960-5868

AVH-002 WATERBROOK

Basin Designation: POST Development for Basin

SUB-BASIN ANALYSIS & CURVE NUMBER DETERMINATION

Total Onsite Basin Area	=	64.04 acres
Total Offsite Basin Area	=	18.27 acres
Total Basin Area	=	82.31 acres

Determine Basin Runoff Curve Number: CN

PHASE 5

PHASE 5

Cover Type	Hydrologic Soil	CN	Acres	Product
Impervious Area	N/A	98	31.70	3106.79
Open Space (Good Cond.)	A	39	32.34	1261.29
			SUB-TOTAL	64.04
				4368.08

$$\text{Weighted CN} = \frac{(\text{Product Sum})}{(\text{Total Area})} = \frac{4368.08}{64.04} \approx \boxed{68}$$

Assumed Basin Impervious Area

Residential Lots				
114 40' Lots			8.11 Ac.	
118 50' Lots			10.29 Ac.	
30 60' Lots			3.10 Ac.	
Sidewalks			2.20 Ac.	
Roadway			7.10 Ac.	
Amenity @ 30% IMP			0.57 Ac.	Permitted
Park/Open Space @ 10% IMP			0.33 Ac.	Impervious
Total Impervious for Development			31.70 Ac	(37.63 ac)

OFFSITE COMMERCIAL

Cover Type	Hydrologic Soil	CN	Acres	Product
Open Space (Good Cond.)	A	39	1.02	39.94
Impervious Area @ 80%	A	98	4.10	401.41
			SUB-TOTAL	5.12
				441.34

$$\text{Weighted CN} = \frac{(\text{Product Sum})}{(\text{Total Area})} = \frac{441.34}{5.12} \approx \boxed{86}$$

POWER EASEMENT (PART OF PHASE 5)

Cover Type	Hydrologic Soil	CN	Acres	Product
Brush(Fair Cond.)	A	35	13.15	460.14
			SUB-TOTAL	13.15
				460.14

$$\text{Weighted CN} = \frac{(\text{Product Sum})}{(\text{Total Area})} = \frac{460.14}{13.15} \approx \boxed{35}$$

APPENDIX E

PERMITTED CURVE NUMBER CALCULATIONS

WaterBrooke PUD
Post Development Basin Hydrology Calculations

Date: 10/24/2017
 By: CDH
 Ck: JTT

Basin:	POST-WBS1
Receiving Node:	SMA-SOUTH
Basin Area:	309.27 acres

Curve Number (CN) Calculations

Soil Index Number	Soil Index Name	Hydrologic Group
8	Candler sand, 0 to 5 percent slopes	A
9	Candler sand, 5 to 12 percent slopes	A
21	Lake sand, 0 to 5 percent slopes	A

See Note 1

Land Cover	Hydrologic Group	Curve Number (Excluding DCIA)	Pervious & NDCIA Area (ac)	DCIA (ac)	Total Area (ac)	CN x Area (exc. DCIA)
Amenity (50%)	A	49	8.95	5.97	14.92	439
Brush (Fair)	A	35	2.72	0.00	2.72	95
Brush (Fair)	D	77	20.09	0.00	20.09	1547
Brush (Good)	D	73	1.15	0.00	1.15	84
Commercial (80%)	A	86	1.84	3.28	5.12	158
Open Space (Good)	A	39	44.35	0.00	44.35	1730
Open Space (Good)	D	80	22.33	0.00	22.33	1786
Single Family (65%)	A	55	57.75	62.57	120.32	3176
Single Family (65%)	D	85	0.70	0.76	1.46	60
Water Surface	N/A	98	0.00	74.61	74.61	0
Woods (Good)	A	30	1.50	0.00	1.50	45
Woods-Grass Comb. (Good)	A	32	0.70	0.00	0.70	22
Totals:			162.08	147.19	309.27	9142

