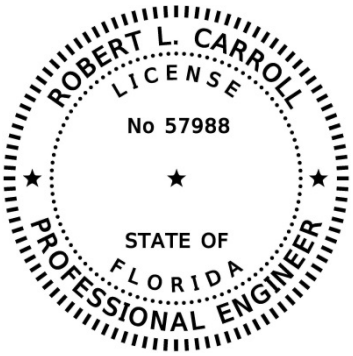
DRAINAGE REPORT

LA BRISA INN

Parker
MCEI FILE NO. 1343.02

PREPARED BY:

McNEIL—CARROLL
ENGINEERING, INC.



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14 March 2023
Date

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1.1 INTRODUCTION

This drainage report was prepared for a proposed hotel reconstruction development in the City of Parker, Florida known as Panama City Marina Hotel and Restaurant. The site consists of one (1) parcel with a total area of 1.88± acres with no wetlands on site and is identified by the Bay County Property Appraiser's office as Parcel ID **25818-040-000**. A vicinity map is included within this permit application for your reference.



1.2 STORMWATER MODELING TECHNIQUES

Interconnected Channel & Pond Routing (ICPR version 3.02) was used as the stormwater management facility modeling software. This program has been accepted by numerous regulatory agencies across Florida and is accepted by FEMA for Flood Insurance projects. ICPR uses a link-node concept to idealize real-world systems. A node is a discrete location in the drainage system where conservation of mass or continuity is maintained. Links are the connections between nodes and are used to transfer or convey water through the drainage system. A Node-Link Diagram, Node Maximum Conditions (Maximum Stage Elevation) and Link Maximum Conditions (Post Development Flow Rate) has been included.

2.0 DESIGN CRITERIA

The development has been designed to meet the treatment requirements of both the City of Parker and Northwest Florida Water Management.

2.1 Water Quality

To comply with the City of Parker's requirements, the stormwater management facility (SWMF) for the proposed drainage area must provide treatment for the first 1/2" of runoff from the drainage area. The total volume must be recovered within 72 hours.

2.2 Water Quantity Criteria per ERP Applicant's Handbook Volume II, Part 3.0

Systems that meet any of the following thresholds must be designed, constructed, operated, and maintained in accordance with this Part: (a) Systems that serve projects of 40 or more acres of total land area; (b) Systems that provide for the placement of 12 or more acres of impervious surface, which also constitutes more than 40 percent of the total land area; or (c) Systems that are at any time capable of impounding a volume of water exceeding 40 acre-feet. The total site area is less than 40 acres, contains less than 12 acres of impervious area and is not capable of impounding a volume of water in excess of 40 acre-feet, and therefore **is exempt** from water quantity and flood control requirements.

2.3 Peak Discharge Attenuation Criteria to Protect Streambanks, per ERP Applicant's Handbook Volume II, Part 4.5.1

For systems serving new construction that is greater than 50 percent impervious (excluding water bodies) of the project area, the post development peak discharge rate must not exceed the pre-development peak discharge rate for the 2-year, 24-hour design storm event, utilizing a Natural Resource Conservation Service (NRCS) type III rainfall distribution with an antecedent moisture condition II. The site area contains **more than** 50% impervious area, and therefore is not exempt from peak discharge attenuation criteria to protect streambanks.

2.4 Flood Attenuation (City of Parker)

To comply with the requirements of The City of Parker, the post development peak discharge rate must not exceed the pre development discharge rate for the 25 year-24-hour storm event.

3.0 PRE-DEVELOPMENT

3.1 Background.

Drainage Area 1

This drainage area is for La Brisa Hotel reconstruction and its parking facility. The existing site has positive fall from approximate EL. 13.0 at the northeast corner to EL. 10.0 along the southern boundary. The site is bordered by Highway 98 rights of way to the west, residential properties to the east, commercial property to the north and vacant property within the government of the City of Parker to the south.

3.2 Time of Concentration (TOC_{pre})

The pre-development time of concentration was calculated using the TR-55 Manual for Small Urban Watersheds methodology which uses sheet flow, shallow concentrated flow and channel flow to determine time of concentrations. The TOC_{pre} result is summarized in Appendix B.

3.2 Geotechnical Information.

Geotechnical exploration was performed by Magnum Engineering for seasonal high water table determination and permeability rates. The soils within this area encountered during the borings were brown/gray slightly silty fine sands from the ground surface to the boring termination depth of 8-feet below existing grade. Groundwater was encountered roughly 5.0 feet below existing grade at the time of drilling. The NRCS Soil Survey indicates Type A soils on the property which was consistent with the geotechnical report.

4.0 POST DEVELOPMENT

The stormwater management system has been designed for the proposed redevelopment and consists of one (1) drainage area utilizing a dry retention pond to provide treatment and attenuation.

4.1 Receiving Waters

The receiving waters for discharges from the site will be to the groundwater and to Pitts Bayou. Groundwater was encountered during the geotechnical exploration at 5.0 feet below existing grade. Based on depth of boring, the tailwater elevation for the groundwater table was conservatively estimated to be elevation 8.0 feet, NAVD88.

