



November 15, 2021

Mr. Maurice Rudolph  
HYDRY Company, LLC  
4314 Pablo Oaks Court  
Jacksonville, Florida 32224

ECS Project No. 35:29020-A1  
Client ID: 3524

Reference: Preliminary Report of Geotechnical Exploration  
**River Landing Lot 103**  
Nocatee, St. Johns County, Florida

Dear Mr. Rudolph:

ECS Florida, LLC (ECS) has completed the requested preliminary geotechnical exploration in general accordance with our Proposal No. 35:17711-GPR dated April 5, 2021. The exploration was performed to explore the general subsurface conditions within the proposed lot area and to provide preliminary recommendations for foundation support.

Additional field testing should be performed to formulate detailed foundation design and site preparation and earthwork construction recommendations prior to final design. Once more detailed information regarding the proposed structure is developed, we should be given the opportunity to review and develop a supplemental design-phase scope of services.

#### **PROJECT INFORMATION**

The general site location is shown on the Site Location Diagram (Figure 1). At the time of our exploration, the site was undeveloped, with ground surface cover consisting of brush and trees. Surface water was not observed near the planned building area at the time of our exploration.

You provided a copy of a site plan for the subject site. This plan indicates the boundary limits for the property and the existing roadways adjacent to the site. However, we note the location of the proposed structure(s) was not available to our office at the time of this report preparation.

The following information explains our assumptions of the planned development.

SUBJECT	DESIGN INFORMATION / ASSUMPTIONS
# of Stories	3 stories above grade
Usage	Residential
Column Loads <sup>(1)</sup>	50 kips
Wall Loads <sup>(1)</sup>	3 kips per linear foot (klf) maximum
Floor Loads <sup>(1)</sup>	150 pounds per square foot (psf) maximum
Fill and Cut Heights	Assumed a maximum of 3 feet of fill and only minor cuts, from existing site grades

(1) If actual structural loads differ from these assumed loads ECS must be contacted immediately in order to revise building foundation recommendations and settlement calculations, as needed.

### FIELD EXPLORATION

We performed a field exploration on August 19, 2021. The approximate boring locations are indicated on the attached Field Exploration Diagram (Figure 2). Our personnel determined the boring locations using a handheld Global Positioning System (GPS) unit. The boring locations on the referenced Field Exploration Diagram should be considered accurate only to the degree implied by the method of measurement used.

We located and performed two Standard Penetration Test (SPT) borings, drilled to depths of approximately 20 feet below the existing ground surface, in general accordance with the methodology outlined in ASTM D 1586 and two auger borings, drilled to depths of approximately 10 feet below the existing ground surface in general accordance with the methodology outlined in ASTM D 1452 to explore the subsurface conditions within the lot area. Soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory for further evaluation. Our exploration procedures are explained in greater detail in Appendix B including the insert titled Subsurface Exploration Procedures.

### VISUAL CLASSIFICATION

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

### GENERAL SUBSURFACE CONDITIONS

A graphical presentation of the generalized subsurface conditions is presented on Figure 3. It should be understood that the soil conditions will vary between the boring locations and in areas of the site not explored during our visit. The following table summarizes the soil conditions encountered.

Typical Depth (ft)		Stratum	Description
From	To		
Existing Ground Surface	0.5 – 1	N/A	Topsoil
0.5 – 1	5 - 7	I	Very loose to Loose FINE SAND (SP) With Shell Fragments, Moist to Wet
5 – 7	6 ½ - 9	II	Medium Dense FINE SAND WITH SILT, Some Organic Fines (SP-SM) and Soft to Firm Organic CLAY (OL), Wet
6 ½ - 9	20	III	Medium Dense FINE SAND (SP) and CLAYEY FINE SAND (SC), Wet

A graphical presentation of the subsurface conditions is shown on the Generalized Subsurface Soil Profiles in Appendix A.

