ALANN ENGINEERING GROUP
CONSULTING ENGINEERS SINCE 1989

STORMWATER CALCULATIONS

IRONWOOD @ HUNTER'S RIDGE

JANUARY 22, 2023

Table of Contents:

Kimberly A. Buck, State of Florida, Professional Engineer, License No. 38565; This item has been electronically signed and sealed by Kimberly A. Buck on the date indicated here using a SHA authentication code. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.

Kimberly A. Buck, State of Florida, Professional Engineer, License No. 38565
2023.07.25 10:38:59-04'00'

880 Airport Rd. Suite 113
Ormond Beach, FL 32174
CA5479

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www.ae-group.com

The site is located in the southwest corner of the Flagler County portion of Hunter's Ridge Development of Regional Impact along the south side of Airport Road. The site consists of 925,022 SF = 21.24 acres. There is an existing portion of an Airport Road retention pond within the bounds of the site. The pond has been removed from the limits of construction. In addition, there is off-site runoff from Airport Road and from the property to the south that needs to be included. Therefore, the total limits of construction is 974,609 SF = 22.37 acres.

The existing time of concentration => 29.0 to 25.0 in 543 ft. = 0.0074'/' for a Tc = 0.515 hrs = 30.90 minutes CN = 79 (See attached TR55 calculations)

Post-Development time of concentration = 10 minutes, CN = 87 (See attached TR55 calculations)
Sidewalks = 11,587
Curb = 2,762 + 4,647
Pavement = 45,082
Lot Area = 341,391 SF @ 70% impervious area = 238,973 SF
Total Impervious area = 303,051 SF = 6.96 ac.
Impervious of pond at NWL = 78,721 SF = 1.81 ac.
Wooded area to remain = 230460 SF = 5.29 ac.
Grass pervious area = 362,377 SF = 8.31 ac.

Estimate NWL at 25.69

Top of Bank elevation = 30.00
NWL elevation = 25.69

Stage Storage Calculations

POND 1

STAGE	AREA	STORAGE	CUM. VOLUME
25.69	1.00	0	0
26.00	1.03	0.31	0.31
27.00	1.12	1.08	1.39
28.00	1.22	1.17	2.56
29.00	1.32	1.27	3.83
29.50	1.37	0.67	4.50
30.00	1.49	0.72	5.22

POND 2

STAGE	AREA	STORAGE	CUM. VOLUME
25.69	0.75	0	0
26	0.77	0.24	0.24
27	0.84	0.81	1.05
28	0.91	0.88	1.93
29	0.99	0.95	2.88
29.5	1.03	0.51	3.39
30	1.13	0.54	3.93

COMBINED PONDS

STAGE	AREA	STORAGE	CUM. VOLUME
25.69	1.75	0	0
26	1.80	0.55	0.55
27	1.96	1.89	2.44
28	2.13	2.05	4.49
29	2.31	2.22	6.71
29.5	2.40	1.18	7.89
30	2.62	1.26	9.15

Volume required for treatment is the greater of 1-inch of runoff or 2.5-inches over the impervious area.

Note: Since wooded area to remain will bypass the treatment ponds and continue to drain to the wetlands, this area is not included in the wet detention calculations. The Wooded area will be modeled as direct discharge.

Per attached wet detention calculations, the treatment volume is 1.45 plus 50% for discharge to an OFW. Total treatment volume required is 2.18 ac-ft. 2.18 – 0.55 = 1.63/1.89 = 0.86 + 26 = 26.86

Based on the stage storage calculations, the weir shall be set at or above elevation 26.86. The weir is set at 27.86 to better tie into existing grade outside of the wetland area.

The orifice size is set at 4.72 inches dia.

Following is a pre-development/post-development comparison based on the attached ICPR calculations. The post-development discharge is the runoff from basin Woods and the discharge from the Pond through the orifice and weir.