4.2 Drainage Area 1 (DA 1).

Drainage Area 1 contains a dry retention pond that provides treatment for ± 1.88 acres. The treatment volume required for this drainage basin was for the first 1/2" of runoff since it was designed as an off-line system. One FDOT Inlet Type C will be installed in order to treat and attenuate the runoff prior to discharge. This drainage area has been designed for the proposed development containing 1.57 acres of onsite impervious area. The top of the pond is set at EL 12.00 and the bottom at El. 10.00.

Seasonal high groundwater was estimated during the geotechnical exploration at EL 8.00.

4.3 CN Summary

The post development site is considered to be developed with SCS Type "A" soil classification. The resulting SCS curve number calculated for the drainage area is summarized in Appendix B. The CN value in the post for the undisturbed/grassed areas are lower due to clean fill being utilized on the lot and the existing soils are very low and subject to seasonal high water table effects. The post condition will be compacted but not subject to the water table, allowing higher permeability.

4.4 Time of Concentration Summary

The post development time of concentration was calculated using the TR-55 Manual for Small Urban Watersheds methodology which uses sheet flow, shallow concentrated flow and channel flow to determine time of concentrations. The TOC_{post} result is summarized in Appendix B.

4.5 100-Year Floodplain Evaluation.

The subject parcel is not located within the 100-year floodplain according to FEMA and the Bay County GIS Flood Map.

5.0 CONCLUSION

The design of the stormwater management system for this project comply with the requirements of the following:

DRAINAGE AREA 1 SUMMARY

Drainage Area	1.88 acres
Impervious Area	1.57 acres
1/2" of Runoff Treatment Required	3,418 cf
Treatment Volume Provided	3,743 cf
Outfall: FDOT Type C Inlet	EL. 11.80
Weir (8" PVC pipe with an Elbow)	Inv. 11.00
Outfall pipes	Two (2) existing 8" PVC pipes

5.1 NWFWMD

The development meets/exceeds the requirements for first 1/2" of runoff.

5.2 FDEP

Erosion control measures will be utilized throughout the construction phase of this project to restrict any turbid runoff from leaving the construction site. Installation details for silt fences and inlet sediment barriers, where applicable, are included within this permit application.

5.3 City of Parker

The design of the stormwater management system for this project complies with the City's stormwater regulations. The city requires that the post development discharge runoff rate for the 25-year, 24-hour storm event cannot exceed the pre development discharge rate.

CRITICAL DURATION ANALYSIS
25 YEAR, 24 HOUR STORM EVENT
DRAINAGE AREA 1

Description	24 Hour
Pre-Dev Runoff (cfs)	1.06
Post –Dev Runoff (cfs)	1.05
Top Bank El (ft)	12.00
Peak Stage (ft)	11.78
Freeboard (ft)	0.22

APPENDIX A

STORAGE RETENTION CALCULATIONS

LA BRISA INN - FILE NO. 1343.02

McNeil Carroll Engineering, Inc.

REQ'D: Volume of storage (retention) for 1/2" rule or runoff from one inch of rainfall

Drainage Area =	1.88	acre	or	82,039	sq. ft		
Impervious Area =	1.57	acre	or	68,352	sq. ft		
Pervious Area =	0.31	acre					
Offsite Site =	0.00	acre		0	sq. ft		
Offsite Impervious Area =	0.00	acre		0	sq. ft	Runoff Coefficient =	0.88
Offsite Pervious Area =	0.00	acre					
Impervious Surface Area =	83.32	%		Water Quantity Criteria Required per 3.1 =		NO	
Top Bank Basin Area =	0.15	acre		Peak Discharge Attenuation Required per 4.5.1=		TRUE, 2-YR, 24-HR	
Soils Group =	A	(A,B,C,D,B/D)					
Fillable porosity = f =	0.30						
K_{vs}=	30.00	ft/day	use	15.00	ft/day	7.5	in/hr
K_H=	45.00	ft/day	use	22.50	ft/day		
FS=	2.00			Length of Bottom of Basin =		137	ft
Basin Bottom Elevation=	10.00			Width of Bottom of Basin =		21	ft
SHWT=	8.00	ft					
Impervious Layer Elevation=	0.00						
h_b=	2.00						

Retention Required

1/2" of runoff = $\frac{\text{(site area)(0.5 in)(43560 ft}^2\text{/ac)}}{\text{12 in/ft}}$

1/2" of runoff= 3418 cf

STAGE/STORAGE

Elevation	Area (sq. ft.)	Area (acres)	Volume (cu. Ft.)	Perc (cfs)
10.00	2,890	0.066	0	0.50
10.50	3,847	0.088	1,684	0.67
11.00	4,678	0.107	3,784	0.81
11.50	5,513	0.127	6,302	0.96
12.00	6,369	0.146	9,259	1.11

Treatment Volume occurs above EL. 10.50

SOLUTION:

Storage required =	3,418	cf	or	0.078	ac-ft		
Minimum depth =	0.91	ft					
Req'd overflow set @	10.91	ft	Overflow set @	11.00	ft	Vol set/Vol req'd =	1.095 = Safety Factor

