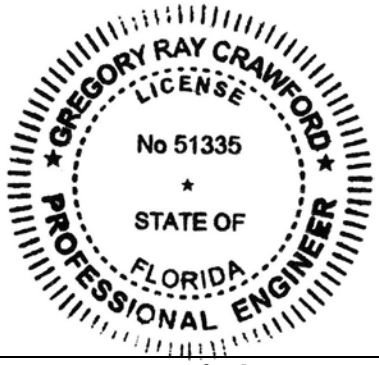
FLORIDA ENGINEERING GROUP
5127 South Orange Avenue
Orlando, FL 32809
Phone: 407-895-0324

Engineering the Future

Surface Water Management System Report

Range Road Subdivision
N. Range Road
Cocoa, Florida 32926



Prepared for:
Karali Associates, LLC.
June 15, 2022
FEG 19-070

Gregory R. Crawford, PE #51335
Florida Engineering Group, Inc.
Certificate No. EB0006595

CONTENTS

I. Project Narrative

A. Project Location

The Range Road Subdivision project site is located on the east side of Range Road in the City of Cocoa, Brevard County, Florida. Specifically, the site is located in Sections 19 and 30, Township 24 South, Range 36 East. The proposed project includes Parcel ID numbers 24-36-19-00-501, 24-36-30-00-258, and 24-36-30-00-252. A Site Location Map is provided in **Appendix A** of this report.

B. Project Site Description

As mentioned, the proposed project is known as Range Road Subdivision which consist of approximately 57.23 acres. The existing conditions of the property are classified as undeveloped land with approximately 27.57 acres of wetlands.

The predominant soils on the project site are (36) Myakka sand, (49) Pomello sand, (54) St. Johns sand, (64) Terra Ceia muck, (67) Tomoka muck, (68) Tomoka muck. The NRCS Soil Survey for Brevard County, Florida classifies these soils as Hydrological Soil Group (HSG) Type A/D, B/D, and Type A.

Per FEMA FIRM Panel 12009C0320H (dated January 29, 2021) and Panel 12009C0425G (dated March 17, 2014), the site is located in Zone AE with a BFE of 21.70 (NAVD 88).

Copies of an aerial photography map, the USGS Quadrangle Map, the SCS Soil Survey Map, and the FEMA Flood Insurance Rate Map for the subject project site are included in **Appendix A** of this report.

C. Project Description

The proposed project consists of a 71-lot single-family residential development with its associated roadways, utility facilities, recreational areas, and stormwater system. The proposed stormwater system will consist of three (3) individual wet bottom ponds, which are interconnected, via a stormwater conveyance piping system, to operate as a single stormwater system. The lot areas will be a minimum of 4,000 square feet. As previously mentioned, the property contains approximately 27.57 acres of wetlands in five (5) separate wetland areas. A majority of the wetlands are located on the eastern portion of the property and there are three (3) isolated wetlands located in the middle of the property. The three (3) isolated wetlands will be impacted, as well as a small portion of the larger wetland to the east for the proposed improvements. The Pre- and Post-Development Basin Maps showing the proposed improvements are provided in **Appendix B** of this report. The basins are described as follows:

1. *Basin PRE*

The Pre basin comprises of 28.14 acres. This basin is mainly comprised of heavily wooded area and contains three (3) isolated wetland areas that will be impacted by the proposed improvements. The two (2) larger wetland areas located on the eastern portion of the property will undisturbed except for a small area that will be impacted for the grading of one (1) of the roadways. The buffer areas will have varying degrees of impact for compensating storage volume and to provide positive outfall for the ponds. Based on the existing topographic features, the basin generally drains easterly towards the larger wetland areas as well as to an existing swale that runs east and west through the middle of the property. The existing swale connects the easterly wetland areas to the existing roadway ditches located along the east side of Range Road. Based on the topography, the swale flows from east to west into the ditch along the east side of Range Road.

As previously mentioned, for the proposed conditions, the stormwater system will consist of three (3) individual wet bottom ponds, which are interconnected, via a stormwater conveyance piping system, to operate as a single stormwater system. These equalized stormwater ponds will provide water quality treatment and water quantity attenuation prior to discharging off-site. The site was divided into three (3) basins, each containing one (1) of the stormwater ponds.

2. *Basin POND-1*

Basin POND-1 comprises of 8.62 acres. The basin will collect the runoff from the south portion of the developed area and direct it to Pond 1 (Tract B) for water quality treatment and attenuation from the overall pond system prior to discharging off-site. POND-1 will include a two (2) outfall structures in it. The first is a broad-crested weir that is located along the eastern berm of the pond to allow the pond to discharge to the existing wetland area located on the east side of the property as it does in the existing conditions. The second outfall will be a control structure located on the southern portion of Pond 3 and will consist of a bleed-down orifice to control the water levels at elevation 18.75. The bleed-down control structure will flow west into the existing ditch along the east side of Range Road and flow north as it does in the existing conditions.

3. *Basin POND-2*

Basin POND-2 comprises of 6.00 acres. The basin will collect the runoff from the northwesterly portion of the developed area and direct it to POND 2 (Tract K) for water quality treatment and attenuation from the overall pond system. There are no outfall weirs or structures in POND-2.

4. *Basin POND-3*

Basin POND-3 comprises of 9.57 acres. The basin will collect the runoff from the northeasterly portion of the developed area and direct it to Pond 3 (Tract G) for water quality treatment and attenuation from the overall pond system prior to discharging off-site. POND-3 includes a broad-crested weir that is located along a portion of the eastern berm of the pond to allow the pond to

discharge to the existing wetland area located on the east side of the property as it does in the existing conditions.

Please see the stormwater calculations included in **Appendix B** of this report and the construction plans for more details.

All elevations listed in this report refer to NAVD 88, unless otherwise noted.

II. Pre-Development Stormwater Management Analysis

The proposed project site varies in elevation from approximately elevation 22 at the northern end of the property to approximately elevation 15 in the existing swale running through the middle of the property. The stormwater runoff generally sheet flows easterly across the property to the existing wetlands located along the eastern portion of the property, as well as flowing into an existing swale crossing east to west through the property. As previously mentioned, the existing swale generally is graded to flow from the east side of the property to the west and discharge into the existing roadside ditch along the east side of Range Road. The existing roadside ditch then flows south to an existing 38"x60" RCP that drains to the west under Range Road. No off-site flows drain to the project area.

The proposed development will be designed to attenuate the post-development peak discharge rate for the Mean Annual and 25-year/24-hour storm events. Please see **Table 1** for the pre-development peak discharge rates for the SJRWMD storm events. See **Appendix C** for the basin summary results.

Table 1: Pre-Development Peak Discharge Rates

PEAK DISCHARGE RATE (cfs)		
Mean Annual (FLMOD)	TW-PRE	28.13
25 year/24 hour (FLMOD)	TW-PRE	64.68

III. Post Development Stormwater Management Analysis

A. General Description and Regulatory Requirements

As mentioned, the surface water management system for the project will consist of three (3) wet detention stormwater ponds that are designed in accordance with the Water Quality and Quantity requirements of the City of Cocoa and SJRWMD requirements. Ponds 1, 2, and 3 are interconnected, via equalizing pipes, such that all of the ponds will act as one large pond for water quality treatment and attenuation prior to discharging to the on-site wetlands along the eastern portion of the property to mimic existing conditions.

The proposed wet detention ponds are designed to provide treatment and attenuation for the stormwater runoff from the proposed improvements for the Mean Annual and 25-year/24-hour storm events. Water Quality Treatment volume for the project is provided in the wet detention ponds to meet the requirements of the SJRWMD, as outlined in Chapter 40C-4, and pursuant to City of Cocoa requirements. As previously mentioned, the wet-detention ponds are interconnected with equalizing pipes that allow them to act as one (1) larger pond. Pond 1 will include a broad-crested weir as well as a drop structure for the bleed-down orifice that will control the water quality treatment, drawdown, and attenuation of the runoff and Pond 3 will include a broad-crested weir that will control the attenuation of the stormwater runoff from the development prior to discharging to the existing wetlands.

B. Environmental Issues

As previously mentioned, the proposed overall property contains wetlands that will mainly remain undisturbed during the construction of the proposed project. However, the three (3) isolated wetland areas located in the middle of the property will be impacted, as well as a small portion of the larger wetland on the east for roadway grading. A 25’ average buffer is also being proposed to ensure the that the wetlands that are proposed to remain will be protected. Please see the Environmental Assessment Report prepared by Ecological Consulting Solutions for the proposed impacts and preservation analysis of the wetlands.

C. Pond Seasonal High Water & Initial Routing Elevations

A geotechnical analysis was prepared for this project by Professional Service Industries, Inc. Within the report, the Seasonal High Water Elevations (SHWT) were determined for the property to be at an Elevation between 19 and 20.50 feet across the site. The proposed wet detention ponds will have a designed Normal Control Elevation of 18.75.

D. Water Quality

Water Quality Treatment volume is provided for the post-development basins using the proposed wet

detention ponds pursuant to the requirements of the SJRWMD as outlined in Chapter 40C-4 and pursuant to the City of Cocoa requirements. This project ultimately discharges into St. Johns River, which is not considered to be an Outstanding Florida Water Body.

The following sections of this report provide detailed Water Quality and Quantity related design calculations and methodology. **Appendix B** of this report provides the Pre-Development allowable peak discharge rate calculations (as previously described), the Post-Development Basin Map, and the Post-Development stormwater calculations. The Basin map delineates the limits of the Post-Development basins and the Calculations, also included in **Appendix B,** provide a breakdown of the pervious cover and impervious cover for the post-development conditions; provide tabulations of curve numbers for each ground cover; provide weighted curve numbers, and times of concentrations for the post-development conditions; Water Quality Treatment Volume determinations; Drawdown analysis; and Permanent Pool Calculations. **Appendix D** of this report provides the output from AdICPR that was used to model the water quality drawdown analysis.

E. Tailwater

The proposed project will discharge to the on-site wetland located to the west of the property as it does in the existing conditions. Based on the existing elevations, the tailwater elevation of 18.50 was used for the 25-year/24-hour storm event.

F. Water Quantity

In general, the same drainage patterns will be maintained in the post-development condition as those in the pre-development condition. Specifically, discharge from the project will be from the proposed on-site wet detention ponds, which are designed to attenuate the post-development flow from the improvement areas prior to discharging westerly to the on-site wetland area.

AdICPR was used to create multiple models of the post-development conditions to show the resulting peak discharge rates and stages in the proposed stormwater system during the Mean Annual (FLMOD) and 25-year/ 24-hour (FLMOD) storm events. See **Appendix D** for the input data and results showing the routing results. Please see **Table** 2 for a summary of the post-development peak discharge rates and stages for the SJRWMD storm events.

Table 2: Post-Development Peak Discharge Rates

PEAK DISCHARGE RATE (cfs)		
Mean Annual (FLMOD)	PRE (cfs)	28.13
	POST (cfs)	16.40
	STAGE (ft.)	19.28
25 year/24 hour (FLMOD)	PRE (cfs)	64.68
	POST (cfs)	64.59
	STAGE (ft.)	19.63

G. Secondary Stormwater Analysis

The proposed project will utilize a closed conveyance system for the runoff from the proposed improvements to the stormwater ponds. Please see **Appendix E** for the results of the secondary stormwater system.

H. Flood Plain Analysis

As mentioned previously, according to the FEMA Flood Insurance Rate Map, this property lies within Zone AE, the 100-year flood plain (Flood Elevation 21.7). Please see **Appendix F** for the 100-year flood plain encroachment volume calculations, as well as the compensating storage volume calculations.