Phase 5 - 6.17 acres
 Phase 5 - 11.78 acres
 Offsite Commercial
 Phase 5 - 4.19 acres
 Phase 5 - 55.05 acres

Composite CN (exc. DCIA) =	56
Composite DCIA =	48%

Time of Concentration (T_c) Calculations

Type of Flow	Length (L) (ft)	Roughness Coefficient (n)	Slope (S) (%)	Velocity (V) (fps)	Travel Time (T _t) (min)
Sheet Flow	100	0.3	2.00	-	13.9
Shallow Conc. (Unpaved)	160		1.50	1.98	1.3
Shallow Conc. (Paved)	100		1.50	2.49	0.7
Channel/Pipe Flow	2340	0.012	2.00	11.03	3.5

Time of Conc. =	19 Minutes
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1.) Soils within the area of previous mining activity do not have a soil type designation in the most recent NRCS Soil Survey. Soils within this area were designated either as hydrologic group "A" or "D" based on the findings in the geotechnical report by UES.

APPENDIX F

PERMITTED ONSITE & OFFSITE DRAINAGE MAPS

FROM PERMIT 146214-2

CONTRIBUTING AREA SUMMARY FOR ON-SITE DEPRESSIONS

DEV. PHASE	STORMWATER MANAGEMENT FACILITY	SFR & ROW @ 65% IMP.	HWY @ 75% IMP.	AMENITY @ 30% IMP.	OPEN SPACE	UNDEVELOPED AREA (BRUSH, WOODS, WATER SURFACE, ETC.)	TOTAL
HARTLE RD	SMA-SOUTH	~	9.29	~	~	~	1.38 AC.
PHASE 1	SMA-NORTH	26.54	0.69	~	1.11	0.60	28.94 AC.
	SMA-SOUTH	19.33	~	6.94*	33.05	102.87	162.19 AC.
PHASE 2	SMA-NORTH	21.97	~	~	14.41	23.01	59.39 AC.
	SMA-SOUTH	10.57	~	~	0.14	~	10.71 AC.
	DEP-1	~	~	~	~	27.13	27.13 AC.
PHASE 3A	SMA-SOUTH	15.43	~	~	9.06	~	24.49 AC.
	DEP-1	~	~	~	~	7.97	7.92 AC.
PHASE 3B	SMA-NORTH	32.30	~	~	4.47	~	36.77 AC.
PHASE 4	SMA-SOUTH	20.78	~	1.81	5.91	0.38	28.88 AC.
PHASE 5	SMA-SOUTH	55.05	~	6.17	4.19	11.78	77.19 AC.
PHASE 6 (PORTION)	SMA-SOUTH	24.38	~	~	4.15	~	28.53 AC.

*PHASE 1 AMENITY CENTER TO BE 70% IMPERVIOUS; ALL OTHERS TO BE 30% IMPERVIOUS

400'