Part II - Unsaturated Vertical Flow Analysis

Treatment Volume Depth (h_v)=	1.00	ft	
Height of water to saturate (h_u)=f(h_b)=	0.60	ft	saturated lateral flow will occur
Volume infiltrated during Stage One (V_u)=	1734	cf	(Eq. 13-3; A_b h_b f)
Unsaturated vertical hydraulic conductivity (K_{vu})=	30.00	ft/day	(DRI Test)
Design Infiltration Rate (I_d)=	15.00	ft/day	(Eq. 13-1; K_{vu}/FS)
Time to saturate soil beneath the basin (t_{sat})=	0.04	days or	0.96 hours (Eq. 13-2; f h_b / I_d)

Part III - Saturated Lateral Flow Analysis

Remaining volume to be infiltrated under saturated lateral flow=	1684	cf	(storage required - volume infiltrated during Stage One)
Elevation of treatment volume at start of saturated lateral flow=	10.58	ft	
height of water in the basin at start of saturated lateral flow (h_2)=	0.58	ft	
height of water in the basin above initial GWT at start of sat lat flow (H_T)=	2.58	ft	(Eq. 13-8; H_T=h_b+h_2)
F_y=	0.77		(Eq. 13-6; F_y=h_c/H_T)
Basin length to width ratio (L/W)=	6.49		
F_x=	2.00		(from Figure 13-7)
Time to recover remaining treatment volume under saturated lateral flow			
H=	8.00	ft	
Average saturated thickness (D) =	9.00	ft	(Eq. 13-7; D=H + h_c/2)
time (t)=	0.14	days	(Eq. 13-9; t=W^2/(4 K_H D F^2_x)

Part IV - Total Recovery Time

Total recovery time (t_{Total})= 0.18 days or 4.3 hours

McNEIL CARROLL ENGINEERING, INC.