I. Administrative

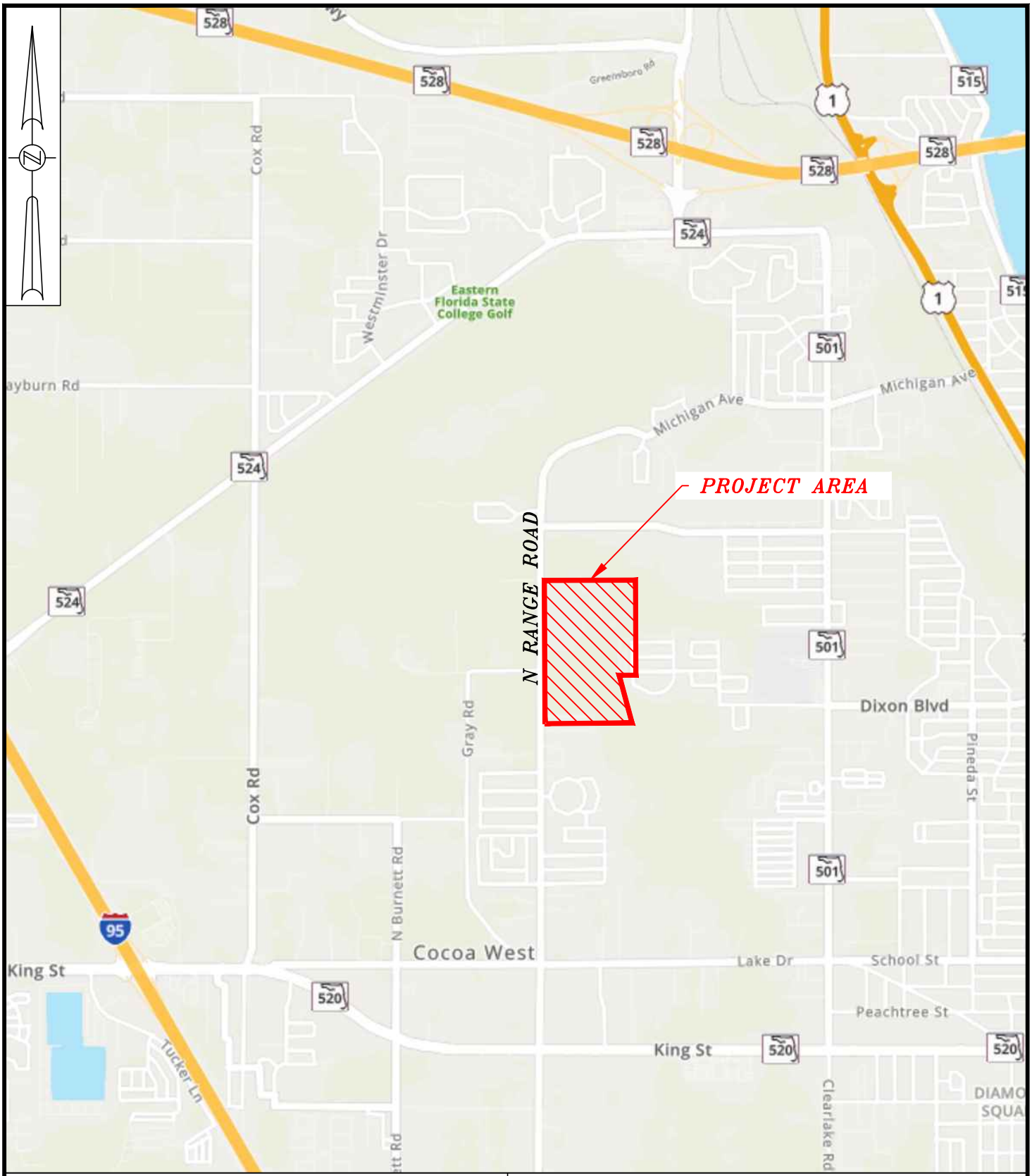
1. *Ownership*

The site is currently owned by Karali Associates, LLC

2. *Operation and Maintenance*

The Homeowners Association (HOA) will operate and maintain the stormwater management system.

Appendix A – Exhibits



PROJECT NAME: RANGE ROAD SUBDIVISION	**SITE LOCATION MAP**
CLIENT: KARALI ASSOCIATES, LLC	
S, T, R: S 30 T 24S R 36E	**F.E.G. PROJECT NO.:** 19-070
DATE: APRIL 01, 2022	**SCALE:** 1" = 200'

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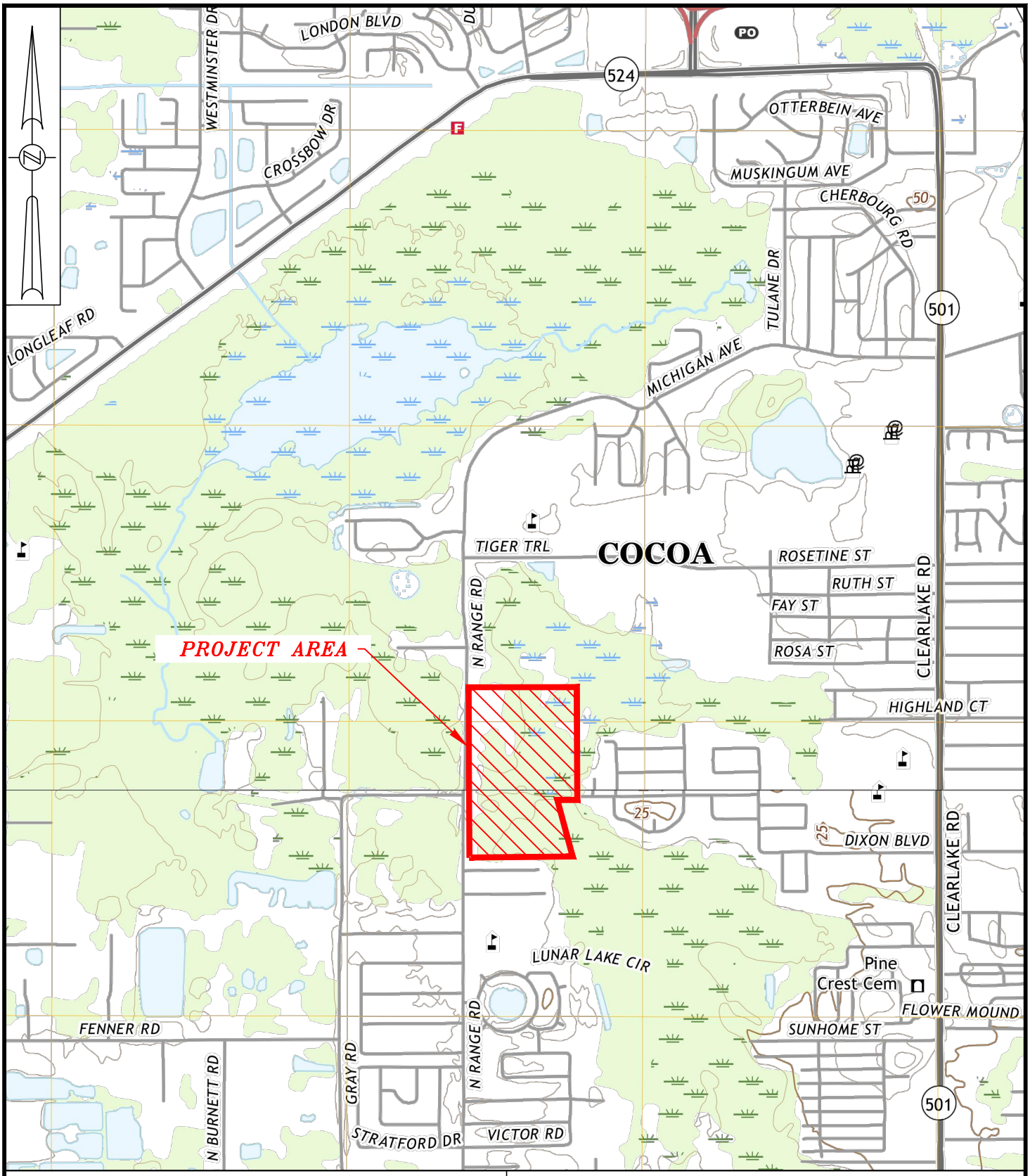

PROJECT NAME: RANGE ROAD SUBDIVISION	**U.S.G.S QUADRANGLE MAP**
CLIENT: KARALI ASSOCIATES, LLC	
S, T, R: S 30 T 24S R 36E	**F.E.G. PROJECT NO.:** 19-070
DATE: APRIL 01, 2022	**SCALE:** 1" = 1500"

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PROJECT NAME: RANGE ROAD SUBDIVISION	2022 AERIAL PHOTOGRAPHY MAP
CLIENT: KARALI ASSOCIATES, LLC	
S, T, R: S 30 T 24S R 36E	F.E.G. PROJECT NO.: 19-070
DATE: APRIL 01, 2022	SCALE: 1" = 500'

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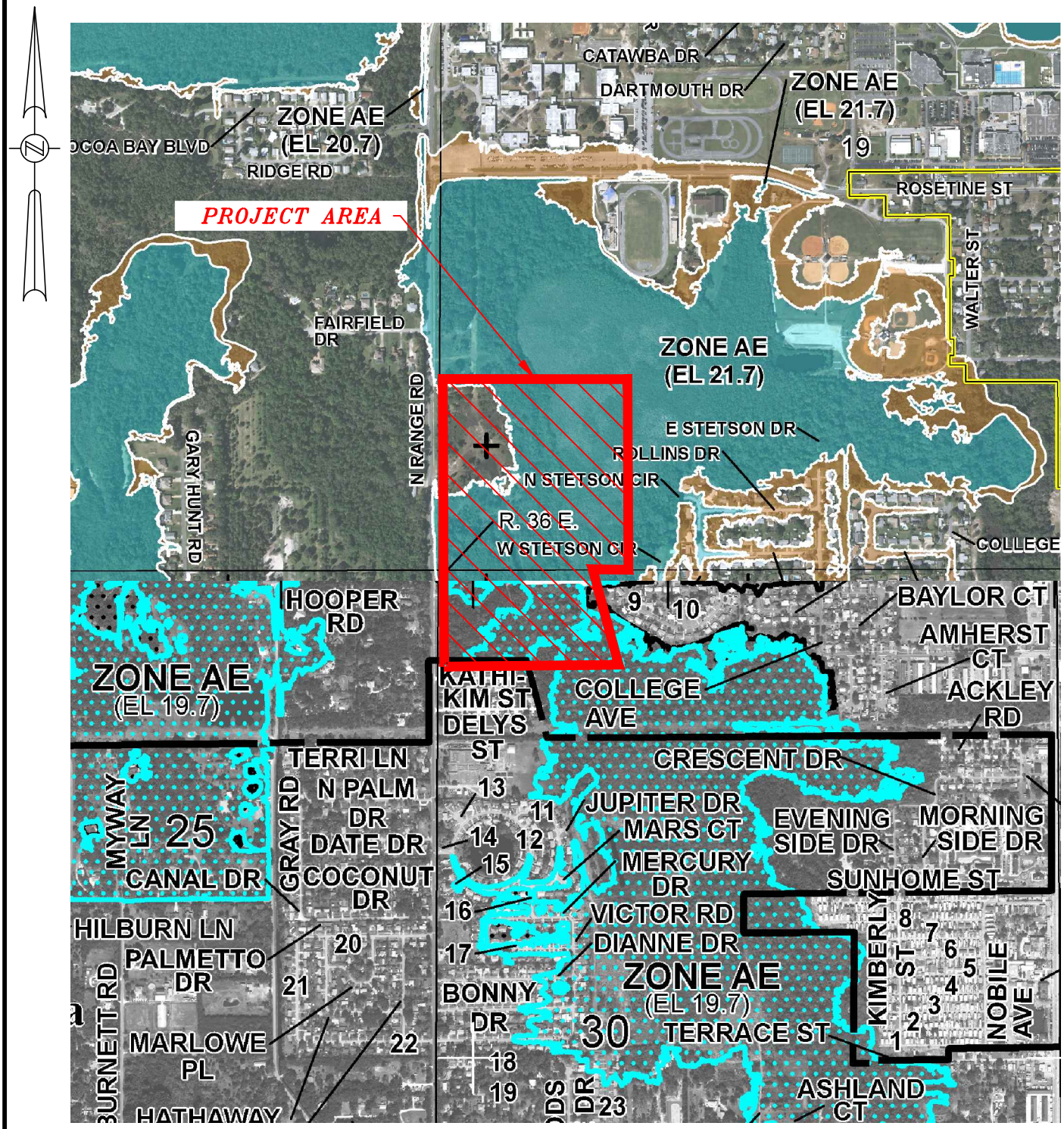