Groundwater was encountered at each boring location and recorded at the time of drilling at depths varying from 3.8 feet to 4 feet below the existing ground surface. We note that groundwater levels will fluctuate due to seasonal climatic variations, surface water runoff patterns, construction operations, and other interrelated factors. The groundwater depth at each boring location is noted on the Generalized Subsurface Profiles and on the Log of Boring records.

**PRELIMINARY DESIGN RECOMMENDATIONS**

Our geotechnical engineering evaluation of the site and subsurface conditions at the property, with respect to the planned construction and our recommendations for earthwork and foundation support, are based on (1) our site observations, (2) the field and laboratory test data obtained, (3) our understanding of the project information and structural conditions as presented in this report, and (4) our experience with similar soil and loading conditions.

Additional field testing should be performed to formulate detailed foundation design and site preparation and earthwork construction recommendations prior to final design. Also, the discovery of any site or subsurface conditions during construction that deviate from the data obtained during this geotechnical exploration should also be reported to us for our evaluation.

Based on the above preliminary evaluation of the site and subsurface conditions at the borings with respect to the anticipated construction, it is our opinion that dewatering operations and sloping of soils for the excavation would be required to remove the organic material from below the proposed structure, which may be impractical at the time of construction due to adjacent development. Therefore, we recommend the proposed structure be supported on a deep foundation system.

**Deep Foundation Support**

The organic-containing soils can be left in-place if the proposed structure (including the floor slabs) is supported by deep foundations. There are several types of deep foundations; however, based on our experience with similar projects and soil conditions, Auger Cast In-Place (ACIP) piles are applicable. ACIP piles are constructed by drilling into the subsurface material with a continuous flight auger which is pulled upward (after achieving the required length) while cement grout is pumped under pressure through the auger. Based on our experience with similar soil conditions, we expect that a 14-inch ACIP bearing 20-feet below the existing grades may develop an axial capacity on the order of 13 tons.

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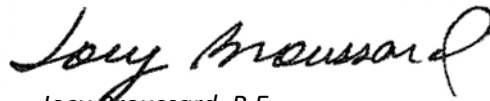
## REPORT LIMITATIONS

Our geotechnical exploration has been performed, our findings obtained, and our recommendations prepared, in accordance with generally accepted geotechnical engineering principles and practices. ECS is not responsible for any independent conclusions, interpretation, opinions, or recommendations made by others based on the data contained in this report. Additional field testing should be performed to formulate detailed foundation design and site preparation and earthwork construction recommendations prior to final design.

Respectfully Submitted  
**ECS FLORIDA, LLC**



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## APPENDICES

### Appendix A – Drawings & Reports

- Figure 1 - Site Location Diagram
- Figure 2 - Field Exploration Diagram
- Figure 3 – Generalized Subsurface Profiles