STORM EVENT	PRE-DEV. DISCHARGE	POST-DEV. DISCHARGE	DWH
Mean Annual	25.63 CFS	1.46 + 6.06 = 7.52	27.95
25-year/24-hour	58.97 CFS	28.34 + 13.95 = 42.29	28.76
100-year/24-hour	75.88 CFS	49.01 + 17.94 = 66.95	29.15

II. PRE-DEVELOPMENT CONDITIONS

880 Airport Rd. Suite 113
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IIa. SOILS - USDA

880 Airport Rd. Suite 113
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81° 10' 37" W
81° 10' 13" W
29° 16' 6" N
29° 15' 52" N
482820
482880
482940
483000
483060
483120
483180
483240
483300
483360
483420
3237710
3237650
3237590
3237530
3237470
3237410
3237350
2
40
2
12
Soil Map may not be valid at this scale.
N
Map Scale: 1:2,870 if printed on A landscape (11" x 8.5") sheet.
Meters
0 40 80 160 240
Feet
0 100 200 400 600
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N 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 1:15,800.

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: Flagler County, Florida
Survey Area Data: Version 21, Sep 1, 2022

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

Date(s) aerial images were photographed: Jan 6, 2022—Feb 10, 2022

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
2	Riviera fine sand, 0 to 2 percent slopes	7.3	36.1%
12	Placid, Basinger, and St. Johns soils, depressional	0.6	2.8%
40	Pomona fine sand, 0 to 2 percent slopes	12.4	61.1%
Totals for Area of Interest		**20.2**	**100.0%**

Flagler County, Florida

2—Riviera fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tzw2
Elevation: 0 to 80 feet
Mean annual precipitation: 44 to 59 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Riviera and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riviera

Setting

Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 28 inches: fine sand
Bt/E - 28 to 32 inches: fine sandy loam
Btg - 32 to 42 inches: sandy clay loam
C - 42 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 3 to 18 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: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Minor Components

Wabasso

Percent of map unit: 8 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Brynwood

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Pinellas

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: Cabbage Palm Flatwoods (R155XY005FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: No

Floridana

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave

Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Oldsmar

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Flagler County, Florida
Survey Area Data: Version 21, Sep 1, 2022

Flagler County, Florida

12—Placid, Basinger, and St. Johns soils, depressional

Map Unit Setting

National map unit symbol: 1nbgy
Elevation: 0 to 50 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 66 to 73 degrees F
Frost-free period: 305 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Placid, depressional, and similar soils: 42 percent
Basinger, depressional, and similar soils: 28 percent
St. johns, depressional, and similar soils: 27 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Placid, Depressional

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 15 inches: fine sand
Cg - 15 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
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 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D

Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Description of Basinger, Depressional

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 2 inches: fine sand
E - 2 to 29 inches: fine sand
E/Bh - 29 to 50 inches: fine sand
C - 50 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
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 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Description of St. Johns, Depressional

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 10 inches: fine sand
E - 10 to 34 inches: fine sand
Bh - 34 to 39 inches: fine sand
C - 39 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Minor Components

Hontoon, depressional

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Samsula, depressional

Percent of map unit: 1 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic soils in depressions and on flood plains (G155XB645FL)

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Flagler County, Florida
Survey Area Data: Version 21, Sep 1, 2022

Flagler County, Florida

40—Pomona fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tzwv
Elevation: 10 to 160 feet
Mean annual precipitation: 44 to 57 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Pomona

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 3 inches: fine sand
E - 3 to 27 inches: fine sand
Bh - 27 to 46 inches: fine sand
Bw - 46 to 57 inches: fine sand
Btg - 57 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Minor Components

Myakka
Percent of map unit: 6 percent
Landform: Drainageways on flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Basinger
Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Riviera
Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
Hydric soil rating: Yes

Wauchula
Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Flagler County, Florida
Survey Area Data: Version 21, Sep 1, 2022

IIb. PRE-DEVELOPMENT BASIN MAP

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FAX: (386) 673-3927

IRONWOOD SUBDIVISION, HUNTER'S RIDGE
FLAGLER COUNTY, FL
PRE-DEVELOPMENT BASIN MAP

NO.	DATE	REVISION	BY

DESIGNER	FILE	DATE
KAB	XXXX-1	10-14-2022
DRAWN BY	PROJECT	SCALE
WKS	XXXX-1	AS NOTED

NOT VALID UNLESS SIGNED AND SEALED
KIMBERLY A. BOYLE P.E. 39565

SHEET

P:\2221-1 Ironwood @ HR\Design\Base\Ironwood_Base - 011223\Ironwood_Base.dwg, 1/22/2023 12:45:38 PM, DWG To PDF.pc3