PROJECT NAME: RANGE ROAD SUBDIVISION	FEMA F.I.R.M MAP PANEL # 12009C0320H (01/29/2021) & 12009C045G (03/17/2014)
CLIENT: KARALI ASSOCIATES, LLC	
S, T, R: S 30 T 24S R 36E	F.E.G. PROJECT NO.: 19-070
DATE: APRIL 01, 2022	SCALE: 1" = 1500'

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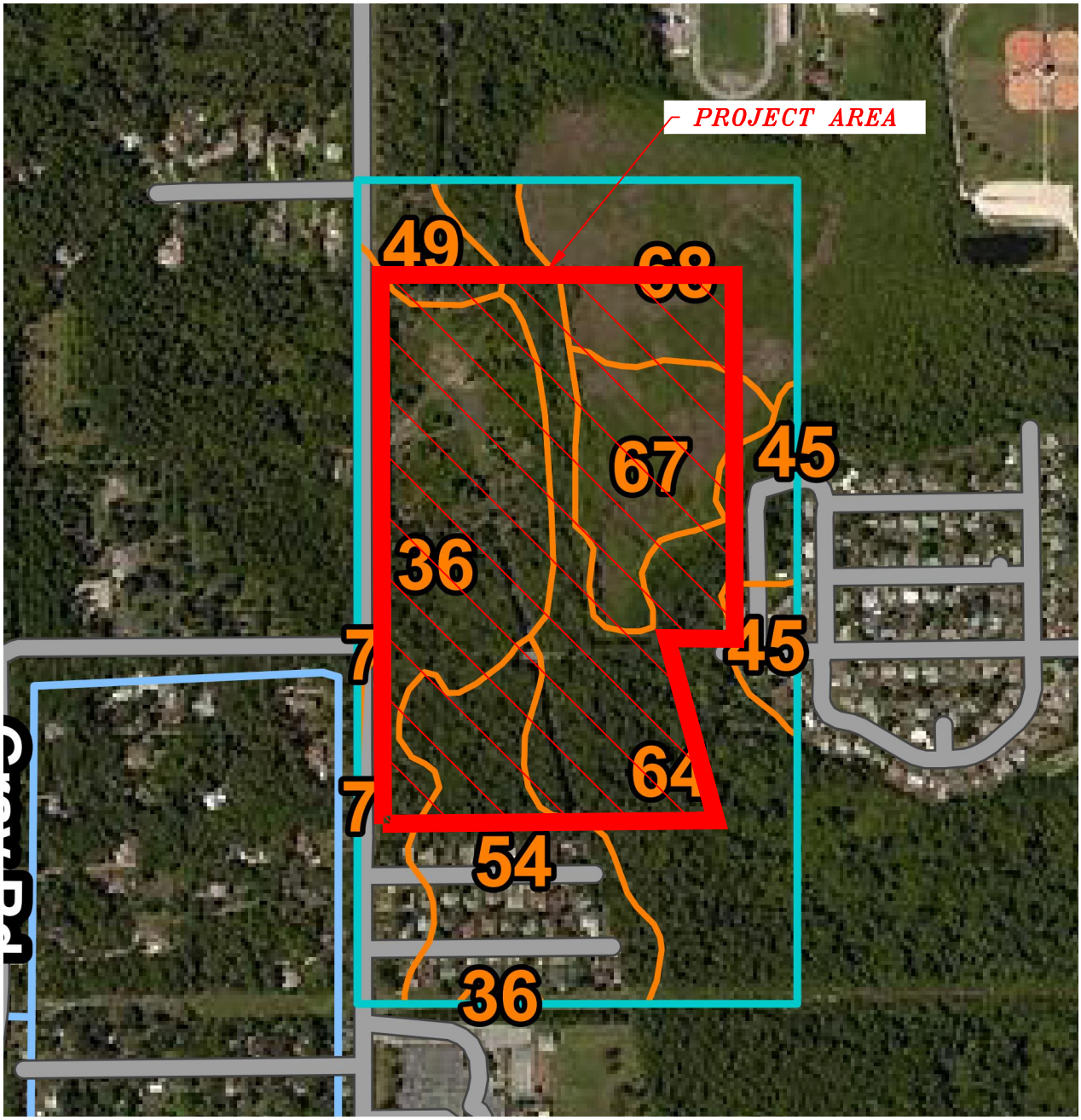

ON–SITE SOILS & LEGEND

36 – MYAKKA SAND, 0 TO 2 PERCENT SLOPES
49 – POMELLO SAND, 0 TO 5 PERCENT SLOPES
54 – ST. JOHNS SAND, 0 TO 2 PERCENT SLOPES
64 – TERRA CEIA MUCK, FREQUENTLY FLOODED

PROJECT NAME: RANGE ROAD SUBDIVISION	SOILS MAP
CLIENT: KARALI ASSOCIATES, LLC	
S, T, R: S 30 T 24S R 36E / F.E.G. PROJECT NO.: 19-070	
DATE: APRIL 01, 2022 / SCALE: 1" = 600'	

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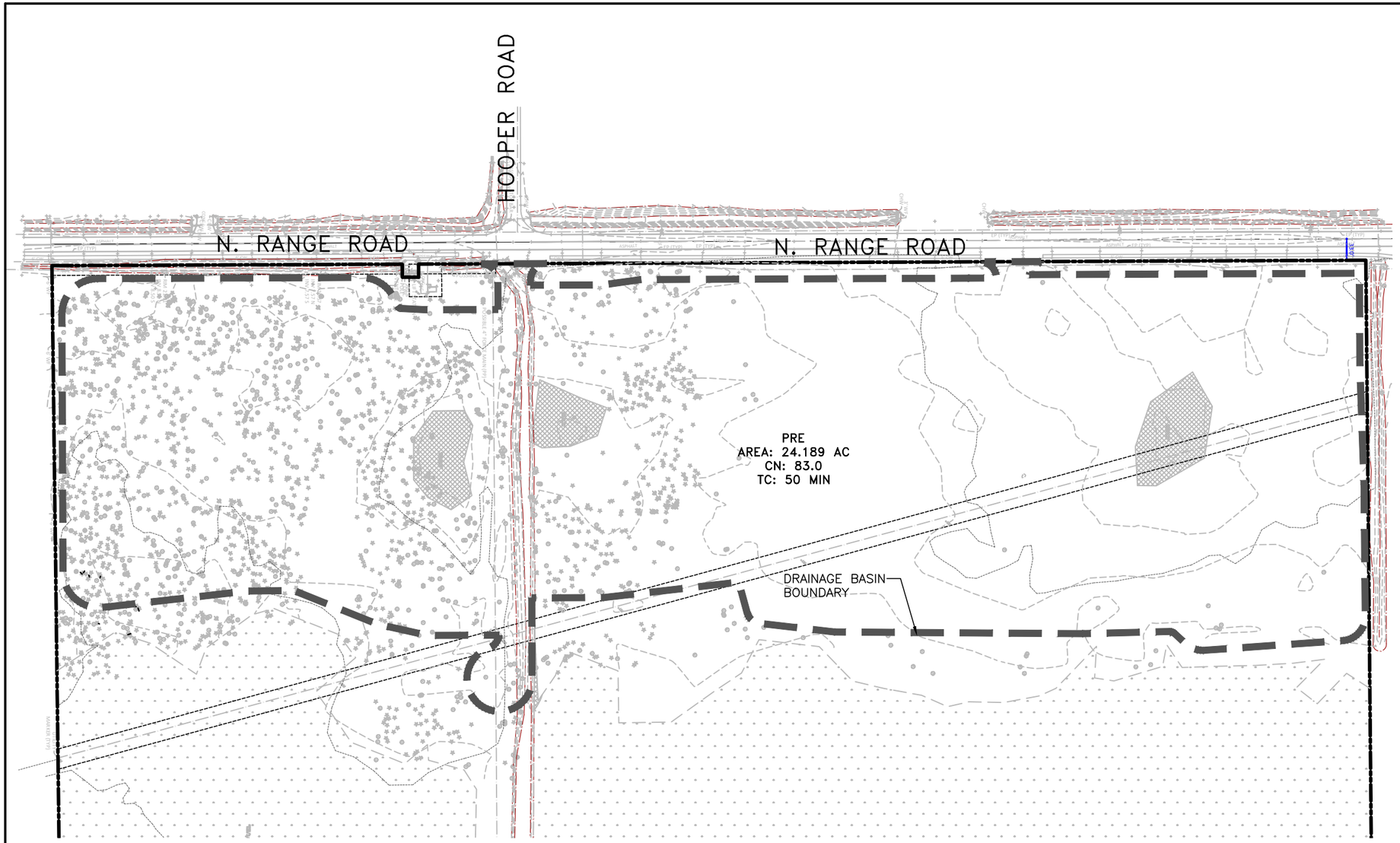
Appendix B – Pre- & Post-Development Basin Maps & Calculations



GRAPHIC SCALE

0' 40' 80' 160'

1" = 80'