### Appendix B – Field Operations

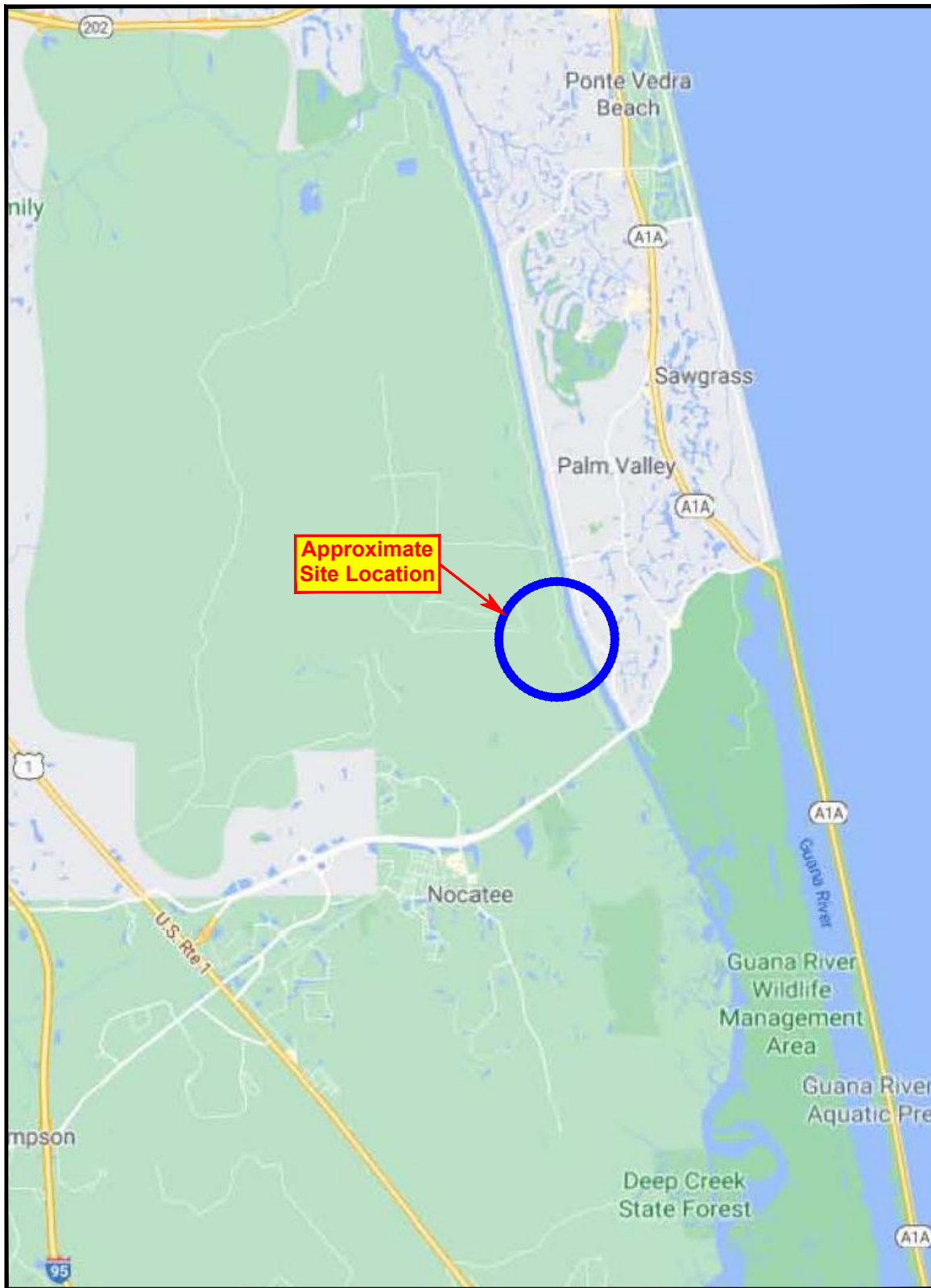
- Reference Notes for Boring Logs
- Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
- Boring Logs

## **APPENDIX A – Drawings & Reports**

Figure 1 - Site Location Diagram

Figure 2 - Field Exploration Diagram

Figure 3 - Generalized Subsurface Profiles



Approximate Site Location



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Site Location Diagram  
**River Landing Natural Lots - Lot 103**