APPENDIX B

CURVE NUMBER CALCULATION

LA BRISA INN - FILE NO. 1343.02

Total Runoff Area 82,039 ft^2
1.88 acres

PRE-DEVELOPMENT

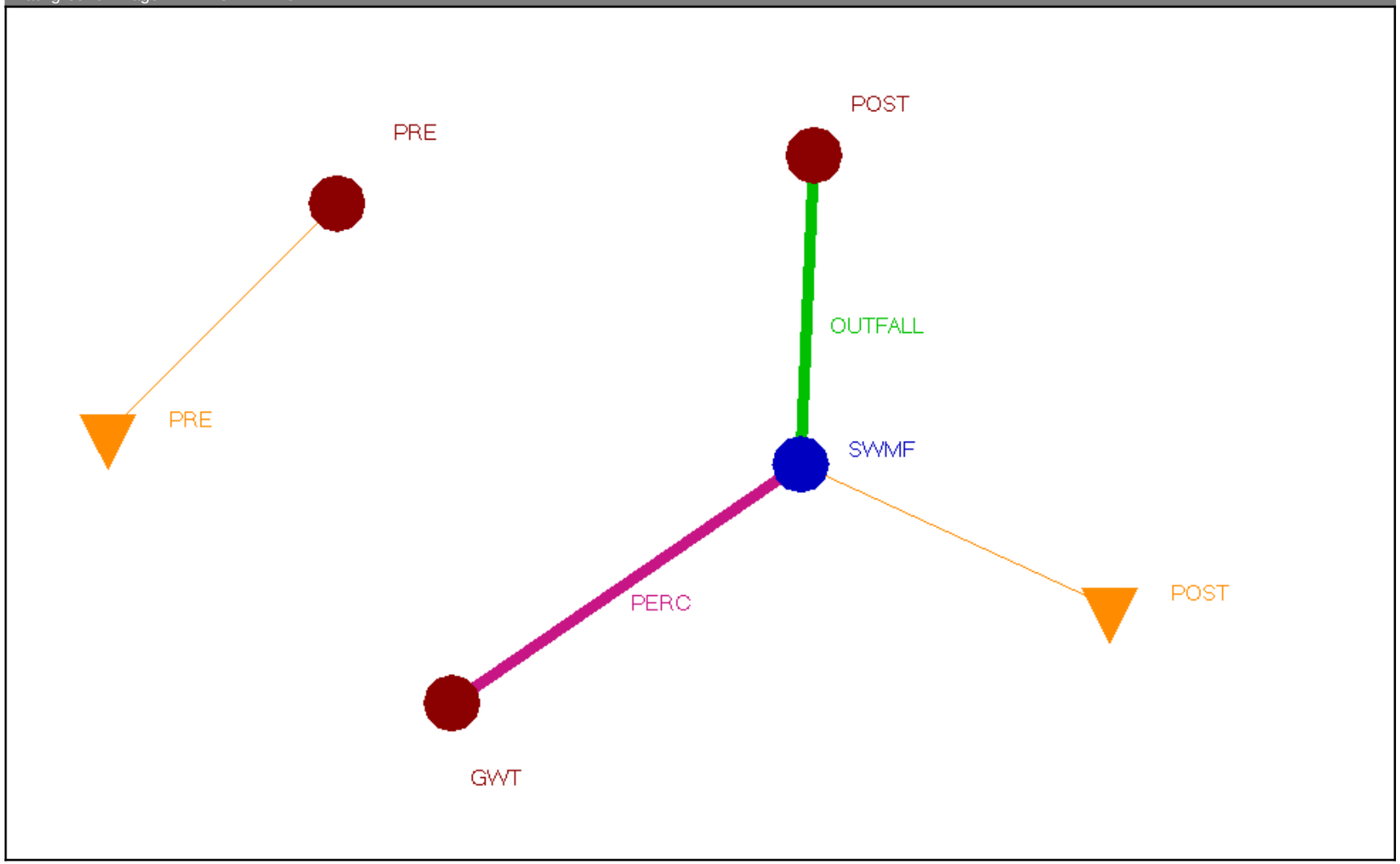
	TYPE A SOILS		TYPE B SOILS		TYPE C SOILS		TYPE D SOILS		CN SOIL GROUP				CN*A	Total
LAND USE	**Area (ft^2)**	**%**	**Area (ft^2)**	**%**	**Area (ft^2)**	**%**	**Area (ft^2)**	**%**	**A**	**B**	**C**	**D**		**Area**
Woods (Poor)		0.00%		0.00%		0.00%		0.00%	45	66	77	83	0	0
Woods (Fair)		0.00%		0.00%		0.00%		0.00%	36	60	73	79	0	0
Woods (Good)		0.00%		0.00%		0.00%		0.00%	30	55	70	77	0	0
Woods/Grass (Poor)	57,427	70.00%		0.00%		0.00%		0.00%	57	73	82	86	3,273,356	57,427
Woods/Grass (Fair)		0.00%		0.00%		0.00%		0.00%	40	65	76	82	0	0
Woods/Grass (Good)		0.00%		0.00%		0.00%		0.00%	32	58	72	79	0	0
Dirt		0.00%		0.00%		0.00%		0.00%	72	82	87	89	0	0
Grass (Fair)		0.00%		0.00%		0.00%		0.00%	49	69	79	84	0	0
Grass (Good)	24,612	30.00%		0.00%		0.00%		0.00%	39	61	74	80	959,856	24,612
1/8 Ac. Residential		0.00%		0.00%		0.00%		0.00%	77	85	90	92	0	0
1/5 Ac. Residential		0.00%		0.00%		0.00%		0.00%	69	80	87	90	0	0
1/4 Ac. Residential		0.00%		0.00%		0.00%		0.00%	61	75	83	87	0	0
1/3 Ac. Residential		0.00%		0.00%		0.00%		0.00%	57	72	81	86	0	0
1/2 Ac. Residential		0.00%		0.00%		0.00%		0.00%	54	70	80	85	0	0
1 Ac. Residential		0.00%		0.00%		0.00%		0.00%	51	68	79	84	0	0
2 Ac. Residential		0.00%		0.00%		0.00%		0.00%	46	65	77	82	0	0
Industrial		0.00%		0.00%		0.00%		0.00%	81	88	91	93	0	0
Gravel Parking		0.00%		0.00%		0.00%		0.00%	76	92	94	95	0	0
Streets and Roads		0.00%		0.00%		0.00%		0.00%	98	98	98	98	0	0
Standing Water		0.00%		0.00%		0.00%		0.00%	100	100	100	100	0	0
TOTALS	**82,039**	**100%**	**0**	**0%**	**0**	**0%**	**0**	**0%**		**COMPOSITE CN**		**52**	**4,233,212**	**82,039**

POST-DEVELOPMENT

	TYPE A SOILS		TYPE B SOILS		TYPE C SOILS		TYPE D SOILS		CN SOIL GROUP				CN*A	Total
LAND USE	**Area (ft^2)**	**%**	**Area (ft^2)**	**%**	**Area (ft^2)**	**%**	**Area (ft^2)**	**%**	**A**	**B**	**C**	**D**		**Area**
Woods (Poor)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	45	66	77	83	0	0
Woods (Fair)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	36	60	73	79	0	0
Woods (Good)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	30	55	70	77	0	0
Woods/Grass (Poor)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	57	73	82	86	0	0
Woods/Grass (Fair)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	43	65	76	82	0	0
Woods/Grass (Good)	0	0.00%		0.00%	0	0.00%	0	0.00%	32	58	72	79	0	0
Dirt	0	0.00%	0	0.00%	0	0.00%	0	0.00%	72	82	87	89	0	0
Grass (Fair)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	49	69	79	84	0	0
Grass (Good)	13,687	16.68%		0.00%	0	0.00%	0	0.00%	39	61	74	80	533,793	13,687
1/8 Ac. Residential	0	0.00%	0	0.00%	0	0.00%	0	0.00%	77	85	90	92	0	0
1/5 Ac. Residential	0	0.00%	0	0.00%	0	0.00%	0	0.00%	69	80	87	90	0	0
1/4 Ac. Residential	0	0.00%	0	0.00%	0	0.00%	0	0.00%	61	75	83	87	0	0
1/3 Ac. Residential	0	0.00%	0	0.00%	0	0.00%	0	0.00%	57	72	81	86	0	0
1/2 Ac. Residential	0	0.00%	0	0.00%	0	0.00%	0	0.00%	54	70	80	85	0	0
1 Ac. Residential	0	0.00%	0	0.00%	0	0.00%	0	0.00%	51	68	79	84	0	0
2 Ac. Residential	0	0.00%	0	0.00%	0	0.00%	0	0.00%	46	65	77	82	0	0
Industrial	0	0.00%	0	0.00%	0	0.00%	0	0.00%	81	88	91	93	0	0
Commercial	0	0.00%	0	0.00%	0	0.00%	0	0.00%	89	92	94	95	0	0
Streets and Roads	68,352	83.32%	0	0.00%	0	0.00%	0	0.00%	98	98	98	98	6,698,496	68,352
Standing Water	0	0.00%	0	0.00%	0	0.00%	0	0.00%	100	100	100	100	0	0
TOTALS	**82,039**	**100%**	**0**	**0%**	**0**	**0%**	**0**	**0%**		**COMPOSITE CN**		**88**	**7,232,289**	**82,039**