DATE	REVISIONS	BY	CHECKED

CONSTRUCTION PLANS
RANGE ROAD SUBDIVISION
CITY OF COCOA, FLORIDA

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PRE DEVELOPMENT BASIN

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
CPN	CPN	GRC	GRC

PROJECT NO. 19-070
SCALE 1"=100'
DATE APRIL 01, 2022
SHEET NO. PRE-1
SHEET 1 OF 1

19-070 Plans.dwg

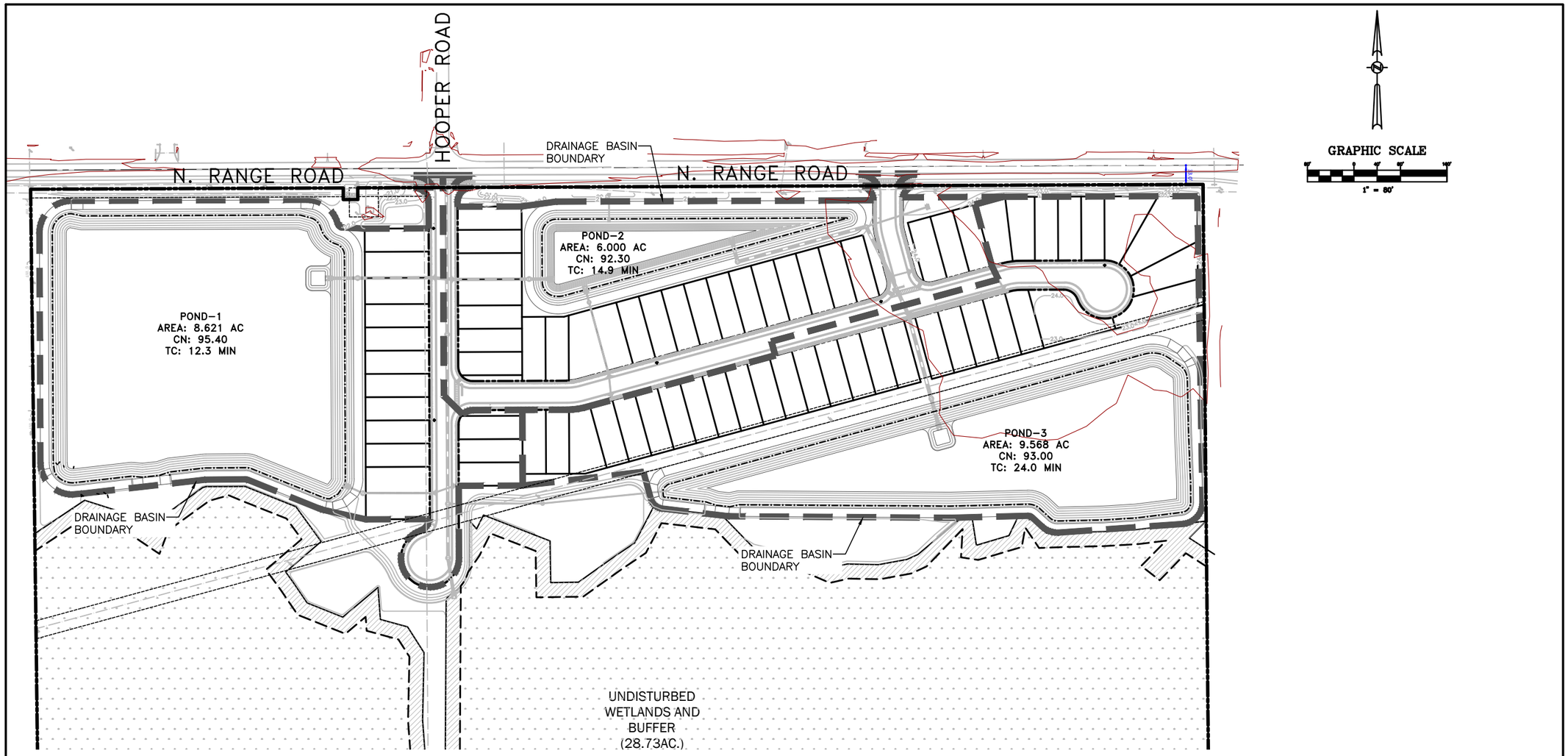
Florida Engineering Group, Inc.
5127 S. Orange Avenue, Suite 200
Orlando, Florida 32809
(407) 895-0324 Fax (407) 895-0325

COMP. BY: GRC
CHECKED BY: GRC
DATE: 05/21/22
SHT No.
JOB No. 19-070

PROJECT: Range Road Subdivision

PRE
RUNOFF CURVE NUMBER (CN)
PRE-DEVELOPMENT CONDITIONS

HYDROLOGIC SOIL GROUP	LAND USE DESCRIPTION - INCLUDE PRACTICE AND CONDITION	CN	% OR AREA (ACRES)	CN * A PRODUCT
	Impervious Area	98.0	0.00	0.00
	Woods (Poor) (Type D)	83.0	24.19	2007.69
24.189		TOTALS	24.19	2007.69
		IMP.AREA	0.00	
			CN (WEIGHTED)	83.0



DATE	REVISIONS	BY	CHECKED

CONSTRUCTION PLANS
RANGE ROAD SUBDIVISION
CITY OF COCOA, FLORIDA

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POST DEVELOPMENT BASIN

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
CPN	CPN	GRC	GRC

PROJECT NO.	19-070
SCALE	1"=100'
DATE	APRIL 01, 2022
SHEET NO.	POST-1
SHEET	1 OF 1

19-070 Plans.dwg

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COMP. BY: GRC
CHECKED BY: GRC
DATE: 05/21/22
SHT No.
JOB No. 19-070

PROJECT: Range Road Subdivision

POND 1
RUNOFF CURVE NUMBER (CN)
POST-DEVELOPMENT CONDITIONS

HYDROLOGIC SOIL GROUP	LAND USE DESCRIPTION - INCLUDE PRACTICE AND CONDITION	CN	% OR AREA (ACRES)	CN * A PRODUCT
	Impervious Area	98.0	1.78	174.39
	Pond (at NCL)	100.0	5.02	501.65
	Open Space (Good) (Type D)	80.0	1.82	145.99
8.621		TOTALS	8.62	822.03
		IMP.AREA	1.78	
			CN (WEIGHTED)	95.4

POND 2
RUNOFF CURVE NUMBER (CN)
POST-DEVELOPMENT CONDITIONS

HYDROLOGIC SOIL GROUP	LAND USE DESCRIPTION - INCLUDE PRACTICE AND CONDITION	CN	% OR AREA (ACRES)	CN * A PRODUCT
	Impervious Area	98.0	3.12	305.95
	Pond (at NCL)	100.0	0.85	84.98
	Open Space (Good) (Type D)	80.0	2.03	162.38
6.002		TOTALS	6.00	553.32
		IMP.AREA	3.12	
			CN (WEIGHTED)	92.2

POND 3
RUNOFF CURVE NUMBER (CN)
POST-DEVELOPMENT CONDITIONS

HYDROLOGIC SOIL GROUP	LAND USE DESCRIPTION - INCLUDE PRACTICE AND CONDITION	CN	% OR AREA (ACRES)	CN * A PRODUCT
	Impervious Area	98.0	3.22	315.48
	Pond (at NCL)	100.0	3.29	328.64
	Open Space (Good) (Type D)	80.0	3.06	245.01
9.568		TOTALS	9.57	889.13
		IMP.AREA	3.22	
			CN (WEIGHTED)	92.9

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DATE: 05/21/22
SHT No.
JOB No. 19-070

PROJECT: Range Road Subdivision

Q=CA*(2gH)^.5
C=0.6

NUMBER OF ORIFICES: 3
DIAMETER OF EACH ORIFICE: 4.00 INCHES
EQUIVILENT DIAMETER ORIFICE: 6.93 INCHES

ORIFICE RELEASES TOTAL P.A.V. IN 90.85 HRS

DIA.= 6.93 IN.
P.A.V.= 2.700 (AC-FT)

ORIFICE RELEASES 50% OF P.A.V. IN 27.62 HRS

EL (FT)	H (FT)	AREA (AC)	FLOW (CFS)	AVG. FLOW (CFS)	AVG. AREA (AC)	INC. DEPTH (FT)	INC. VOL. (AC-FT)	TOTAL VOL. (AC-FT)	INC. TIME (HR)	TOTAL TIME (HR)
18.55	0.30	9.313	0.690							
				0.660	9.300	0.05	0.465	0.465	8.52	8.52
18.50	0.25	9.286	0.630							
				0.597	9.273	0.05	0.464	0.929	9.40	17.93
18.45	0.20	9.260	0.563							
				0.526	9.246	0.05	0.462	1.391	10.64	28.57
18.40	0.15	9.233	0.488							
				0.443	9.220	0.05	0.461	1.852	12.59	41.15
18.35	0.10	9.206	0.398							
				0.340	9.193	0.05	0.460	2.312	16.35	57.51
18.30	0.05	9.179	0.282							
				0.141	9.166	0.05	0.458	2.770	39.37	96.87
18.25		9.153								

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COMP: BY	GRC
CHK'D BY:	GRC
DATE:	05/21/22
JOB #	19-070

PROJECT: **Range Road Subdivision**

ST JOHNS RIVER WATER MANAGEMENT DISTRICT

STAGE-STORAGE CALCULATION
POST DEVELOPMENT

POND 1

	STAGE ELEVATION (NAVD)	AREA (SF)	INC. VOLUME (CF)	CUM. VOLUME (CF)	CUM. VOLUME (AC-FT)
	10.00	180,888	751,560	1,621,528	37.225
	11.00	184,350	765,612	1,438,906	33.033
	12.00	187,839	779,769	1,252,813	28.761
PPV	13.00	191,353	801,304	1,068,676	24.533
	14.00	194,892	196,674	869,968	19.972
	15.00	198,456	200,250	673,295	15.457
	16.00	202,045	205,672	473,044	10.860
	17.00	209,299	212,976	267,372	6.138
	18.00	216,653	54,396	54,396	1.249
NCL	18.25	218,517	0	0	0.000
	20.00	237,280	398,823	398,823	9.156
	21.00	243,388	240,334	639,157	14.673
	22.00	249,537	246,462	885,619	20.331

POND 2

	STAGE ELEVATION (NAVD)	AREA (SF)	INC. VOLUME (CF)	CUM. VOLUME (CF)	CUM. VOLUME (AC-FT)
	10.00	16,217	17,031	239,103	5.489
	11.00	17,844	18,695	222,072	5.098
	12.00	19,546	20,433	203,377	4.669
PPV	13.00	21,321	22,246	182,944	4.200
	14.00	23,171	24,133	160,698	3.689
	15.00	25,095	26,094	136,565	3.135
	16.00	27,093	29,203	110,471	2.536
	17.00	31,313	33,571	33,571	0.771
	18.00	35,829	9,106	81,268	1.866
NCL	18.25	37,019	0	0	0.000
	20.00	45,452	72,162	72,162	1.657
	21.00	50,417	47,934	120,096	2.757
	22.00	55,483	52,950	173,046	3.973

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ST JOHNS RIVER WATER MANAGEMENT DISTRICT

STAGE-STORAGE CALCULATION
POST DEVELOPMENT

POND 3

	STAGE ELEVATION (NAVD)	AREA (SF)	INC. VOLUME (CF)	CUM. VOLUME (CF)	CUM. VOLUME (AC-FT)
	13.00	112,584	114,577	782,412	17.962
PPV	14.00	116,571	118,579	667,834	15.331
	15.00	120,587	122,615	549,255	12.609
	16.00	124,642	128,719	426,641	9.794
	17.00	132,796	136,929	136,929	3.143
	18.00	141,063	35,527	297,922	6.839
NCL	18.25	143,156	0	0	0.000
	20.00	156,724	262,395	262,395	6.024
	21.00	161,523	159,123	421,518	9.677
	22.00	166,322	163,922	585,441	13.440

COMBINED PONDS

	STAGE ELEVATION (NAVD)	AREA (SF)	INC. VOLUME (CF)	CUM. VOLUME (CF)	CUM. VOLUME (AC-FT)
	10.00	197,105	199,650	2,256,761	51.808
	11.00	202,194	204,790	2,057,112	47.225
	12.00	207,385	258,537	1,852,322	42.523
	13.00	309,689	322,161	1,593,785	36.588
	14.00	334,634	339,386	1,271,624	29.192
	15.00	344,138	348,959	932,238	21.401
	16.00	353,780	363,594	583,279	13.390
	17.00	373,407	383,476	383,476	8.803
	18.00	393,545	99,030	219,685	5.043
NCL	18.25	398,692	0	0	0.00
W.Q.	18.55	405,680	120,656	120,656	2.77
	20.00	439,456	733,379	733,379	16.84
	21.00	455,327	447,391	1,180,771	27.11
	22.00	471,342	463,334	1,644,105	37.74

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Orlando, Florida 32809
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COMP. BY: GRC
CHECKED BY: GRC
DATE: 05/21/22
SHT No.
JOB No. 19-070

PROJECT: Range Road Subdivision

WATER QUALITY TREATMENT VOLUME DETERMINATION (POND)

WET DETENTION POND

BASIN AREA (Total - Onsite & Offsite)=	24.19	Ac.	
Proposed Total (Non-Pond) Impervious Area =	8.12	Ac.	