St. Johns County, Florida



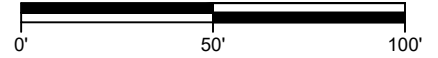
Date: 11/10/21

Project No.: 35-29020-A1

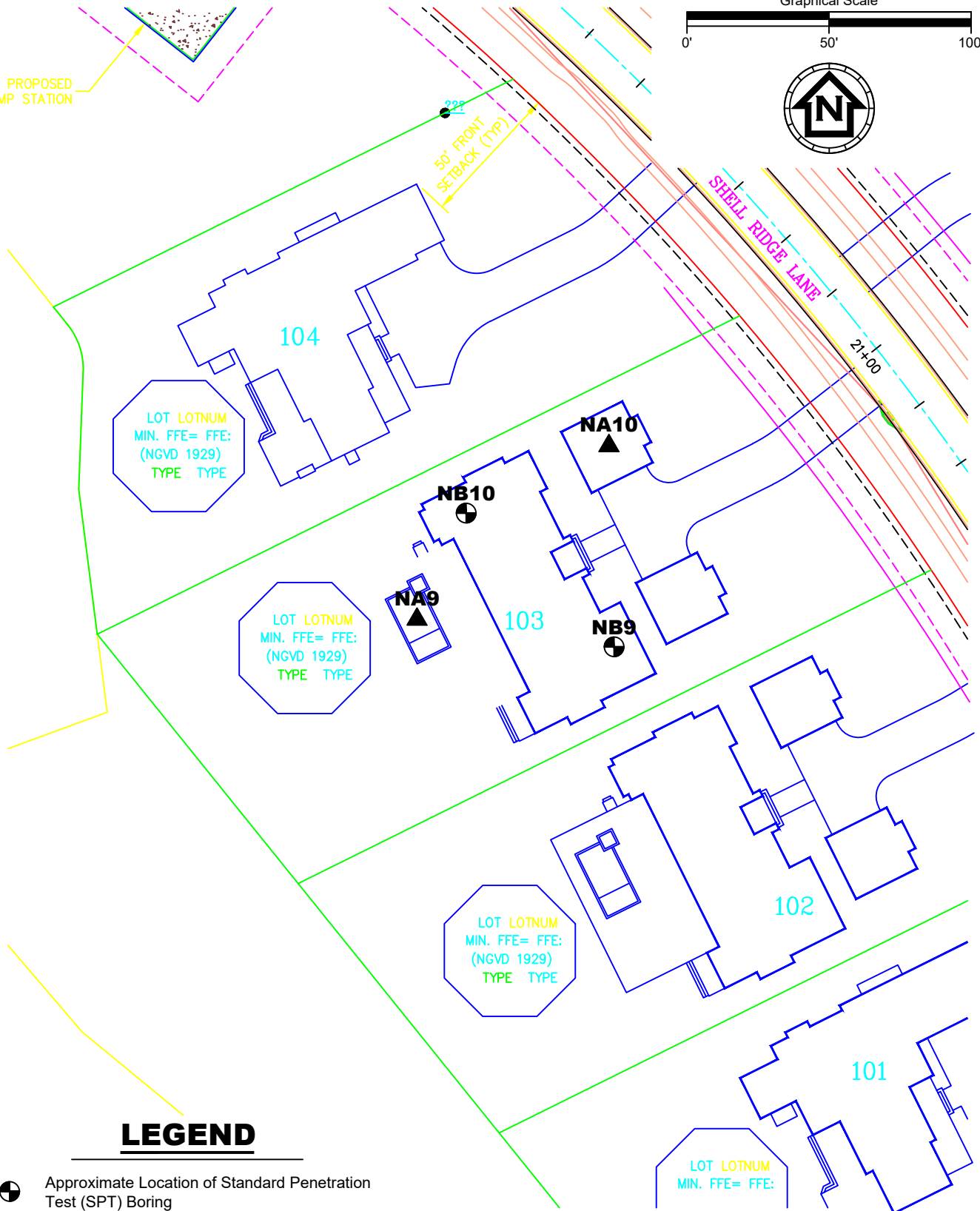
Figure 1

JAS - 35-29020-A1

Graphical Scale



PROPOSED PUMP STATION





LOT LOTNUM  
MIN. FFE= FFE:  
(NGVD 1929)  
TYPE TYPE

LOT LOTNUM  
MIN. FFE= FFE:  
(NGVD 1929)  
TYPE TYPE

LOT LOTNUM  
MIN. FFE= FFE:  
(NGVD 1929)  
TYPE TYPE

LOT LOTNUM  
MIN. FFE= FFE:

### LEGEND

-  Approximate Location of Standard Penetration Test (SPT) Boring
-  Approximate Location of Auger Boring



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### Field Exploration Diagram River Landing Natural Lots - Lot 103

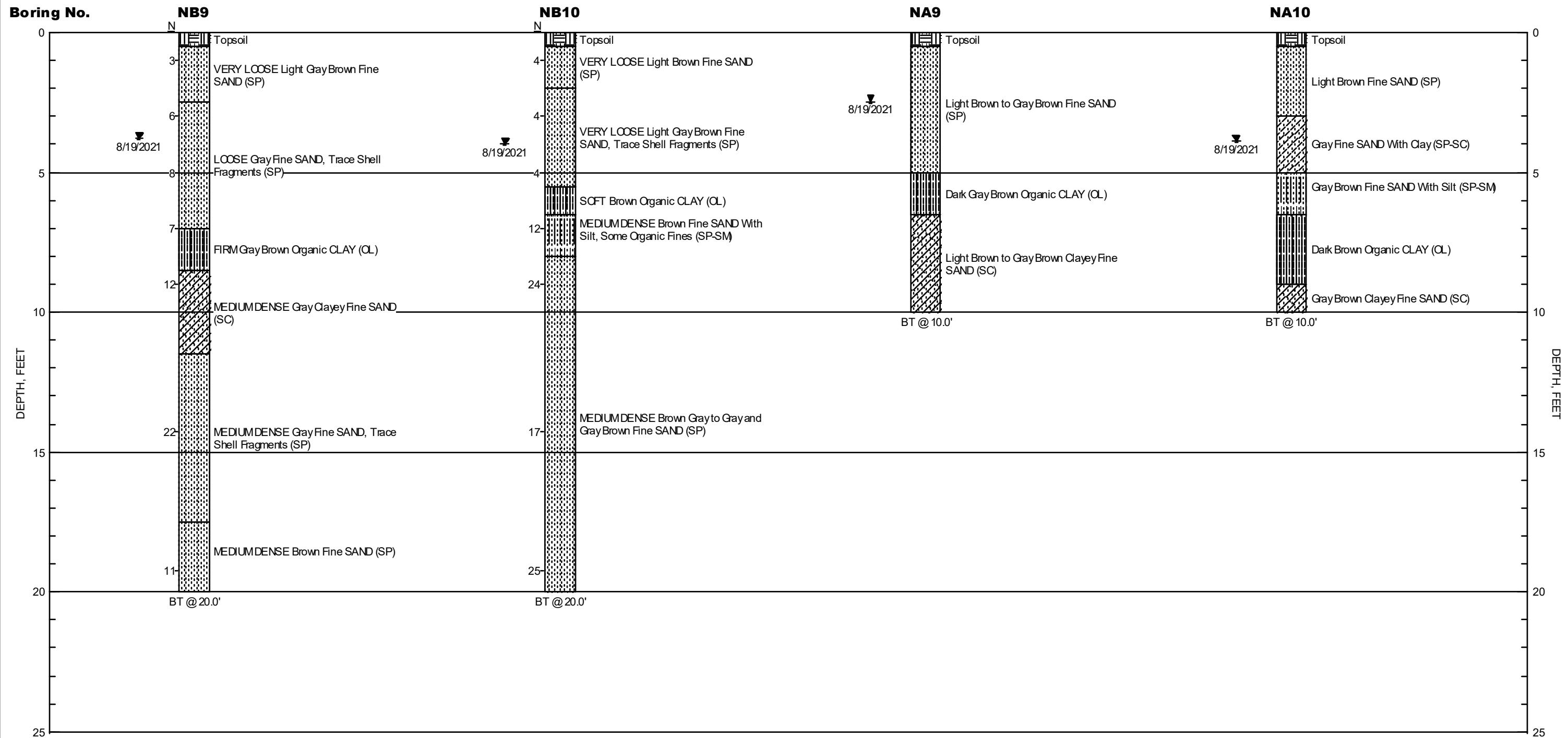
St. Johns County, Florida

Date: 11/10/21


Project No.: 35-29020-A1

Figure 2

JAS - 35-29020-A1




**LEGEND**

-  Topsoil
-  Fine SAND (SP)
-  N Standard Penetration Resistance, Blows/Foot
-  Fine SAND With Silt (SP-SM)
-  Fine SAND With Clay (SP-SC)
-  SP Unified Soil Classification System
-  Organic CLAY (CL)
-  Clayey Fine SAND (SC)
-  Groundwater Level at Time of Drilling
-  BT Boring Terminated at Depth Below Grade

Generalized Subsurface Profiles

**River Landing Natural Lots - Lot 103**

St. Johns County, Florida



DATE: 11/10/21	PROJ. NO.: 35-2020-A1	Figure 3
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## **APPENDIX B – Field Operations**

Reference Notes for Boring Logs

Subsurface Exploration Procedure: Standard Penetration Testing (SPT)

Boring Logs

# REFERENCE NOTES FOR BORING LOGS

MATERIAL <sup>1,2</sup>	
	<b>ASPHALT</b>
	<b>CONCRETE</b>
	<b>GRAVEL</b>
	<b>TOPSOIL</b>
	<b>VOID</b>
	<b>BRICK</b>
	<b>AGGREGATE BASE COURSE</b>
	<b>GW WELL-GRADED GRAVEL</b> gravel-sand mixtures, little or no fines
	<b>GP POORLY-GRADED GRAVEL</b> gravel-sand mixtures, little or no fines
	<b>GM SILTY GRAVEL</b> gravel-sand-silt mixtures
	<b>GC CLAYEY GRAVEL</b> gravel-sand-clay mixtures
	<b>SW WELL-GRADED SAND</b> gravelly sand, little or no fines
	<b>SP POORLY-GRADED SAND</b> gravelly sand, little or no fines
	<b>SM SILTY SAND</b> sand-silt mixtures
	<b>SC CLAYEY SAND</b> sand-clay mixtures