LEGEND

PROPERTY BOUNDARY

BASIN NAME POST-1

BASIN DIVIDE

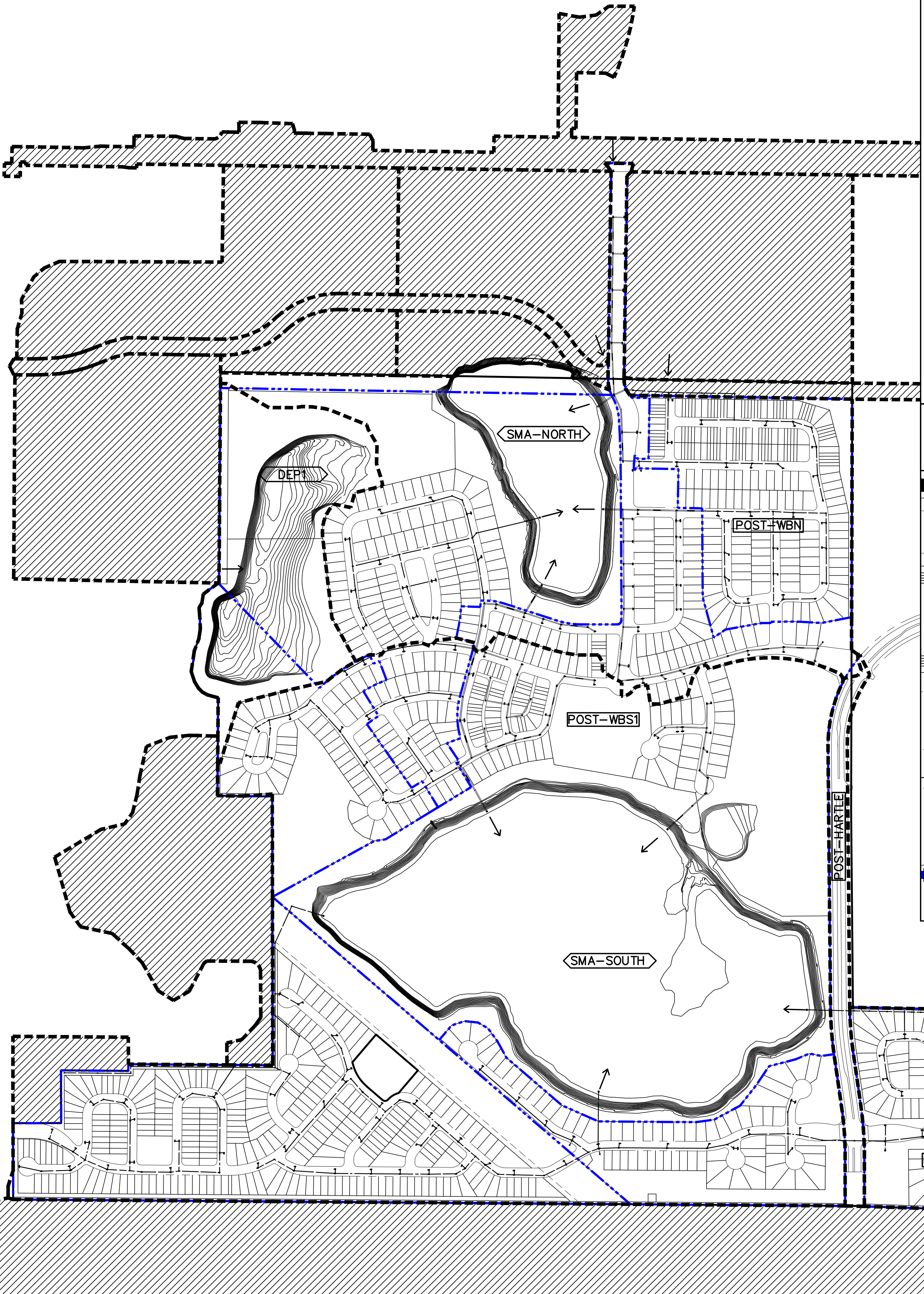
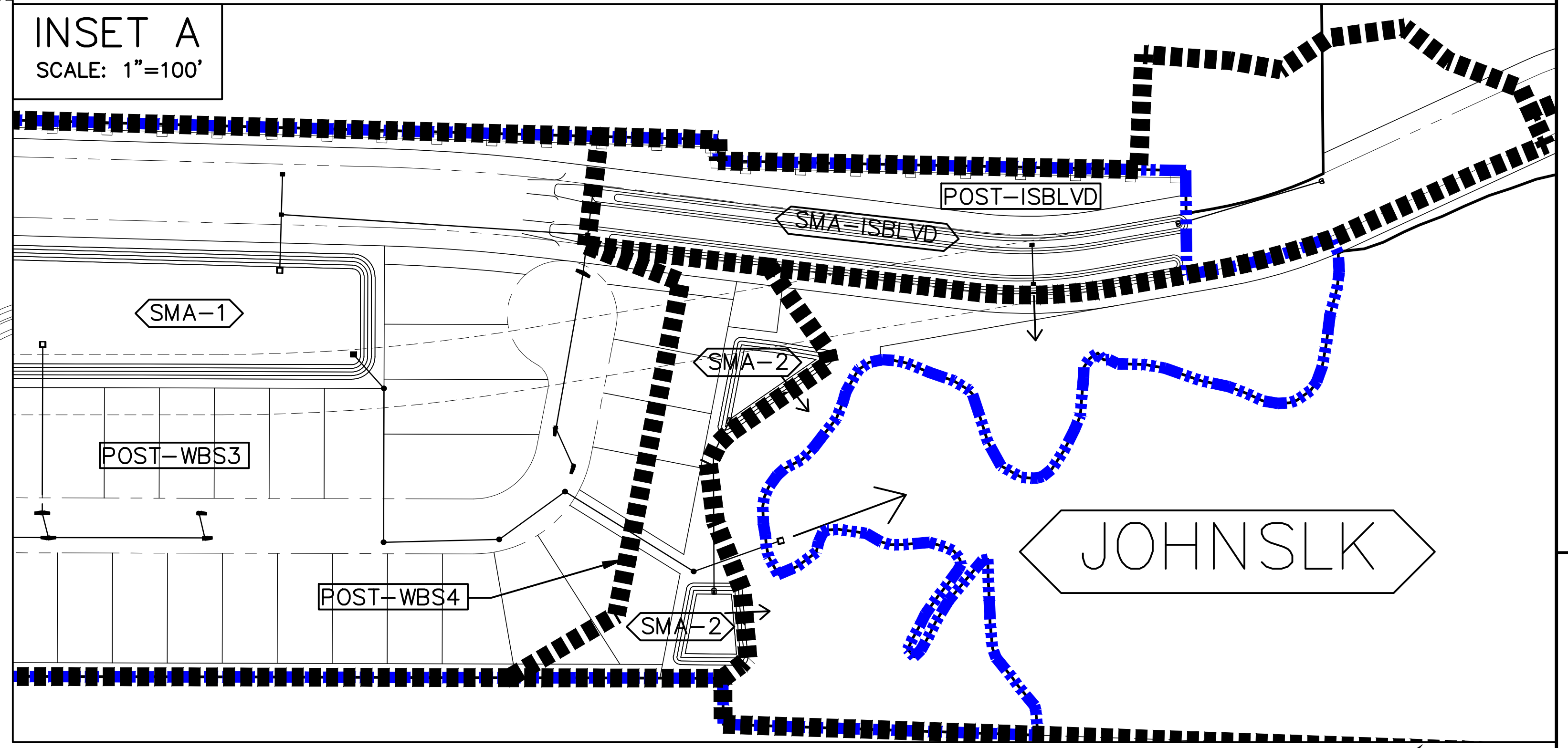
OFFSITE BASIN