IIc. PRE-DEVELOPMENT TIME OF CONCENTRATION

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WinTR-55 Current Data Description

--- Identification Data ---

User: KAB
Project: Ironwood
SubTitle: Pre-development
State: Florida
County: Flagler
Filename: P:\2221-1 Ironwood @ HR\Calcs\TR55\pre tr55.w55

Date: 1/22/2023
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Site			22.37	79	0.515

Total area: 22.37 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
5.0	6.25	7.75	8.75	9.75	11.0	4.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Ironwood
Pre-development
Flagler County, Florida

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
5.0	6.25	7.75	8.75	9.75	11.0	4.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

KAB

Ironwood
Pre-development
Flagler County, Florida

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Site	22.37	0.515	79		

Total Area: 22.37 (ac)

Ironwood
Pre-development
Flagler County, Florida

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Site							
SHEET	100	0.0074	0.400				0.426
SHALLOW	443	0.0074	0.050				0.089
					Time of Concentration		0.515

Ironwood
Pre-development
Flagler County, Florida

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Site	Woods - grass combination	(good)	D	22.37	79
	Total Area / Weighted Curve Number			22.37	79

IId. PRE-DEVELOPMENT ICPR MODEL

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II.d.i. INPUT

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

         Name: SITE                     Node: SITE                   Status: Onsite
        Group: BASE                     Type: SCS Unit Hydrograph CN

        Unit Hydrograph: Uh256                   Peaking Factor: 256.0
          Rainfall File:                  Storm Duration(hrs): 0.00
    Rainfall Amount(in): 0.000              Time of Conc(min): 30.90
              Area(ac): 22.370                 Time Shift(hrs): 0.00
          Curve Number: 79.00              Max Allowable Q(cfs): 999999.000
               DCIA(%): 0.00



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

         Name: 100YR24HR
     Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\PRE\100YR24HR.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 11.00

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

--------------------------------------------------------------------------------------------------------------
         Name: 25YR24HR
     Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\PRE\25YR24HR.R32

      Override Defaults: Yes
    Storm Duration(hrs): 24.00
          Rainfall File: Flmod
    Rainfall Amount(in): 9.00

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

--------------------------------------------------------------------------------------------------------------
         Name: MEANANNUAL
     Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\PRE\MEANANNUAL.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
```

II.d.ii. HYDROLOGY

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```
            Basin Name: SITE
            Group Name: BASE
            Simulation: 100YR24HR
             Node Name: SITE
            Basin Type: SCS Unit Hydrograph

        Unit Hydrograph: Uh256
          Peaking Fator: 256.0
    Spec Time Inc (min): 4.12
    Comp Time Inc (min): 4.12
         Rainfall File: Flmod
   Rainfall Amount (in): 11.000
   Storm Duration (hrs): 24.00
                 Status: Onsite
     Time of Conc (min): 30.90
       Time Shift (hrs): 0.00
              Area (ac): 22.370
   Vol of Unit Hyd (in): 1.000
          Curve Number: 79.000
              DCIA (%): 0.000

        Time Max (hrs): 12.29
        Flow Max (cfs): 75.88
     Runoff Volume (in): 8.342
    Runoff Volume (ft3): 677387


--------------------------------------------------------------------------------

            Basin Name: SITE
            Group Name: BASE
            Simulation: 25YR24HR
             Node Name: SITE
            Basin Type: SCS Unit Hydrograph

        Unit Hydrograph: Uh256
          Peaking Fator: 256.0
    Spec Time Inc (min): 4.12
    Comp Time Inc (min): 4.12
         Rainfall File: Flmod
   Rainfall Amount (in): 9.000
   Storm Duration (hrs): 24.00
                 Status: Onsite
     Time of Conc (min): 30.90
       Time Shift (hrs): 0.00
              Area (ac): 22.370
   Vol of Unit Hyd (in): 1.000
          Curve Number: 79.000
              DCIA (%): 0.000

        Time Max (hrs): 12.29
        Flow Max (cfs): 58.97
     Runoff Volume (in): 6.440
    Runoff Volume (ft3): 522949


--------------------------------------------------------------------------------

            Basin Name: SITE
            Group Name: BASE
            Simulation: MEANANNUAL
             Node Name: SITE
            Basin Type: SCS Unit Hydrograph

        Unit Hydrograph: Uh256
          Peaking Fator: 256.0
    Spec Time Inc (min): 4.12
    Comp Time Inc (min): 4.12
         Rainfall File: Flmod
   Rainfall Amount (in): 5.000
   Storm Duration (hrs): 24.00
                 Status: Onsite
     Time of Conc (min): 30.90
       Time Shift (hrs): 0.00
              Area (ac): 22.370
   Vol of Unit Hyd (in): 1.000
          Curve Number: 79.000
              DCIA (%): 0.000

        Time Max (hrs): 12.29
        Flow Max (cfs): 25.63
     Runoff Volume (in): 2.799
    Runoff Volume (ft3): 227302
```