TREATMENT VOLUME REQUIRED

Method A
FOR FIRST 1.0 INCH OF RUNOFF OVER TOTAL SITE AREA:
REQUIRED WATER QUALITY VOLUME = **2.02 Ac.-Ft.** **(Method A)**

Method B
IMPERVIOUS (NON-POND) AREA 8.12 Ac

2.5" X IMPERVIOUS (NON-POND) AREA + 0.5" X BASIN AREA
REQUIRED WATER QUALITY VOLUME = **2.70 Ac.-Ft.** **(Method B)**

REQUIRED WATER QUALITY VOLUME	**2.70**	**Ac-Ft**
TOTAL REQUIRED WATER QUALITY VOLUME	**2.70**	**Ac-Ft**

TOTAL WATER QUALITY VOLUME PROVIDED: 2.77 **Ac-Ft** **at** **18.55**

PERMANENT POOL CALCULATIONS:

PPV = (((DA)*(C)*(WS RAINFALL)*(RESIDENCE TIME))/(WET SEASON)*(12))

DA = DRAINAGE AREA	24.19	Ac.
C = RUNOFF COEFFIENT	**0.70**	
C= [((0.9)*(Impervious+NCL Area(Acres)) + (0.2)*(Pervious Area(Acres))]/TotalArea(Acres)		
WS RAINFALL = WET SEASON RAINFALL (FIGURE 29-1)	32.0	inches
RESIDENCE TIME = 14 DAYS (MIN)	14.0	Days

REQUIRED PERMANENT POOL VOLUME:	**4.131**	**Ac-Ft**
50% EXTRA (NO LITTORAL ZONE):	***2.065***	**Ac-Ft**
TOTAL REQUIRE PERMANENT POOL VOLUME:	**6.196**	**Ac-Ft**
50% EXTRA (DISCHARGE TO OFW):	***3.098***	**Ac-Ft**
TOTAL REQUIRE PERMANENT POOL VOLUME:	**9.295**	**Ac-Ft**

PROVIDED PERMANENT POOL VOLUME: 42.714 **Ac-Ft**

MEAN DEPTH CALCULATIONS

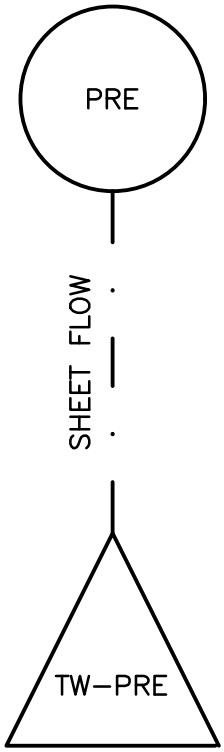
Mean Depth = PPV(p) / A(p)

PPV(p) = Permanent Pool Volume Provided	42.714	Ac-Ft
A(p) = Area at NCL	**9.15**	Acres

REQUIRED MEAN DEPTH	**2 FT < MD < 8 FT**	
MD PROVIDED	**4.667**	**FT**

Appendix C – Pre-Development ICPR Routings

Name:	PRE	PRE
Group:	BASE	BASE
Simulation:	25-24	Mean-24
Node:	TW-PRE	TW-PRE
Type:	SB	SB
Spec Time Inc(min):	5.00	5.00
Comp Time Inc(min):	5.00	5.00
Rain File:	Flmod	Flmod
Rain Amount(in):	9.500	5.000
Duration(hrs):	24.00	24.00
Status:	Onsite	Onsite
TC(min):	50.00	50.00
Time Shift(hrs):	0.00	0.00
Area(ac):	24.189	24.189
Curve Num:	83.000	83.000
DCIA(%):	0.000	0.000
Time Max(hrs):	12.17	12.17
Flow Max(cfs):	64.82	28.19
Runoff Volume(in):	7.419	3.174
Runoff Volume(ft3):	651415	278705



PROJECT NAME: RANGE ROAD SUBDIVISION	PRE-NODAL DIAGRAM
CLIENT: KARALI ASSOCIATES, LLC	
S, T, R: S 30 T 24S R 36E / F.E.G. PROJECT NO.: 19-070	
DATE: JUNE 15, 2022 / SCALE: NONE	

FEG FLORIDA ENGINEERING GROUP
Engineering the Future
5127 S. Orange Avenue, Suite 200
Orlando, FL 32809
Phone: 407-895-0324
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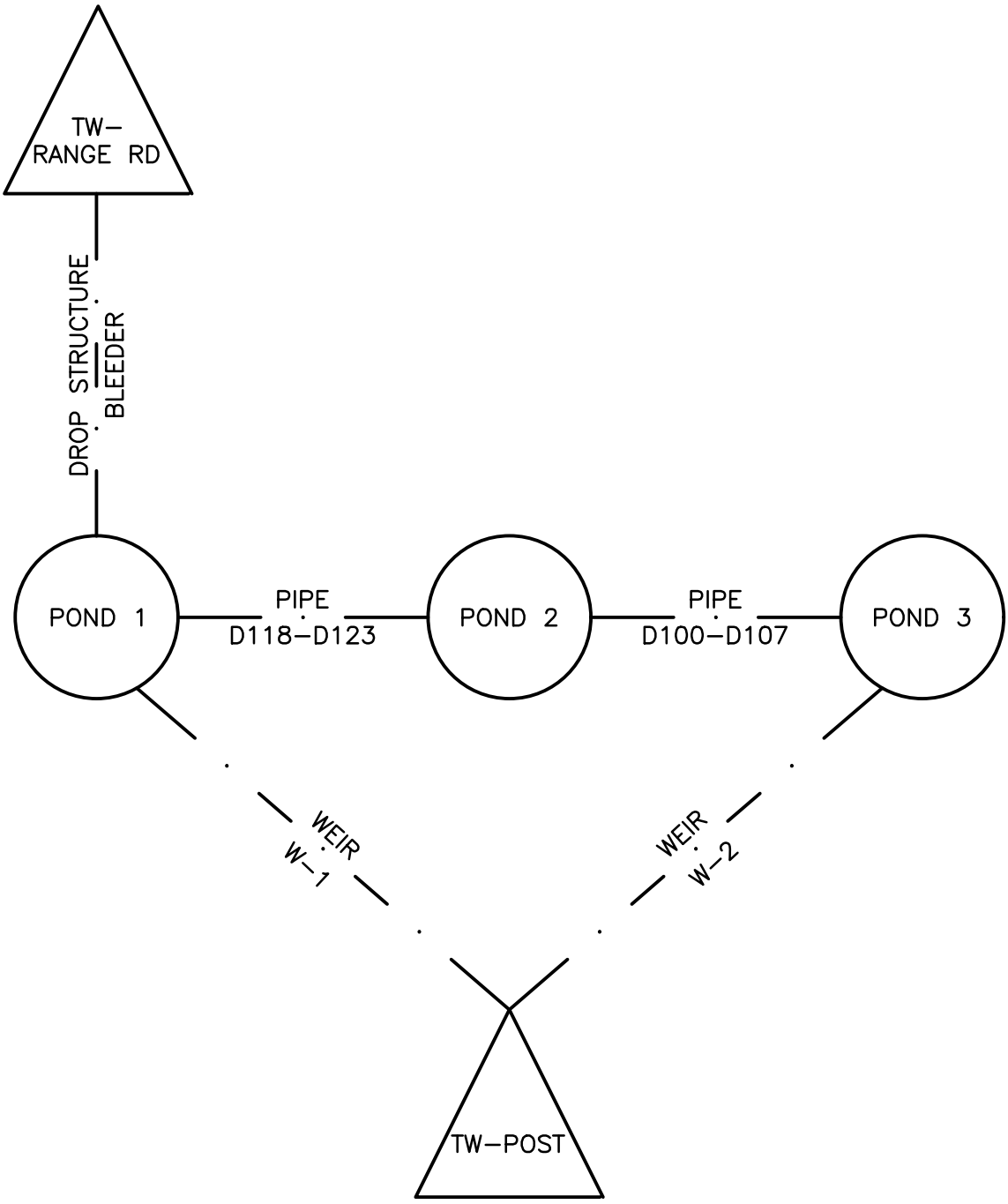
www.feg-inc.us

Appendix D – Post-Development ICPR Routings

Name:	POND-1	POND-2	POND-3	POND-1	POND-2
Group:	BASE	BASE	BASE	BASE	BASE
Simulation:	25-24	25-24	25-24	Mean-24	Mean-24
Node:	POND 1	POND 2	POND 3	POND 1	POND 2
Type:	SB	SB	SB	SB	SB
Spec Time Inc(min):	5.00	5.00	5.00	5.00	5.00
Comp Time Inc(min):	5.00	5.00	5.00	5.00	5.00
Rain File:	Flmod	Flmod	Flmod	Flmod	Flmod
Rain Amount(in):	9.500	9.500	9.500	5.000	5.000
Duration(hrs):	24.00	24.00	24.00	24.00	24.00
Status:	Onsite	Onsite	Onsite	Onsite	Onsite
TC(min):	12.30	14.90	24.00	12.30	14.90
Time Shift(hrs):	0.00	0.00	0.00	0.00	0.00
Area(ac):	8.621	6.000	9.568	8.621	6.000
Curve Num:	95.500	92.300	93.000	95.500	92.300
DCIA(%):	0.000	0.000	0.000	0.000	0.000
Time Max(hrs):	11.92	11.92	12.00	11.92	11.92
Flow Max(cfs):	49.34	31.51	42.09	25.42	15.69
Runoff Volume(in):	8.957	8.567	8.653	4.476	4.122
Runoff Volume(ft3):	280304	186597	300530	140068	89771

Name:	POND-3
Group:	BASE
Simulation:	Mean-24
Node:	POND 3
Type:	SB
Spec Time Inc(min):	5.00
Comp Time Inc(min):	5.00
Rain File:	Flmod
Rain Amount(in):	5.000
Duration(hrs):	24.00
Status:	Onsite
TC(min):	24.00
Time Shift(hrs):	0.00
Area(ac):	9.568
Curve Num:	93.000
DCIA(%):	0.000
Time Max(hrs):	12.00
Flow Max(cfs):	21.14
Runoff Volume(in):	4.198
Runoff Volume(ft3):	145801