NODE NAME SMA-SOUTH

POINT OF DISCHARGE

PHASE LINE

INSET A
SCALE: 1"=100'



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DONALD W. MCINTOSH ASSOCIATES, INC.
 ENGINEERS
 2200 PARK AVENUE NORTH, WINTER PARK, FLORIDA 32789 (407) 644-4088

JOB NUMBER: 27146
 DATE: 5/6/16
 SCALE: 1"=400'
 CHECKED BY: JTT
 DESIGNED BY: CDH
 DRAWN BY: CDH

NO. 1
 DATE 10/24/17
 DESCRIPTION: REMOVED N COMMERCIAL POND, REVISED HOOKS ST
 REVISIONS:

WATERBROOKE PUD
 CITY OF CLERMONT, FL

MASTER DRAINAGE PLAN - ONSITE

DRAWING: 27146-MDP
 SHEET:

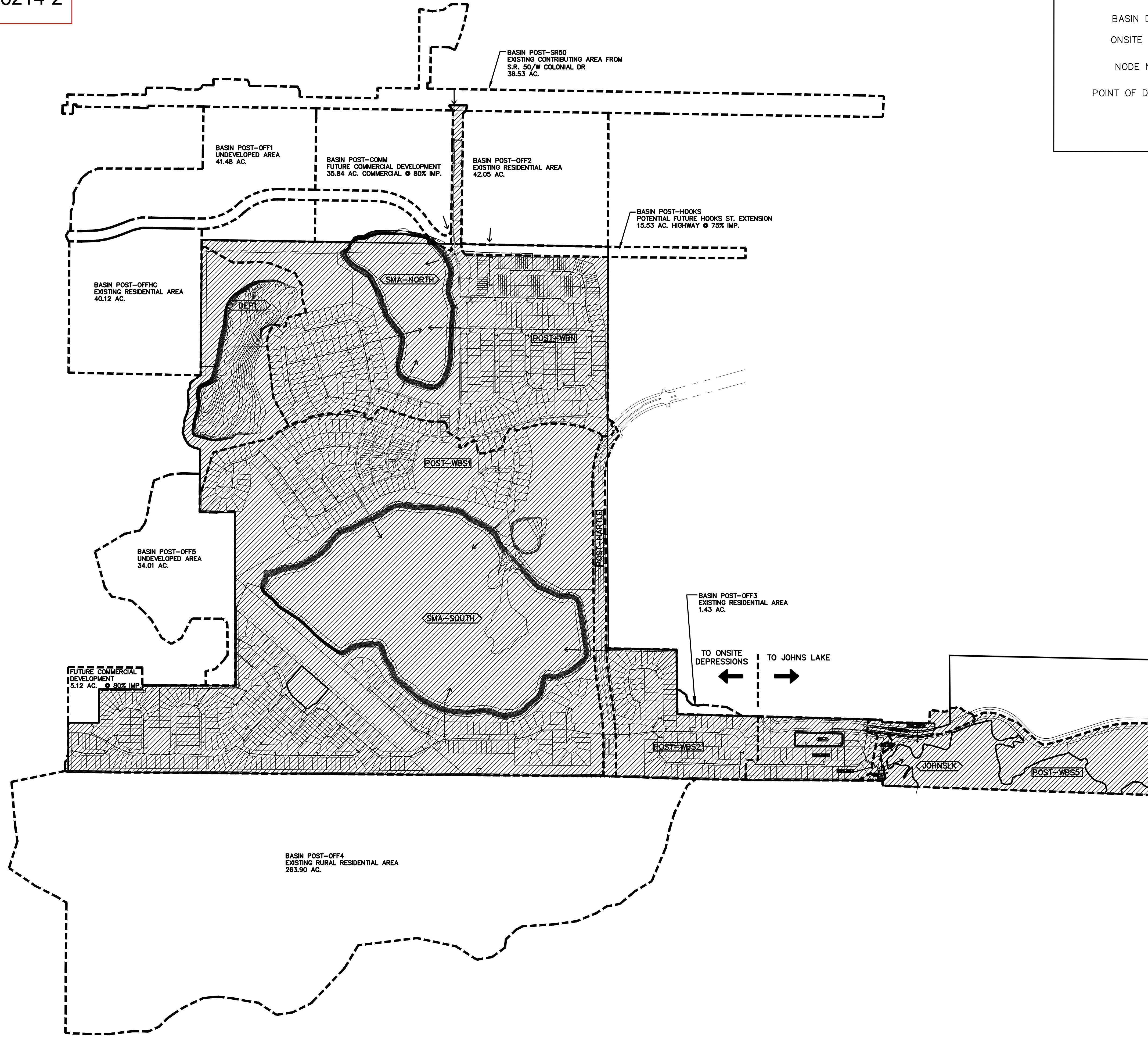
1 OF 1

PROJECT: WATERBROOKE PUD
 SHEET TITLE: MASTER DRAINAGE PLAN
 DWG FILE NAME: F:\Proj\2007\27146\EDWG\Exhibits\27146-MDP.dwg
 XREF FILE NAME: pbase.dwg