	<b>ML SILT</b> non-plastic to medium plasticity
	<b>MH ELASTIC SILT</b> high plasticity
	<b>CL LEAN CLAY</b> low to medium plasticity
	<b>CH FAT CLAY</b> high plasticity
	<b>OL ORGANIC SILT or CLAY</b> non-plastic to low plasticity
	<b>OH ORGANIC SILT or CLAY</b> high plasticity
	<b>PT PEAT</b> highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS			
SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION		
DESIGNATION	PARTICLE SIZES	
Boulders	12 inches (300 mm) or larger	
Cobbles	3 inches to 12 inches (75 mm to 300 mm)	
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")	<0.074 mm (smaller than a No. 200 sieve)	

COHESIVE SILTS & CLAYS		
UNCONFINED COMPRESSIVE STRENGTH, QP <sup>4</sup>	SPT <sup>5</sup> (BPF)	CONSISTENCY <sup>7</sup> (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT <sup>7</sup>	COARSE GRAINED (%) <sup>8</sup>	FINE GRAINED (%) <sup>8</sup>
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective (ex: "Silty")	25 - 45	30 - 45

GRAVELS, SANDS & NON-COHESIVE SILTS	
SPT <sup>5</sup>	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS <sup>6</sup>	
	WL (First Encountered)
	WL (Completion)
	WL (Seasonal High Water)
	WL (Stabilized)

FILL AND ROCK			
FILL	POSSIBLE FILL	PROBABLE FILL	ROCK

<sup>1</sup>Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

<sup>2</sup>To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

<sup>3</sup>Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

<sup>4</sup>Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

<sup>5</sup>Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

<sup>6</sup>The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

<sup>7</sup>Minor deviation from ASTM D 2488-17 Note 14.