McNEIL—CARROLL ENGINEERING, INC.

Background Image: NETWORK DIAGRAM



Sim	Node Name	Maximum Total Inflow Rate [cfs]	Time to Maximum Total Inflow Rate [hrs]
025-024	PRE	1.06	12.0154

Simple Basin: POST

Scenario:	TRYING POND
Node:	SWMF
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:	UH484
Peaking Factor:	484.0
Area:	1.8800 ac
Curve Number:	88.0
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	

Comment:

Simple Basin: PRE

Scenario:	TRYING POND
Node:	PRE
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:	UH484
Peaking Factor:	484.0
Area:	1.8800 ac
Curve Number:	52.0
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	

Comment:

Node: GWT

Scenario:	TRYING POND
Type:	Time/Stage
Base Flow:	0.00 cfs
Initial Stage:	8.00 ft
Warning Stage:	9.00 ft
Boundary Stage:	

Comment:

Node: POST

Scenario:	TRYING POND
Type:	Time/Stage
Base Flow:	0.00 cfs
Initial Stage:	8.45 ft
Warning Stage:	9.00 ft
Boundary Stage:	

Comment:

Node: PRE

Scenario:	TRYING POND
Type:	Time/Stage
Base Flow:	0.00 cfs
Initial Stage:	0.00 ft
Warning Stage:	0.00 ft
Boundary Stage:	

Comment:

Node: SWMF

Scenario: TRYING POND
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 10.00 ft
Warning Stage: 11.75 ft

Stage [ft]	Area [ac]	Area [ft2]
10.00	0.0660	2875
10.50	0.0880	3833
11.00	0.1070	4661
11.50	0.1270	5532
12.00	0.1460	6360

Comment:

Drop Structure Link: OUTFALL		Upstream Pipe		Downstream Pipe	
Scenario:	TRYING POND	Invert:	10.90 ft	Invert:	10.29 ft
From Node:	SWMF	Manning's N:	0.0100	Manning's N:	0.0100
To Node:	POST	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	0.67 ft	Max Depth:	0.67 ft
Flow Direction:	Both	Bottom Clip			
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	2	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
Length:	190.00 ft	Top Clip			
FHWA Code:	1	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.50	Op Table:		Op Table:	
Exit Loss Coef:	1.00	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		Bottom Clip	
Weir:	1	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Horizontal	Default:	0.00 ft
Geometry Type:	Circular	Op Table:	
Invert:	11.00 ft	Ref Node:	
Control Elevation:	10.50 ft	Discharge Coefficients	
Max Depth:	0.67 ft	Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Weir Component		Bottom Clip	
Weir:	2	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Horizontal	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	11.80 ft	Ref Node:	
Control Elevation:	11.80 ft	Discharge Coefficients	
Max Depth:	3.08 ft	Weir Default:	3.200
Max Width:	2.00 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Drop Structure Comment:

Percolation Link: PERC

Scenario:	TRYING POND	Surface Area Option:	Vary Based on Stage/Area Table
From Node:	SWMF		
To Node:	GWT	Vertical Flow Termination:	Horizontal Flow Algorithm
Link Count:	1	Perimeter 1:	923.00 ft
Flow Direction:	Both	Perimeter 2:	1245.00 ft
Aquifer Base Elevation:	0.00 ft	Perimeter 3:	1821.00 ft
Water Table Elevation:	8.00 ft	Distance P1 to P2:	25.00 ft
Annual Recharge Rate:	0 ipy	Distance P2 to P3:	100.00 ft
Horizontal Conductivity:	22.500 fpd	# of Cells P1 to P2:	5
Vertical Conductivity:	15.000 fpd	# of Cells P2 to P3:	10
Fillable Porosity:	0.300		
Layer Thickness:	2.00 ft		

Comment:

Simulation: DRAWDOWN

Scenario: DRAWDOWN
Run Date/Time: 1/19/2023 11:08:32 AM
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	100.0000