Name:	POND-1	POND-2	POND-3
Group:	BASE	BASE	BASE
Simulation:	100-24	100-24	100-24
Node:	POND 1	POND 2	POND 3
Type:	SB	SB	SB
Spec Time Inc(min):	5.00	5.00	5.00
Comp Time Inc(min):	5.00	5.00	5.00
Rain File:	Flmod	Flmod	Flmod
Rain Amount(in):	10.500	10.500	10.500
Duration(hrs):	24.00	24.00	24.00
Status:	Onsite	Onsite	Onsite
TC(min):	12.30	14.90	24.00
Time Shift(hrs):	0.00	0.00	0.00
Area(ac):	8.621	6.000	9.568
Curve Num:	95.500	92.300	93.000
DCIA(%):	0.000	0.000	0.000
Time Max(hrs):	11.92	11.92	12.00
Flow Max(cfs):	54.62	34.99	46.70
Runoff Volume(in):	9.955	9.561	9.648
Runoff Volume(ft3):	311533	208244	335086



PROJECT NAME: RANGE ROAD SUBDIVISION	POST-NODAL DIAGRAM
CLIENT: KARALI ASSOCIATES, LLC	
S, T, R: S 30 T 24S R 36E / F.E.G. PROJECT NO.: 19-070	
DATE: JUNE 15, 2022 / SCALE: NONE	

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==========
==== Basins ====
==========

Name: POND-1 Node: POND 1 Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 12.30
Area(ac): 8.621 Time Shift(hrs): 0.00
Curve Number: 95.50 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

Name: POND-2 Node: POND 2 Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 14.90
Area(ac): 6.000 Time Shift(hrs): 0.00
Curve Number: 92.30 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

Name: POND-3 Node: POND 3 Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 24.00
Area(ac): 9.568 Time Shift(hrs): 0.00
Curve Number: 93.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

Name: PRE Node: TW-PRE Status: Onsite
Group: BASE Type: Santa Barbara CN

Rainfall File: Flmod Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000 Time of Conc(min): 50.00
Area(ac): 24.189 Time Shift(hrs): 0.00
Curve Number: 83.00 Time Increment(min): 5.00
DCIA(%): 0.00 Max Allowable Q(cfs): 999999.000

==========
==== Nodes ====
==========

Name: POND 1 Base Flow(cfs): 0.000 Init Stage(ft): 18.250
Group: BASE Warn Stage(ft): 22.000
Type: Stage/Area

Stage(ft)	Area(ac)
10.000	4.1526
16.000	4.6383
18.500	5.0592
22.000	5.7286

Name: POND 2 Base Flow(cfs): 0.000 Init Stage(ft): 18.250

Group: BASE Warn Stage(ft): 22.000
Type: Stage/Area

Stage(ft)	Area(ac)
10.000	0.3732
16.000	0.6220
18.500	0.8771
22.000	1.2737

Name: POND 3 Base Flow(cfs): 0.000 Init Stage(ft): 18.250
Group: BASE Warn Stage(ft): 22.000
Type: Stage/Area

Stage(ft)	Area(ac)
13.000	2.5846
16.000	2.8614
18.500	3.3344
22.000	3.8182

Name: TW-POST Base Flow(cfs): 0.000 Init Stage(ft): 18.000
Group: BASE Warn Stage(ft): 22.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	18.000
12.00	18.250
24.00	18.200
60.00	18.200
72.00	18.100

Name: TW-PRE Base Flow(cfs): 0.000 Init Stage(ft): 18.500
Group: BASE Warn Stage(ft): 18.500
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	18.500
12.00	18.500
24.00	18.500
60.00	18.500
72.00	18.500

Name: TW-RANGERD Base Flow(cfs): 0.000 Init Stage(ft): 18.000
Group: BASE Warn Stage(ft): 18.250
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	18.000
12.00	18.250
24.00	18.000

==========
==== Pipes ==========

```
================================================================================

         Name: D100-D107          From Node: POND 2            Length(ft): 536.00
        Group: BASE                 To Node: POND 3                 Count: 1
                                                          Friction Equation: Automatic
               UPSTREAM       DOWNSTREAM                Solution Algorithm: Most Restrictive
     Geometry: Circular       Circular                         Flow: Both
     Span(in): 60.00          60.00                   Entrance Loss Coef: 0.00
     Rise(in): 60.00          60.00                       Exit Loss Coef: 1.00
   Invert(ft): 12.180         12.400                      Bend Loss Coef: 0.00
  Manning's N: 0.013000       0.013000                  Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000          0.000                    Stabilizer Option: None


Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


--------------------------------------------------------------------------------------------------------
         Name: D118-D123          From Node: POND 1            Length(ft): 562.00
        Group: BASE                 To Node: POND 2                 Count: 1
                                                          Friction Equation: Automatic
               UPSTREAM       DOWNSTREAM                Solution Algorithm: Automatic
     Geometry: Circular       Circular                         Flow: Both
     Span(in): 60.00          60.00                   Entrance Loss Coef: 0.00
     Rise(in): 60.00          60.00                       Exit Loss Coef: 1.00
   Invert(ft): 11.080         10.890                      Bend Loss Coef: 0.00
  Manning's N: 0.013000       0.013000                  Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000          0.000                    Stabilizer Option: None


Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


================================================================================
==== Drop Structures ===========================================================
================================================================================

         Name: BLEEDER            From Node: POND 1            Length(ft): 45.00
        Group: BASE                 To Node: TW-RANGERD             Count: 1

               UPSTREAM       DOWNSTREAM                Friction Equation: Automatic
     Geometry: Circular       Circular                 Solution Algorithm: Automatic
     Span(in): 15.00          15.00                            Flow: Both
     Rise(in): 15.00          15.00                   Entrance Loss Coef: 0.500
   Invert(ft): 17.500         17.250                      Exit Loss Coef: 1.000
  Manning's N: 0.013000       0.013000                  Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dc
 Bot Clip(in): 0.000          0.000                       Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall
```

```
*** Weir 1 of 1 for Drop Structure BLEEDER ***
                                                                                TABLE
                 Count: 3                      Bottom Clip(in): 0.000
                  Type: Horizontal                Top Clip(in): 0.000
                  Flow: Both                   Weir Disc Coef: 3.130
              Geometry: Circular              Orifice Disc Coef: 0.600

              Span(in): 4.00                        Invert(ft): 18.250
              Rise(in): 4.00                 Control Elev(ft): 18.250


================================================================================
==== Weirs =====================================================================
================================================================================

         Name: W-1                From Node: POND 1
        Group: BASE                 To Node: TW-POST
         Flow: Both                   Count: 1
         Type: Vertical: Mavis     Geometry: Trapezoidal

            Bottom Width(ft): 30.00
        Left Side Slope(h/v): 20.00
       Right Side Slope(h/v): 20.00
                  Invert(ft): 18.550
       Control Elevation(ft): 18.550
      Struct Opening Dim(ft): 9999.00
                                          TABLE
             Bottom Clip(ft): 0.000
                Top Clip(ft): 0.000
          Weir Discharge Coef: 2.600
      Orifice Discharge Coef: 0.600



--------------------------------------------------------------------------------------------------------
         Name: W-2                From Node: POND 3
        Group: BASE                 To Node: TW-POST
         Flow: Both                   Count: 1
         Type: Vertical: Mavis     Geometry: Trapezoidal

            Bottom Width(ft): 24.00
        Left Side Slope(h/v): 20.00
       Right Side Slope(h/v): 20.00
                  Invert(ft): 18.550
       Control Elevation(ft): 18.550
      Struct Opening Dim(ft): 9999.00
                                          TABLE
             Bottom Clip(ft): 0.000
                Top Clip(ft): 0.000
          Weir Discharge Coef: 2.600
      Orifice Discharge Coef: 0.600



================================================================================
==== Hydrology Simulations =====================================================
================================================================================

         Name: 10-24
     Filename: P:\2019\19-070_RangeRoad\ENGINEERING\DRAINAGE\ICPR\10-24.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 8.00

Time(hrs)       Print Inc(min)
--------------- ---------------
30.000          5.00

--------------------------------------------------------------------------------------------------------
```

Name: 100-24
Filename: P:\2019\19-070_RangeRoad\ENGINEERING\DRAINAGE\ICPR\100-24.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 10.50

Time(hrs)	Print Inc(min)
30.000	5.00

Name: 25-24
Filename: P:\2019\19-070_RANGEROAD\ENGINEERING\DRAINAGE\ICPR\25-24.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 9.50

Time(hrs)	Print Inc(min)
30.000	5.00

Name: Mean-24
Filename: P:\2019\19-070_RANGEROAD\ENGINEERING\DRAINAGE\ICPR\Mean-24.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 5.00

Time(hrs)	Print Inc(min)
30.000	5.00

==========
==== Routing Simulations ==========
==========

Name: 10-24 Hydrology Sim: 10-24
Filename: P:\2019\19-070_RangeRoad\ENGINEERING\DRAINAGE\ICPR\10-24.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
999.000	15.000

Group	Run
BASE	Yes

Name: 100-24 Hydrology Sim: 100-24
Filename: P:\2019\19-070_RangeRoad\ENGINEERING\DRAINAGE\ICPR\100-24.I32

Execute: Yes Restart: No Patch: No
Alternative: No

```
       Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
   Time Step Optimizer: 10.000
       Start Time(hrs): 0.000                    End Time(hrs): 24.00
    Min Calc Time(sec): 0.5000               Max Calc Time(sec): 60.0000
       Boundary Stages: 100YR                   Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
999.000         15.000

Group           Run
--------------- -----
BASE            Yes


------------------------------------------------------------------------------------------------------
        Name: 25-24              Hydrology Sim: 25-24
    Filename: P:\2019\19-070_RANGEROAD\ENGINEERING\DRAINAGE\ICPR\25-24.I32

     Execute: Yes         Restart: No            Patch: No
 Alternative: No

       Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
   Time Step Optimizer: 10.000
       Start Time(hrs): 0.000                    End Time(hrs): 24.00
    Min Calc Time(sec): 0.5000               Max Calc Time(sec): 60.0000
       Boundary Stages:                         Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
999.000         15.000

Group           Run
--------------- -----
BASE            Yes


------------------------------------------------------------------------------------------------------
        Name: Mean-24            Hydrology Sim: Mean-24
    Filename: P:\2019\19-070_RANGEROAD\ENGINEERING\DRAINAGE\ICPR\Mean-24.I32

     Execute: Yes         Restart: No            Patch: No
 Alternative: No

       Max Delta Z(ft): 1.00                    Delta Z Factor: 0.00500
   Time Step Optimizer: 10.000
       Start Time(hrs): 0.000                    End Time(hrs): 24.00
    Min Calc Time(sec): 0.5000               Max Calc Time(sec): 60.0000
       Boundary Stages:                         Boundary Flows:


Time(hrs)       Print Inc(min)
--------------- ---------------
999.000         15.000

Group           Run
--------------- -----
BASE            Yes


================================================================================
==== Boundary Conditions ======================================================
================================================================================

     Name: 100YR                Node: TW-POST              Type: Stage
```

Time(hrs)	Stage(ft)
0.000	16.900
12.000	21.700
24.000	21.700

Range Road Subdivision
May 20, 2022
Project Number: 19-070
Post-Development Routing Results

Name	Simulation	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs
POND 1	25-24	19.04	22.00	0.0046	224944	49.33	21.20
POND 1	Mean-24	18.76	22.00	0.0047	222642	25.35	4.50
POND 2	25-24	19.07	22.00	0.0050	41136	17.06	7.72
POND 2	Mean-24	18.77	22.00	0.0050	39674	8.08	6.85
POND 3	25-24	19.07	22.00	0.0049	148717	49.37	30.95
POND 3	Mean-24	18.77	22.00	0.0050	146922	22.56	7.22
TW-POST	25-24	18.25	22.00	0.0003	0	64.54	0.00
TW-POST	Mean-24	18.25	22.00	0.0003	0	15.76	0.00
TW-RANGERD	25-24	18.25	18.25	0.0003	0	1.09	0.00
TW-RANGERD	Mean-24	18.25	18.25	0.0003	0	0.89	0.00