<sup>8</sup>Percentages are estimated to the nearest 5% per ASTM D 2488-17.



## SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

### SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 12 inches (in 3 or 4 Increments of 6 inches each)
- Auger is advanced\* and an additional SPT is performed
- One SPT test is typically performed for every two to five feet
- Obtain two-inch diameter soil sample



*\*Drilling Methods May Vary*— The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.



# LOG OF BORING

Project No.: 35-29020-A1  
 Boring No.: NB9  
 Sheet 1 of 1

Project: River Landing Natural Lots - Lot 103 Client: HyDry Company, LLC  
 Drill Rig: 104A Driller: C. Morgan  
 Boring Location: See Field Exploration Plan Drill Rod: AWJ Drill Mud: Super Gel-X  
 Casing Size: \_\_\_\_\_ Length of Casing: \_\_\_\_\_  
 Groundwater Depth: 3.8 ft Time: \_\_\_\_\_ Drilling Date: 8/19/21 Boring Begun: 8/19/21 Boring Completed: 8/19/21

SAMPLE NO.	DEPTH, FEET	SAMPLE TYPE	DESCRIPTION	BLOWS PER 6 IN.	N Value	PERCENT ORGANIC MATERIAL	PERCENT PASSING NO. 200 SIEVE	PLASTIC LIMIT	MOISTURE CONTENT (%)	LIQUID LIMIT	SHEAR STRENGTH (ksf)	
											○	+
	0		Topsoil	1								
1	1		VERY LOOSE Light Gray Brown Fine SAND (SP)	1	3							
	2			2								
	3			2								
2	4		LOOSE Gray Fine SAND, Trace Shell Fragments (SP)	3	6							
	5			3								
	6			3								
	7			4								
	8			1								
	9			1								
	10			1								
4	11		FIRM Gray Brown Organic CLAY (OL)	5	7							
	12			3								
	13			2								
5	14		MEDIUM DENSE Gray Clayey Fine SAND (SC)	4	12							
	15			8								
	16			12								
	17											
	18											
	19											
6	20		MEDIUM DENSE Gray Fine SAND, Trace Shell Fragments (SP)	4	22							
	21			9								
	22			13								
	23											
	24											
	25											
7	26		MEDIUM DENSE Brown Fine SAND (SP)	4	11							
	27			4								
	28			4								
	29			7								
	30		Boring Terminated @ 20 ft.									

Remarks



# LOG OF BORING

Project No.: 35-29020-A1  
 Boring No.: NB10  
 Sheet 1 of 1

Project: River Landing Natural Lots - Lot 103 Client: HyDry Company, LLC  
 Boring Location: See Field Exploration Plan Drill Rig: 104A Driller: C. Morgan  
 Groundwater Depth: 4 ft Time: Drilling Date: 8/19/21 Drill Rod: AWJ Drill Mud: Super Gel-X  
 Casing Size: \_\_\_\_\_ Length of Casing: \_\_\_\_\_  
 Boring Begun: 8/19/21 Boring Completed: 8/19/21

SAMPLE NO.	DEPTH, FEET	SAMPLE TYPE	DESCRIPTION	BLOWS PER 6 IN.	N Value	PERCENT ORGANIC MATERIAL	PERCENT PASSING NO. 200 SIEVE	PLASTIC LIMIT	MOISTURE CONTENT (%)	LIQUID LIMIT	SHEAR STRENGTH (ksf)	
											PLASTICITY INDEX	UNSATURATED SHEAR STRENGTH
	0		Topsoil	1								
1	1		VERY LOOSE Light Brown Fine SAND (SP)	2	4							
2	2		VERY LOOSE Light Gray Brown Fine SAND, Trace Shell Fragments (SP)	2								
3	3			2								
4	4			2								
5	5		SOFT Brown Organic CLAY (OL)	1	4							
6	6		MEDIUM DENSE Brown Fine SAND With Silt, Some Organic Fines (SP-SM)	3								
7	7		MEDIUM DENSE Brown Gray Fine SAND (SP)	3								
8	8			5								
9	9			7	12							
10	10			11								
11	11			9								
12	12			11								
13	13			13								
14	14			16								
15	15		MEDIUM DENSE Gray Fine SAND (SP)	8								
16	16			7								
17	17			10	17							
18	18											
19	19											
20	20		MEDIUM DENSE Gray Brown Fine SAND (SP)	2								
21	21			10								
22	22			15								
23	23											
24	24											
25	25		Boring Terminated @ 20 ft.		25							