	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 Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	No Rainfall
Max dZ:	1.0000 ft		
Link Optimizer Tol:	0.0001 ft		
Edge Length Option:	Automatic		
		Dflt Damping (1D):	0.0050 ft
		Min Node Srf Area (1D):	100 ft2
		Energy Switch (1D):	Energy

Comment:

Simulation: 025-024

Scenario:	TRYING POND
Run Date/Time:	1/19/2023 11:08:40 AM
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 Fact: 0.5 dec
dZ Tolerance: 0.0010 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft
Edge Length Option: Automatic

IA Recovery Time: 24.0000 hr
Smp/Man Basin Rain Opt: Global
Rainfall Name: ~FDOT-24
Rainfall Amount: 11.00 in
Storm Duration: 24.0000 hr
Dflt Damping (1D): 0.0050 ft
Min Node Srf Area (1D): 100 ft2
Energy Switch (1D): Energy

Comment:

Sim	Node Name	Maximum Stage [ft]
025-024	SWMF	11.78

Sim	Node Name	Maximum Total Inflow Rate [cfs]	Time to Maximum Total Inflow Rate [hrs]
025-024	POST	1.05	12.1557

APPENDIX C

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bay County, Florida



June 17, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:995 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bay County, Florida
Survey Area Data: Version 21, Sep 7, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 2, 2020—Dec 8, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
27	Mandarin sand, 0 to 2 percent slopes	0.8	38.7%
42	Resota fine sand, 0 to 5 percent slopes	1.2	61.3%
Totals for Area of Interest		**2.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bay County, Florida

27—Mandarin sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4g9
Elevation: 10 to 70 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Mandarin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mandarin

Setting

Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Talf, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 7 inches: sand
E - 7 to 25 inches: sand
Bh - 25 to 57 inches: sand
C - 57 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Minor Components

Chipley

Percent of map unit: 5 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Hurricane

Percent of map unit: 4 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Foxworth

Percent of map unit: 3 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G152AA121FL)
Hydric soil rating: No

Resota

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, riser, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G152AA121FL)
Hydric soil rating: No

42—Resota fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2ttl8
Elevation: 10 to 40 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F

Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Resota and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Resota

Setting

Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 19 inches: fine sand
Bw - 19 to 42 inches: fine sand
C - 42 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (20.00 to 50.00 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G152AA121FL)
Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G152AA121FL)
Hydric soil rating: No

Minor Components

Ortega

Percent of map unit: 4 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G152AA121FL)
Hydric soil rating: No

Kureb

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, dunes on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on ridges and dunes of xeric uplands (G152AA111FL)
Hydric soil rating: No

Mandarin

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (La Brisa Inn)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group (La Brisa Inn)



Map Scale: 1:995 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Bay County, Florida
Survey Area Data: Version 21, Sep 7, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 2, 2020—Dec 8, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group (La Brisa Inn)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
27	Mandarin sand, 0 to 2 percent slopes	A	0.8	38.7%
42	Resota fine sand, 0 to 5 percent slopes	A	1.2	61.3%
Totals for Area of Interest			**2.0**	**100.0%**

Rating Options—Hydrologic Soil Group (La Brisa Inn)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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APPENDIX D

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

GEOTECHNICAL ENGINEERING REPORT

LA BRISA
PANAMA CITY, FLORIDA

PREPARED FOR:

MR. Doug CROOK, P.E.
PANHANDLE ENGINEERING, INC.
3005 SOUTH HIGHWAY 77
LYNN HAVEN, FLORIDA 32444

1026 PIERSON DRIVE
LYNN HAVEN, FLORIDA 32444
TELEPHONE (850) 258.0994

MAGNUM ENGINEERING INC
GEOTECHNICAL ENGINEERING CONSULTANTS

February 26, 2021

Mr. Doug Crook, P.E.
Panhandle Engineering, Inc.
3005 South Highway 77
Lynn Haven, Florida 32444

SUBJECT: La Brisa - Geotechnical Services
Parker, Florida
MEI Project No. M121-107-243

Dear Mr. Slonina:

This letter forwards the results of our Geotechnical exploration for the proposed development. Our exploration consisted of One (1) 8-feet deep hand auger boring and one (1) Double Ring Infiltrometer Test (DRI) in the proposed stormwater pond area. The subsurface exploration was conducted to provide soil related information to aid in the design of an effective stormwater management system in accordance with ERP and/or local municipal regulations.

Upon completion of our field testing, the samples were brought back to the office for visual inspection, classification, and analysis by our engineering staff.

Project Information

The subject site is located east of Tyndall Parkway at the La Brisa Inn in Parker, Florida. At the time of our exploration, the site was currently a hotel site which had been damaged from Hurricane Michael back in October 2018.. Based on visual inspection, the site appeared relatively level with less than 3 feet of grade change across the site.

If any of the above information is incorrect, please inform Magnum Engineering, Inc. so that we can review and update our recommendations, as needed.

Subsurface Conditions

Figure #1 show the Boring Location Plan and Figure #2 shows the Logs of Borings for the Hand Auger borings HA-1. The test location was established in the field using a 100-foot tape and estimating right angles with reference to existing landmarks, thus, the test location should be considered approximate.