III. POST-DEVELOPMENT CONDITIONS

III.a. POST-DEVELOPMENT BASIN MAP

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SHEET

DESIGNER	FILE	DATE
KAB	XXXX-1	10-14-2022
DRAWN BY	PROJECT	SCALE
WRS	XXXX-1	AS NOTED

NO.	DATE	REVISION	BY

IRONWOOD SUBDIVISION, HUNTER'S RIDGE

FLAGLER COUNTY, FL

POST-DEVELOPMENT BASIN MAP

ALANN ENGINEERING GROUP, INC.
CONSULTING ENGINEERS
CERTIFICATE No. EB5479
880 AIRPORT ROAD, SUITE. 113
ORMOND BEACH, FL 32174
TEL: (386) 673-7640
FAX: (386) 673-3927

III.b. POST-DEVELOPMENT TIME OF CONCENTRATION

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WinTR-55 Current Data Description

--- Identification Data ---

User: KAB
Project: Ironwood
SubTitle: Post-development
State: Florida
County: Flagler
Filename: P:\2221-1 Ironwood @ HR\Calcs\TR55\post tr55.w55

Date: 1/22/2023
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Site			17.08	89	0.677
Woods			5.29	79	0.515

Total area: 22.37 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
5.0	6.25	7.75	8.75	9.75	11.0	4.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

KAB

Ironwood
Post-development
Flagler County, Florida

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
5.0	6.25	7.75	8.75	9.75	11.0	4.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

KAB

Ironwood
Post-development
Flagler County, Florida

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Site	17.08	0.677	89		
Woods	5.29	0.515	79		

Total Area: 22.37 (ac)

Ironwood
Post-development
Flagler County, Florida

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Site							
User-provided							0.677
					Time of Concentration		0.677
Woods							
SHEET	100	0.0074	0.400				0.426
SHALLOW	443	0.0074	0.050				0.089
					Time of Concentration		0.515

KAB

Ironwood
Post-development
Flagler County, Florida

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Site	Open space; grass cover > 75%	(good)	D	8.31	80
	Paved parking lots, roofs, driveways		D	8.77	98
	Total Area / Weighted Curve Number			17.08	89
Woods	Woods - grass combination	(good)	D	5.29	79
	Total Area / Weighted Curve Number			5.29	79

III.c. WET DETENTION CALCULATIONS

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BASIN # SITE

TOTAL AREA: 17.08
IMPERVIOUS AREA: 6.96
PERVIOUS AREA: 10.12
PERCENT IMPERVIOUS: 41%

RUNOFF COEFFICIENT: 0.49

NWL 25.69

STAGE/STORAGE:

	STAGE (FT)	AREA (AC)	STORAGE (AC-FT)	CUMULATIVE STOARGE (AC-FT)	CUMULATIVE STORAGE ABOVE ORIFICE
			0	0	
			0.00	0.00	
			0.00	0.00	
			0.00	0.00	
			0.00	0.00	
			0.00	0.00	
	13.69	0.77	0.00	0.00	
	23.59	1.44	10.94	10.94	
NWL	25.69	1.75	3.35	14.29	0.00
	27.00	1.96	2.43	16.72	2.43
	28.00	2.13	2.05	18.76	4.48
	29.00	2.31	2.22	20.98	6.70
	30.00	2.62	2.47	23.45	9.16

REQ'D TREATMENT VOL.: Area x 1 inch of runoff OR 2.5" x impervious area, whichever is greater
(add 50% to above number for OFW water quality standards)

	1.42	OR	1.45	
VOLUME REQ'D.=	1.45			add 50% of OFW
	2.18			0.73

SET CONTROL ELEV.