SHEET NO. 1 OF 1
 PROJECT: WATERBROOKE PUD
 SHEET TITLE: MASTER DRAINAGE PLAN
 DWG FILE NAME: F:\Proj2007\27146\EDWG\Exhibits\27146-MDP.dwg
 XREF FILE NAME: pspbase.dwg

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FROM PERMIT 146214-2



LEGEND

PROPERTY BOUNDARY ———

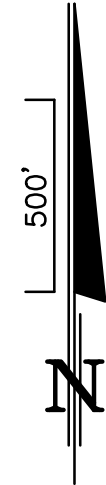
BASIN NAME POST-1

BASIN DIVIDE - - - - -

ONSITE BASIN [Hatched Box]

NODE NAME SMA-SOUTH

POINT OF DISCHARGE →



<p>DONALD W. MCINTOSH ASSOCIATES, INC. ENGINEERS 2200 PARK AVENUE NORTH, WINTER PARK, FLORIDA 32789 (407) 644-4068</p>		<p>DATE: 5/6/16</p>	<p>SCALE: 1"=500'</p>	<p>JOB NUMBER: 27146</p>	<p>NO. 1</p>	<p>DATE: 10/24/17</p>	<p>DESCRIPTION: REMOVED N COMMERCIAL POND, REVISED HOOKS ST</p>	<p>CHK.</p>	
<p>WATERBROOKE PUD CITY OF CLERMONT, FL</p>		<p>MASTER DRAINAGE PLAN - OFFSITE</p>		<p>DRAWN BY: CDH</p>		<p>DESIGNED BY: CDH</p>		<p>CHECKED BY: JTT</p>	
<p>DRAWING: 27146-MDP</p>	<p>SHEET</p>	<p>1 OF 1</p>		<p>DATE: 5/6/16</p>		<p>SCALE: 1"=500'</p>		<p>JOB NUMBER: 27146</p>	

APPENDIX G

PERMITTED PEAK STAGES SMA-SOUTH



Total Rainfall (From Technical Publication SJ 88-3: Rao, 1988):

- 4.2 inches (Mean-Annual)
- 6.7 inches (10-year, 24-hour)
- 8.4 inches (25-year, 24-hour)
- 11.2 inches (25-year, 96-hour)

Time of Concentration:

SCS Kinematic Wave method, as described in TR-55.

c. Routing

Routing calculations were performed using Interconnected Channel and Pond Routing (3.10) by Streamline Technologies, Inc.

d. Tailwater Determination

The tailwater elevation for the Johns Lake discharge was assumed to be the base flood elevation of 100.6 ft NGVD.

e. Initial Stage

In lieu of demonstrating 72-hour treatment volume recovery in the two land-locked depressions, the starting elevation for the routing simulations was set at the elevation corresponding treatment volume. The treatment volume was calculated using the SJRWMD methodology, as outlined in section E.

3. Results

The calculations in Appendix C demonstrate that the land-locked depressions provide adequate storage to retain back-to-back 25-year 96-hour storms within their banks, without accounting for infiltration. Additionally, the proposed dry retention ponds in the eastern portion of the site provide adequate attenuation of the design storms. The peak stage summary for the land-locked depressions and the pre-post comparison of peak discharge rates to the boundary node are provided below:

TABLE 1 – PEAK STAGE SUMMARY

Design Storm	SMA-NORTH Peak Stage (NGVD29)	SMA-SOUTH Peak Stage (NGVD29)
25-Year, 96 Hour (1 st)	90.72	86.32
25-Year, 96 Hour (2 nd)	94.42	91.45

TABLE 2 – BOUNDARY NODE DISCHARGE RATES

Design Storm	Boundary Node	Pre-Development Discharge (cfs)	Post-Development Discharge (cfs)
Mean Annual	JOHNSLK	26.87	26.70
10-Year, 24-Hour	JOHNSLK	44.31	43.47
25-Year, 24-Hour	JOHNSLK	60.19	58.17