The auger boring (HA-1) generally encountered brown/gray slightly silty fine sands from the ground surface to the boring termination depth of 8-feet below existing grade.

The above subsurface descriptions are of a generalized nature, provided to highlight the major soil strata encountered. The Logs of Boring should be reviewed for specific subsurface conditions at each boring location. The stratifications shown on the Logs of Boring represent the subsurface conditions at the actual boring locations only, and variations in the subsurface conditions can and may occur between boring locations and should therefore be expected. The stratifications represent the approximate boundary between subsurface materials, and the transitions between strata may be gradual.

Please refer to the attached Logs of Borings presented as Figure #2 for a more detailed description of the soils encountered.

Groundwater Conditions

Groundwater was encountered roughly 5.0 feet below existing grade at the time of drilling (February 20, 2021), which was during a period of normal seasonal rainfall. By definition, the normal seasonal high groundwater table elevation is the highest level of the saturated zone in the soil during a year with normal rainfall. The procedure used in estimating the seasonal high groundwater table is based on adjusting the existing groundwater table encountered upward or downward, taking into consideration factors such as antecedent rainfall, redoximorphic features (identifying soil mottling) and vegetative indicators. Please refer to the table provided below for groundwater data at each boring location.

GROUNDWATER DATA

TEST LOCATION	DEPTH TO EXISTING GROUNDWATER TABLE	DEPTH TO ESTIMATED SEASONAL HIGH GROUNDWATER TABLE (ft)
HA-1	5.0 feet	4.5 feet

Large fluctuations are possible under severe weather conditions. We recommend that the Contractor verify the actual groundwater levels at the time of construction to determine potential impacts groundwater will have on construction procedures.

Double Ring Infiltrometer Test

One (1) Double Ring Infiltrometer test was performed in the field in general accordance with the procedures outlined in ASTM D-3385, ``Infiltration Rate of Soils in Field using Double Ring Infiltrometers''. Testing consisted of initially clearing all surface vegetation and topsoil from within the test area. The Infiltration test was performed approximately 1.0 feet below existing grade at location DRI-1. The outer ring, which is approximately 24 inches in diameter, was then driven to a depth of 6 inches below the exposed ground surface. The inner ring, approximately 12 inches in diameter, was then centrally located within the outer ring and driven to a depth of 2 inches. The two rings were then simultaneously filled with water to a height of 4 inches above the exposed ground surface test soils. The water level was maintained at this height throughout the test period, with the required amount of water added to maintain this level in both rings recorded at time intervals of 5 minutes.

The infiltration rate for the inner ring and the annular space between the rings is determined by dividing (a) the water volume used (within each specific area) during the stabilized flow period of the test, by (b) the specific area and (c) the time interval. Infiltration rates are generally converted to units of inches per hour. The infiltration rate for the inner ring, if different than the infiltration rate of the annular area between the rings, according to ASTM, should be used as the infiltration rate for the soils.

INFILTRATION DATA

LOCATION	ORIENTATION	TEST DEPTH (feet)	SUSTAINED INFILTRATION RATE (in/hr)
DRI-1	$K_{V\ (unsaturated)}$	1.0	15.0* in/hr

Note: The above infiltration rate has not been factored and is up to the designer to apply an appropriate factor of safety.

We recommend using a transformation ratio of 1 horizontal to 1 vertical (i.e. the estimated ratio of horizontal to vertical permeability).

ENVIRONMENTAL RESOURCE PERMITTING (ERP) DESIGN PARAMETERS

DESCRIPTION	LOCATION	DESIGN PARAMTER
SUSTAINED INFILTRATION RATE (K_{VU})	DRI-1	15.0 IN/HR*
TEST DEPTH	DRI-1	1.0 FT
FILLABLE POROSITY	DRI-1	30%
DEPTH TO EXISTING GROUNDWATER TABLE	DRI-1	5.0 FT BELOW EXISTING GRADE
DEPTH TO ESTIMATED SEASONAL HIGH GROUNDWATER TABLE	DRI-1	4.5 FT BELOW EXISTING GRADE
DEPTH TO CONFINING LAYER	DRI-1	>15 FEET**

***** The above infiltration rate has not been factored and it is up to the designer to apply an appropriate factor of safety.

**Based on our experience with soils in the general area.

Warranty and Limitations of Study

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. Magnum Engineering, Inc. is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

Soil conditions at other locations may differ from those encountered in the test borings, and the passage of time may cause the soils conditions to change from those described in this report.

This report is intended for use by the designers of this project. While we have no objections to it being provided for review by parties to this project, it is not a specification document and is not to be used as a part of the specifications. If desired, we can assist in the development of specifications for this project based upon our exploration.

The nature and extent of variation and change in the subsurface conditions at the site may not become evident until the course of construction. Construction monitoring by the geotechnical engineer or his representative is therefore considered necessary to verify the subsurface conditions and to check that the soils connected construction phases are properly carried out. If significant variations or changes are in evidence, it may be necessary to reevaluate the recommendations in this report.