Range Road Subdivision
May 20, 2022
Project Number: 19-070
Post-Development Routing Results

Name	Simulation	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs
POND 1	100-24	21.72	22.00	0.0049	247264	54.61	46.63
POND 2	100-24	21.75	22.00	0.0049	54379	21.25	15.57
POND 3	100-24	21.72	22.00	0.0050	164701	60.73	60.13
TW-POST	100-24	21.70	22.00	-1.1000	0	120.12	0.00

Florida Engineering Group, Inc.
5127 S. Orange Avenue, Suite 200
Orlando, Florida 32809

Appendix E – Secondary Stormwater Calculations

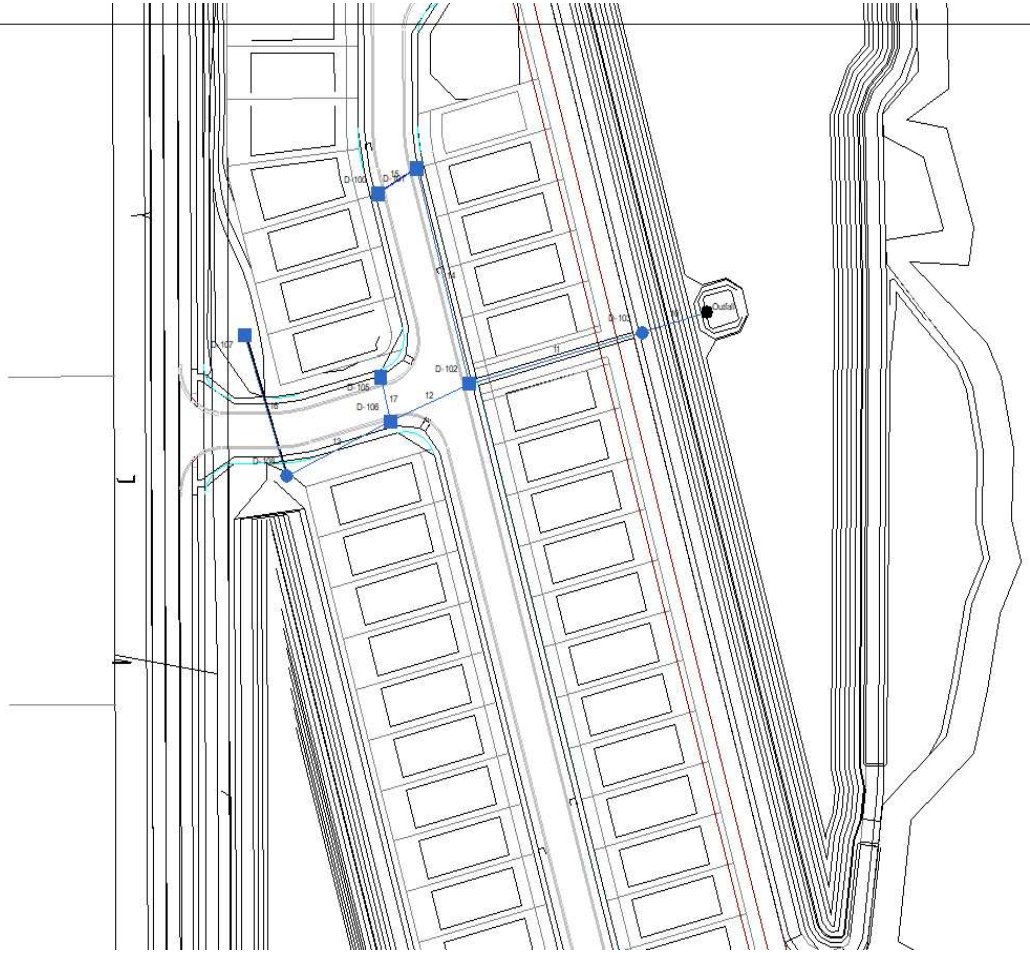
Sub-basin Drainage Area Calculations

Range Road Subdivision

FEG Project Number: 19-070

STRUCTURE	TOTAL (ac)	IMP (ac)	PER (ac)	C
D-100	1.093	0.534	0.559	0.54
D-101	0.152	0.106	0.046	0.69
D-102	0.418	0.186	0.232	0.51
D-103	0.001	0	0.001	0.20
D-105	0.321	0.203	0.118	0.64
D-106	0.372	0.215	0.157	0.60
D-107	0.332	0.1	0.232	0.41
D-108	0.001	0	0.001	0.20
D-109	0.001	0	0.001	0.20
D-111	1.033	0.59	0.443	0.60
D-112	0.547	0.37	0.177	0.67
D-113	0.001	0	0.001	0.20
D-115	0.399	0.241	0.158	0.62
D-116	0.385	0.258	0.127	0.67
D-117	0.001	0	0.001	0.20
D-120	0.001	0	0.001	0.20
D-121	0.325	0.173	0.152	0.57
D-122	0.294	0.15	0.144	0.56
D-123	0.001	0	0.001	0.20

Hydraflow Plan View



Project File: 2022-05-20_19-070_TEST.stm	No. Lines: 17	05-21-2022

FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q	Inlet elev	Elev of HGL			Rise	HGL	Actual		Date: 05-21-2022
					C1 = 0.2 C2 = 0.5 C3 = 0.9							Total flow		Elev of Crown			Span	Pipe	Full Flow		Frequency: 10 yrs
														Elev of Invert							Proj: 2022-05-20_19-070_TE
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
17	12	Curb	0.013	35.0	0.00	0.00	0.00	10.00	0.49	7.05	0.21	0.00	22.88	19.59	19.57	0.02	15	0.05	1.19	1.45	
					0.00	0.00	0.00					1.45		19.65	19.57		15	0.23	2.52	3.09	
					0.00	0.00	0.00							18.40	18.32	0.08	Cir				
---	---																				
16	13	DrGrt	0.013	113.0	0.00	0.00	0.00	10.00	2.41	7.05	0.14	0.00	22.50	19.01	18.98	0.02	15	0.02	0.78	0.96	
					0.00	0.00	0.00					0.96		18.35	17.75		15	0.53	3.83	4.71	
					0.00	0.00	0.00							17.10	16.50	0.60	Cir				
---	---																				
15	14	Curb	0.013	38.0	0.00	0.00	0.00	10.00	0.27	7.05	0.59	0.00	23.71	19.51	19.45	0.06	18	0.16	2.36	4.16	
					0.00	0.00	0.00					4.16		18.52	18.45		18	0.18	2.55	4.51	
					0.00	0.00	0.00							17.02	16.95	0.07	Cir				
14	11	Curb	0.013	170.0	0.00	0.00	0.00	10.27	1.03	7.01	0.70	0.00	23.74	19.35	18.98	0.37	18	0.22	2.76	4.87	
					0.00	0.00	0.00					4.87		18.35	17.87		18	0.28	3.16	5.58	
					0.00	0.00	0.00							16.85	16.37	0.48	Cir				
---	---																				
13	12	MH	0.013	96.0	0.00	0.00	0.00	12.41	33.25	6.68	0.14	0.00	22.50	18.98	18.98	0.00	60	0.00	0.05	0.91	
					0.00	0.00	0.00					0.91		17.30	17.36		60	-0.06	0.00	0.00	
					0.00	0.00	0.00							12.30	12.36	-0.06	Cir				
12	11	Curb	0.013	72.0	0.00	0.00	0.00	45.65	6.11	3.84	0.56	0.00	22.88	18.98	18.98	0.00	60	0.00	0.11	2.17	
					0.00	0.00	0.00					2.17		17.46	17.50		60	-0.06	0.00	0.00	
					0.00	0.00	0.00							12.46	12.50	-0.04	Cir				
11	10	Curb	0.013	150.0	0.00	0.00	0.00	51.76	4.93	3.57	1.47	0.00	23.26	18.98	18.98	0.00	60	0.00	0.27	5.25	
					0.00	0.00	0.00					5.25		17.50	17.41		60	0.06	3.25	63.80	
					0.00	0.00	0.00							12.50	12.41	0.09	Cir				
10	End	MH	0.013	56.0	0.00	0.00	0.00	56.69	1.88	3.37	1.47	0.00	22.00	18.98	18.98	0.00	60	0.00	0.25	4.97	
					0.00	0.00	0.00					4.97		15.02	15.00		60	0.04	2.51	49.22	
					0.00	0.00	0.00							10.02	10.00	0.02	Cir				
---	---																				
9	8	Curb	0.013	35.0	0.00	0.00	0.00	10.00	0.24	7.05	0.62	0.00	22.95	19.92	19.87	0.05	18	0.15	2.50	4.37	
					0.00	0.00	0.00					4.37		20.00	19.87		18	0.37	3.62	6.40	
					0.00	0.00	0.00							18.50	18.37	0.13	Cir				

NOTES: Intensity = 281.36 / (Inlet time + 31.90) ^ 0.99 (in/hr) ; Time of flow in section is based on full flow.

Project File: 2022-05-20_19-070_TEST.stm

FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q	Inlet elev	Elev of HGL			Rise	HGL	Actual		Date: 05-21-2022
					C1 = 0.2 C2 = 0.5 C3 = 0.9							Total flow		Elev of Crown			Span	Pipe	Full Flow		Frequency: 10 yrs
														Elev of Invert							Proj: 2022-05-20_19-070_TE
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
8	7	Grate	0.013	130.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.24	0.98	7.02	0.99	0.00 6.92	22.95	19.17 17.67 15.67	19.05 18.97 16.97	0.12 -1.30	24 24 Cir	0.09 -1.00	2.20 0.00	6.92 0.00	
7	End	MH	0.013	29.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	11.22	0.22	6.86	0.99	0.00 6.77	22.00	19.01 18.87 16.87	18.98 18.57 16.57	0.03 0.30	24 24 Cir	0.09 1.03	2.15 7.32	6.77 23.00	
---	---																				
6	5	Curb	0.013	37.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.00	0.42	7.05	0.25	0.00 1.75	23.60	21.73 21.73 20.73	21.72 21.65 20.65	0.01 0.08	12 18 Elip	0.04 0.22	1.48 2.38	1.75 2.81	
5	4	Curb	0.013	123.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.42	1.02	6.99	0.51	0.00 3.53	23.59	21.60 21.77 20.27	21.48 21.48 19.98	0.12 0.29	18 18 Cir	0.10 0.24	2.06 2.89	3.53 5.10	
4	End	MH	0.013	36.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	11.44	0.30	6.82	0.51	0.00 3.45	23.00	19.04 19.58 18.08	18.98 19.50 18.00	0.06 0.08	18 18 Cir	0.18 0.22	2.85 2.80	3.45 4.95	
---	---																				
3	2	Curb	0.013	35.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.00	5.61	7.05	0.19	0.00 1.31	23.43	18.98 15.06 11.06	18.98 15.04 11.04	0.00 0.02	48 48 Cir	0.00 0.06	0.10 2.73	1.31 34.34	
2	1	Curb	0.013	130.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	15.61	11.09	6.23	0.35	0.00 2.18	23.43	18.98 15.04 11.04	18.98 14.98 10.98	0.00 0.06	48 48 Cir	0.00 0.05	0.17 2.46	2.18 30.86	
1	End	MH	0.013	56.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	26.70	4.87	5.07	0.35	0.00 1.77	22.00	18.98 14.03 10.03	18.98 14.00 10.00	0.00 0.03	48 48 Cir	0.00 0.05	0.14 2.65	1.77 33.25	