ORIFICE INVERT: 25.69
WEIR ELEV: **26.86**
TREATMENT VOL. DEPTH= 1.17

PERM. POOL VOLUME:

RUNOFF COEFF.= 0.49
2 WEEK RES. TIME: 21 days/153 days

MIN. PERM POOL VOL. = Area x runoff coefficient x wet season rainfall of 30" x 3 week res. Time divided by 12"/'

MIN. PERM POOL VOL = 2.84 AC-FT.

POND VOLUME BELOW
ORIFICE INVERT = 14.29 AC-FT.

SIZE CONTROL STRUCTURE:
Note: volume to draw down is 1.09 AC-FT

DETERMINE ORIFICE SIZE TO DRAWDOWN VOLUME IN 24 - 30 HOURS

$A = Q / (C\sqrt{2gh})$

$h = (h1 + h2)/2$

h1 =	1.17		
h2 =	0.58		
C =	0.60		
g =	32.20		
Q =	treatment volume x 43560 sf/ac x 1/2 x 1/24 hrs x 1hr/3600 sec =		0.55
h =	0.88		
A =	0.12 SQ. FT.		
DIA. OF ORIFICE =	SQ. RT. OF (4A/3.1416) =	0.39 FT.	
	OR	**4.72** INCHES	Min. 2.75" dia. Requi

MEAN DEPTH OF POND: volume of pond at orifice inv. Divided by area of pond at orifice invert

VOLUME OF POND =	14.29
AREA OF POND =	1.75
MEAN DEPTH OF POND =	8.17

LITTORAL ZONE ALTERNATE:

IN LIEU OF LITTORAL ZONE PLANTINGS ADD 50% PERM. POOL VOLUME:

NORMAL PERM POOL VOL:	2.84	
REQ'D VOLUME:	4.27	LITTORAL PLANTING NOT REQUIRED
VOLUME PROVIDED:	14.29	

III.d. POST-DEVELOPMENT ICPR MODEL

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III.d.i. INPUT

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

Name: SITE | Node: POND | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:		Storm Duration(hrs):	0.00
Rainfall Amount(in):	0.000	Time of Conc(min):	10.00
Area(ac):	17.080	Time Shift(hrs):	0.00
Curve Number:	89.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

Name: WOODS | Node: WOODS | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh256	Peaking Factor:	256.0
Rainfall File:		Storm Duration(hrs):	0.00
Rainfall Amount(in):	0.000	Time of Conc(min):	30.90
Area(ac):	5.290	Time Shift(hrs):	0.00
Curve Number:	79.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

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

Name: 99 | Base Flow(cfs): 0.000 | Init Stage(ft): 25.690
Group: BASE | Warn Stage(ft): 25.690
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	25.690
12.00	25.690
24.00	25.690

Name: POND | Base Flow(cfs): 0.000 | Init Stage(ft): 25.690
Group: BASE | Warn Stage(ft): 30.000
Type: Stage/Area

Stage(ft)	Area(ac)
25.690	1.7500
26.000	1.8000
27.000	1.9600
28.000	2.1300
29.000	2.3100
29.500	2.4000
30.000	2.6200

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

Name: ORIFICE | From Node: POND | Length(ft): 65.00
Group: BASE | To Node: 99 | Count: 1
Friction Equation: Automatic
Solution Algorithm: Most Restrictive
Flow: Both
Entrance Loss Coef: 0.00
Exit Loss Coef: 1.00
Bend Loss Coef: 0.00
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dc
Stabilizer Option: None

	UPSTREAM	DOWNSTREAM
Geometry:	Circular	Circular
Span(in):	4.72	4.72
Rise(in):	4.72	4.72
Invert(ft):	25.690	25.690
Manning's N:	0.010000	0.010000
Top Clip(in):	0.000	0.000
Bot Clip(in):	0.000	0.000

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

Downstream FHWA Inlet Edge Description:

Circular Concrete: Square edge w/ headwall

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

Name: WEIR From Node: POND
Group: BASE To Node: 99
Flow: Both Count: 1
Type: Vertical: Fread Geometry: Trapezoidal