Furthermore, if the project characteristics are altered significantly from those discussed in this report, if the project information contained in this report is incorrect or if additional information becomes available, a review must be made by this office to determine if any modifications in the recommendations will be necessary.

We hope this letter provides sufficient information for the present. If you have any questions or comments, please feel free to call.

Sincerely,
MAGNUM ENGINEERING, INC.

JAMES T. VICKERS, P.E.
Sr. Geotechnical Engineer
Florida Registration # 56813

James T. Vickers, P.E.
Digitally signed by James T. Vickers, P.E.
Date: 2021.02.26 06:07:29 -06'00'

Attachments: Figure #1 – Boring Location Plan
Figure #2 – Logs of Borings
Figure #3 – Double Ring Infiltrometer Results

This item has been electronically signed and sealed by James T. Vickers, P.E. on the date adjacent to the seal.

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

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BORING LOCATION PLAN

FIGURE # 1

Tyndall Pkwy
98
HA-1/DRI-1
N
200 ft
Google Earth
© 2020 Google

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LOGS OF BORING

FIGURE # 2

Magnum Engineering, Inc.
1026 Pierson Drive
Lynn Haven, Florida 32444
Telephone: 8502658332

BORING NUMBER HA-1

CLIENT Panhandle Engineering, Inc.
PROJECT NAME La Brisa
PROJECT NUMBER M121-107-243
PROJECT LOCATION Parker, Florida
DATE STARTED 2/20/21 **COMPLETED** 2/20/21
GROUND ELEVATION ___ **HOLE SIZE** ___
DRILLING CONTRACTOR GeoDrill Tech, LLC
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger Boring
▽ **DEPTH TO GROUNDWATER AT TIME OF DRILLING** 5.0 ft
LOGGED BY J. Governale **CHECKED BY** J. Vickers
ESTIMATED SEASONAL HIGH GWT ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Brown/Gray Slightly Silty Fine SAND (SP-SM)	AU									
2.5												
5.0		▽										
7.5												
		Boring Termination Depth at 8.0 feet.										

GEOTECH BH COLUMNS LA BRISA.GPJ GINT STD US LAB.GDT 2/23/21

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DOUBLE RING INFILTROMETER TEST RESULTS

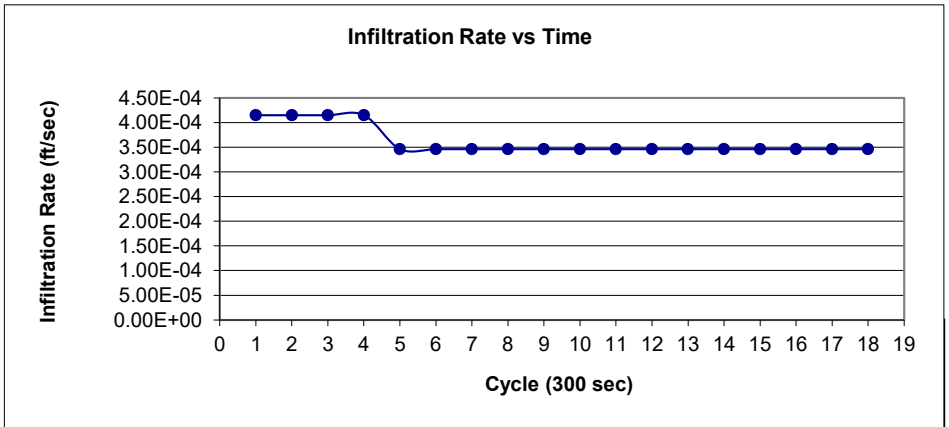
APPENDIX A

MAGNUM ENGINEERING INC
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Double-Ring Field Infiltration Test

Test Location:	DRI-1			
Project Name:	La Brisa			
Project Location:	Parker, Florida			
Test Depth:	1	ft		
Depth to GWT:	5	ft		
Inner Ring Diameter:	12	in	0.3048	m
Outer Ring Diameter:	24	in	0.6096	m
Pre-Saturation	30	min		
Area Outer Ring:	3.1416	ft^2	0.00202683	m^2
Area Inner Ring:	0.7854	ft^2	0.00050671	m^2
Net Outer Ring Area:	2.3562	ft^2	0.00152013	m^2

	Inner Ring		
Cycle	ElapTime (sec)	Vol Used (in^3)	Infiltration Rate (ft/sec)
1	300	169	4.15E-04
2	300	169	4.15E-04
3	300	169	4.15E-04
4	300	169	4.15E-04
5	300	141	3.46E-04
6	300	141	3.46E-04
7	300	141	3.46E-04
8	300	141	3.46E-04
9	300	141	3.46E-04
10	300	141	3.46E-04
11	300	141	3.46E-04
12	300	141	3.46E-04
13	300	141	3.46E-04
14	300	141	3.46E-04
15	300	141	3.46E-04
16	300	141	3.46E-04
17	300	141	3.46E-04
18	300	141	3.46E-04
Results	Sustained Rate	147	3.62E-04



Infiltration Rate: **1.06E-02 cm/sec** **15.0 in/hr**