Remarks



Project No.: 35-29020-A1  
 Boring No.: NA9  
 Sheet 1 of 1

### LOG OF BORING

Project: River Landing Natural Lots - Lot 103 Client: HyDry Company, LLC  
 Drill Rig: 104A Driller: C. Morgan  
 Boring Location: See Field Exploration Plan Drill Rod: Flight Auger Drill Mud: \_\_\_\_\_  
 Casing Size: \_\_\_\_\_ Length of Casing: \_\_\_\_\_  
 Groundwater Depth: 2.5 ft Time: \_\_\_\_\_ Drilling Date: 8/19/21 Boring Begun: 8/19/21 Boring Completed: 8/19/21

SAMPLE NO.	DEPTH, FEET	SAMPLE TYPE	DESCRIPTION	BLOWS PER 6 IN.	N Value	PERCENT ORGANIC MATERIAL	PERCENT PASSING NO. 200 SIEVE	PLASTIC LIMIT	MOISTURE CONTENT (%)	LIQUID LIMIT	SHEAR STRENGTH (ksf)	
											Unconfined Compression	Triaxial Compression
	0		Topsoil									
	0 - 1		Light Brown Fine SAND (SP)									
	1 - 2		Gray Brown Fine SAND (SP)									
	2 - 3		Dark Gray Brown Organic CLAY (OL)									
	3 - 4		Light Brown Clayey Fine SAND (SC)									
	4 - 5		Gray Brown Clayey Fine SAND (SC)									
	5 - 10		Boring Terminated @ 10 ft.									

Remarks



Project No.: 35-29020-A1  
 Boring No.: NA10  
 Sheet 1 of 1

### LOG OF BORING

Project: River Landing Natural Lots - Lot 103 Client: HyDry Company, LLC  
 Drill Rig: 104A Driller: C. Morgan  
 Boring Location: See Field Exploration Plan Drill Rod: Flight Auger Drill Mud: \_\_\_\_\_  
 Casing Size: \_\_\_\_\_ Length of Casing: \_\_\_\_\_  
 Groundwater Depth: 3.9 ft Time: \_\_\_\_\_ Drilling Date: 8/19/21 Boring Begun: 8/19/21 Boring Completed: 8/19/21

SAMPLE NO.	DEPTH, FEET	SAMPLE TYPE	DESCRIPTION	BLOWS PER 6 IN.	N Value	PERCENT ORGANIC MATERIAL	PERCENT PASSING NO. 200 SIEVE	PLASTIC LIMIT	MOISTURE CONTENT (%)	LIQUID LIMIT	SHEAR STRENGTH (ksf)	
											<ul style="list-style-type: none"> <li>○ Pocket Penetrometer Undisturbed Sample</li> <li>● Pocket Penetrometer Disturbed Sample</li> <li>▼ Torvane</li> <li>● Unconfined Compression</li> <li>⊠ Triaxial Compression</li> </ul>	
	0		Topsoil									
1	1		Light Brown Fine SAND (SP)									
	2		Gray Fine SAND With Clay (SP-SC)									
2	5		Gray Brown Fine SAND With Silt (SP-SM)									
3			Dark Brown Organic CLAY (OL)									
4			Gray Brown Clayey Fine SAND (SC)									
5	10		Boring Terminated @ 10 ft.									
	15											
	20											
	25											
Remarks												