Bottom Width(ft): 10.00
Left Side Slope(h/v): 0.25
Right Side Slope(h/v): 0.25
Invert(ft): 27.860
Control Elevation(ft): 27.860
Struct Opening Dim(ft): 9999.00
TABLE
Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

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

Name: 100YR24HR
Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\PRE\100YR24HR.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 11.00

Time(hrs)	Print Inc(min)
30.000	5.00

Name: 25YR24HR
Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\PRE\25YR24HR.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Flmod
Rainfall Amount(in): 9.00

Time(hrs)	Print Inc(min)
30.000	5.00

Name: MEANANNUAL
Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\PRE\MEANANNUAL.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: 100YR24HR Hydrology Sim: 100YR24HR
Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\POST\100YR24HR.I32

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

Max Delta Z(ft): 1.00 Delta Z Factor: 0.10000
Time Step Optimizer: 0.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 5.0000 Max Calc Time(sec): 150.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
30.000	5.000

Group	Run
BASE	Yes

Name: 25YR24HR Hydrology Sim: 25YR24HR
Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\POST\25YR24HR.I32

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

Max Delta Z(ft): 1.00 Delta Z Factor: 0.10000
Time Step Optimizer: 0.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 5.0000 Max Calc Time(sec): 150.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
30.000	5.000

Group	Run
BASE	Yes

Name: MEANANNUAL Hydrology Sim: MEANANNUAL
Filename: P:\2221-1 Ironwood @ HR\Calcs\ICPR\POST\MEANANNUAL.I32

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

Max Delta Z(ft): 1.00 Delta Z Factor: 0.10000
Time Step Optimizer: 0.000
Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 5.0000 Max Calc Time(sec): 150.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
30.000	5.000

Group	Run
BASE	Yes

III.d.ii. HYDROLOGY

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```
            Basin Name: SITE
            Group Name: BASE
            Simulation: 100YR24HR
             Node Name: POND
            Basin Type: SCS Unit Hydrograph

        Unit Hydrograph: Uh323
          Peaking Fator: 323.0
    Spec Time Inc (min): 1.33
    Comp Time Inc (min): 1.33
         Rainfall File: Flmod
   Rainfall Amount (in): 11.000
   Storm Duration (hrs): 24.00
                 Status: Onsite
     Time of Conc (min): 10.00
       Time Shift (hrs): 0.00
              Area (ac): 17.080
   Vol of Unit Hyd (in): 1.001
          Curve Number: 89.000
              DCIA (%): 0.000

        Time Max (hrs): 12.02
        Flow Max (cfs): 118.64
     Runoff Volume (in): 9.648
    Runoff Volume (ft3): 598203


--------------------------------------------------------------------------------

            Basin Name: WOODS
            Group Name: BASE
            Simulation: 100YR24HR
             Node Name: WOODS
            Basin Type: SCS Unit Hydrograph

        Unit Hydrograph: Uh256
          Peaking Fator: 256.0
    Spec Time Inc (min): 4.12
    Comp Time Inc (min): 4.12
         Rainfall File: Flmod
   Rainfall Amount (in): 11.000
   Storm Duration (hrs): 24.00
                 Status: Onsite
     Time of Conc (min): 30.90
       Time Shift (hrs): 0.00
              Area (ac): 5.290
   Vol of Unit Hyd (in): 1.000
          Curve Number: 79.000
              DCIA (%): 0.000

        Time Max (hrs): 12.29
        Flow Max (cfs): 17.94
     Runoff Volume (in): 8.342
    Runoff Volume (ft3): 160187


--------------------------------------------------------------------------------

            Basin Name: SITE
            Group Name: BASE
            Simulation: 25YR24HR
             Node Name: POND
            Basin Type: SCS Unit Hydrograph

        Unit Hydrograph: Uh323
          Peaking Fator: 323.0
    Spec Time Inc (min): 1.33
    Comp Time Inc (min): 1.33
         Rainfall File: Flmod
   Rainfall Amount (in): 9.000
   Storm Duration (hrs): 24.00
                 Status: Onsite
     Time of Conc (min): 10.00
       Time Shift (hrs): 0.00
              Area (ac): 17.080
   Vol of Unit Hyd (in): 1.001
          Curve Number: 89.000
              DCIA (%): 0.000