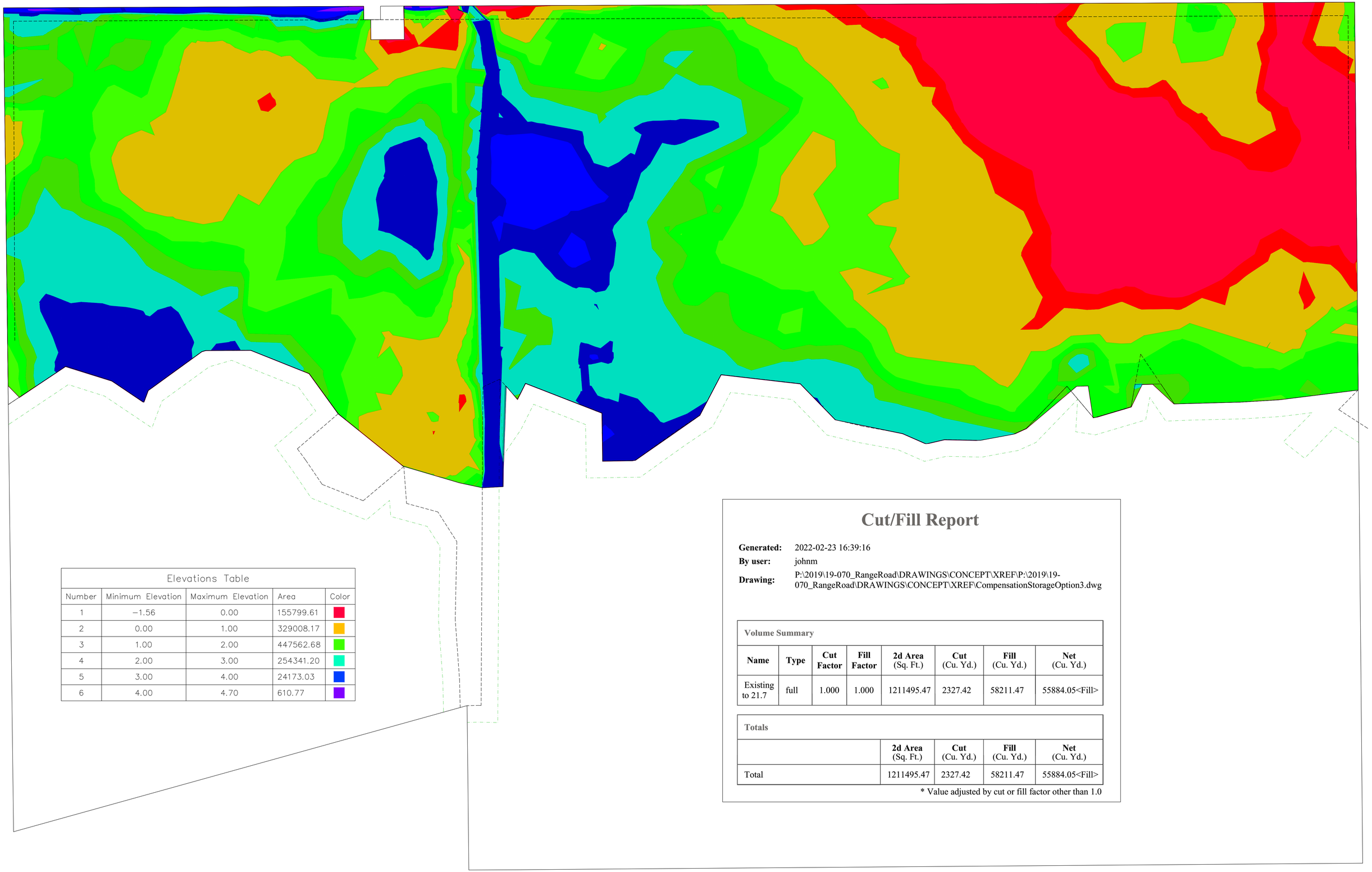
NOTES: Intensity = 281.36 / (Inlet time + 31.90) ^ 0.99 (in/hr) ; Time of flow in section is based on full flow.

Project File: 2022-05-20_19-070_TEST.stm

Range Road Subdivision
May 20, 2022
Project Number: 19-070
Post-Development Routing Results

Name	Simulation	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs
POND 1	10-24	18.96	22.00	0.0046	224298	41.38	18.99
POND 2	10-24	18.98	22.00	0.0050	40704	13.98	6.85
POND 3	10-24	18.98	22.00	0.0049	148198	40.17	22.51

Appendix F – Flood Plain Compensating Storage Calculations



Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	−1.56	0.00	155799.61	
2	0.00	1.00	329008.17	
3	1.00	2.00	447562.68	
4	2.00	3.00	254341.20	
5	3.00	4.00	24173.03	
6	4.00	4.70	610.77	

Cut/Fill Report

Generated: 2022-02-23 16:39:16

By user: johnm

Drawing: P:\2019\19-070_RangeRoad\DRAWINGS\CONCEPT\XREF\P:\2019\19-070_RangeRoad\DRAWINGS\CONCEPT\XREF\CompensationStorageOption3.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Existing to 21.7	full	1.000	1.000	1211495.47	2327.42	58211.47	55884.05<Fill>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	1211495.47	2327.42	58211.47	55884.05<Fill>

* Value adjusted by cut or fill factor other than 1.0

Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	-2.44	0.00	706991.46	
2	0.00	1.50	167839.31	

Cut/Fill Report

Generated: 2022-02-23 16:31:04

By user: johnm

Drawing: P:\2019\19-070_RangeRoad\DRAWINGS\CONCEPT\XREF\P:\2019\19-070_RangeRoad\DRAWINGS\CONCEPT\XREF\CompensationStorageOption3.dwg

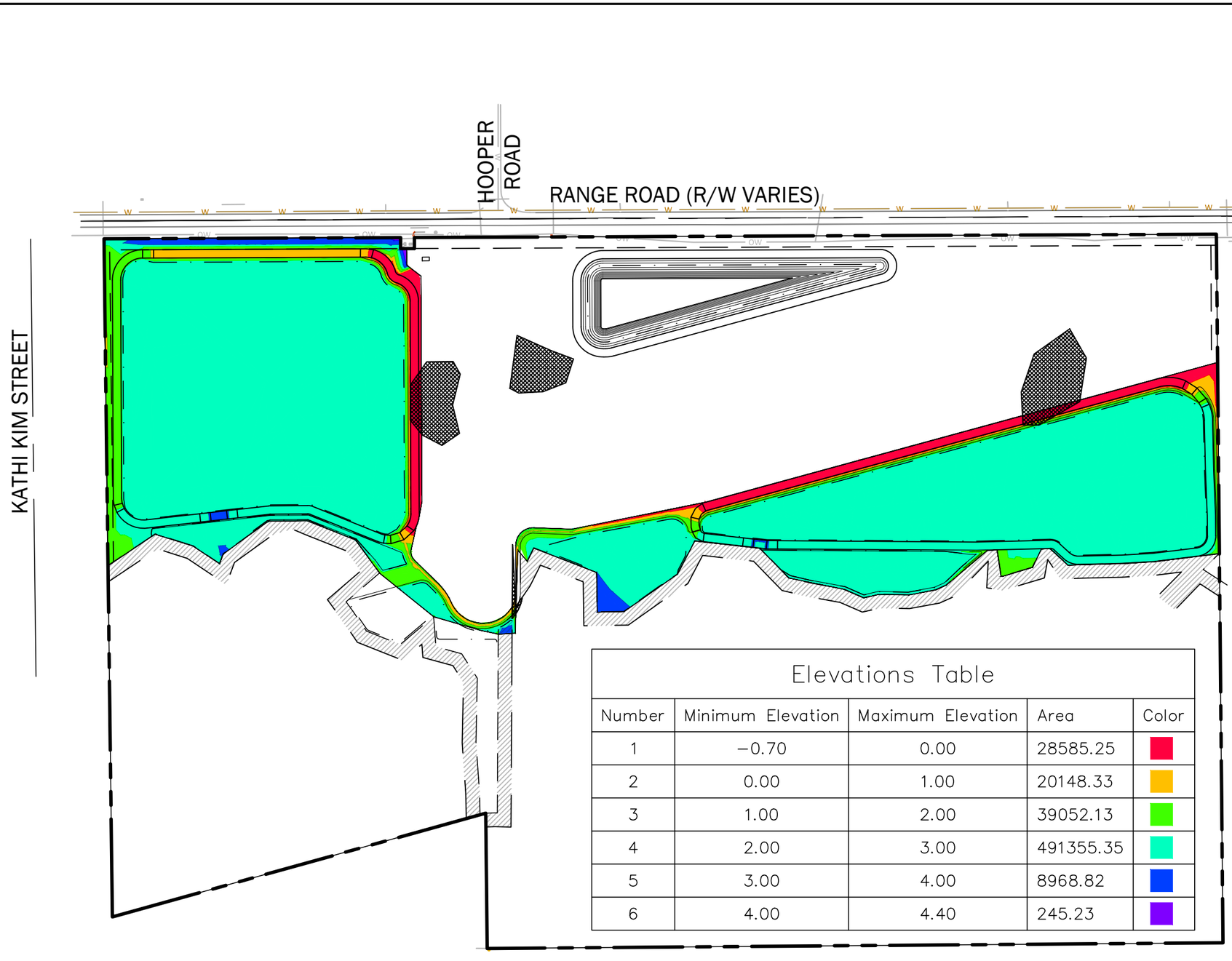
Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
EXISTING TO SHWT	full	1.000	1.000	874830.77	21237.92	2346.70	18891.23<Cut>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	874830.77	21237.92	2346.70	18891.23<Cut>

* Value adjusted by cut or fill factor other than 1.0



GRAPHIC SCALE

200 0 100 200 400

1" = 200'

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	−0.70	0.00	28585.25	
2	0.00	1.00	20148.33	
3	1.00	2.00	39052.13	
4	2.00	3.00	491355.35	
5	3.00	4.00	8968.82	
6	4.00	4.40	245.23	

Cut/Fill Report

Generated: 2022-03-17 17:44:59
By user: johnm
Drawing: P:\2019\19-070_RangeRoad\DRAWINGS\CONCEPT\XREF\P:\2019\19-070_RangeRoad\DRAWINGS\CONCEPT\XREF\CompensationStorageOption5.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
NWL - 21.7	full	1.000	1.000	588835.64	331.19	51617.06	51285.86<Fill>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	588835.64	331.19	51617.06	51285.86<Fill>

* Value adjusted by cut or fill factor other than 1.0

DATE	REVISIONS	BY	CHECKED

RANGE ROAD SUBDIVISION
CITY OF COCOA, FLORIDA

FEG FLORIDA ENGINEERING GROUP
Engineering the Future

5127 S. Orange Avenue, Suite 200
Orlando, FL 32809
Phone: 407-895-0324
Fax: 407-895-0325

www.feg-inc.us

FLOOD PLAIN COMPENSATING STORAGE

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
CPN	JWM	GRC	GRC

PROJECT NO. 19-070
SCALE 1" = 200'
DATE JUNE, 2022
SHEET NO.
SHEET OF

THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY: GREGORY R. CRAWFORD, P.E. ON June 17, 2022 USING A DIGITAL SIGNATURE.

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GREGORY R. CRAWFORD, P.E.
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