        Time Max (hrs): 12.02
        Flow Max (cfs): 95.55
     Runoff Volume (in): 7.673
    Runoff Volume (ft3): 475732
```

Basin Name: WOODS
Group Name: BASE
Simulation: 25YR24HR
Node Name: WOODS
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh256
Peaking Fator: 256.0
Spec Time Inc (min): 4.12
Comp Time Inc (min): 4.12
Rainfall File: Flmod
Rainfall Amount (in): 9.000
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 30.90
Time Shift (hrs): 0.00
Area (ac): 5.290
Vol of Unit Hyd (in): 1.000
Curve Number: 79.000
DCIA (%): 0.000

Time Max (hrs): 12.29
Flow Max (cfs): 13.95
Runoff Volume (in): 6.440
Runoff Volume (ft3): 123666

Basin Name: SITE
Group Name: BASE
Simulation: MEANANNUAL
Node Name: POND
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh323
Peaking Fator: 323.0
Spec Time Inc (min): 1.33
Comp Time Inc (min): 1.33
Rainfall File: Flmod
Rainfall Amount (in): 5.000
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 10.00
Time Shift (hrs): 0.00
Area (ac): 17.080
Vol of Unit Hyd (in): 1.001
Curve Number: 89.000
DCIA (%): 0.000

Time Max (hrs): 12.04
Flow Max (cfs): 48.83
Runoff Volume (in): 3.774
Runoff Volume (ft3): 233960

Basin Name: WOODS
Group Name: BASE
Simulation: MEANANNUAL
Node Name: WOODS
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh256
Peaking Fator: 256.0
Spec Time Inc (min): 4.12
Comp Time Inc (min): 4.12
Rainfall File: Flmod
Rainfall Amount (in): 5.000
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 30.90
Time Shift (hrs): 0.00
Area (ac): 5.290
Vol of Unit Hyd (in): 1.000
Curve Number: 79.000
DCIA (%): 0.000

Time Max (hrs): 12.29
Flow Max (cfs): 6.06
Runoff Volume (in): 2.799
Runoff Volume (ft3): 53752

III.d.iii. OUTPUT

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III.d.iii.1. NODE SUMMARY

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Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
99	BASE	100YR24HR	0.00	25.69	25.69	0.0000	1	12.43	49.01	0.00	0.00
POND	BASE	100YR24HR	12.43	29.15	30.00	0.0977	101822	11.99	116.03	12.43	49.01
99	BASE	25YR24HR	0.00	25.69	25.69	0.0000	1	12.57	28.34	0.00	0.00
POND	BASE	25YR24HR	12.57	28.76	30.00	0.0987	98712	11.99	93.10	12.57	28.34
99	BASE	MEANANNUAL	0.00	25.69	25.69	0.0000	1	18.69	1.46	0.00	0.00
POND	BASE	MEANANNUAL	18.69	27.95	30.00	0.0841	92408	12.03	47.26	18.69	1.46

III.d.iii.2. LINK SUMMARY

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Name	Group	Simulation	Max Time Flow hrs	Max Flow cfs	Max Delta Q cfs	Max Time US Stage hrs	Max US Stage ft	Max Time DS Stage hrs	Max DS Stage ft
ORIFICE	BASE	100YR24HR	12.43	0.77	0.018	12.43	29.15	12.38	26.08
WEIR	BASE	100YR24HR	12.43	48.24	3.105	12.43	29.15	0.00	25.69
ORIFICE	BASE	25YR24HR	12.57	0.72	0.021	12.57	28.76	12.47	26.08
WEIR	BASE	25YR24HR	12.57	27.62	2.347	12.57	28.76	0.00	25.69
ORIFICE	BASE	MEANANNUAL	18.69	0.60	0.027	18.69	27.95	18.07	26.07
WEIR	BASE	MEANANNUAL	18.69	0.85	0.020	18.69	27.95	0.00	25.69

IV. SOILS REPORT

ECS Florida, LLC.

Preliminary Geotechnical Engineering Report

Ironwood at Hunter's Ridge

Hunter's Ridge Development
Ormond Beach, Florida

ECS Project Number 56:1610

September 23, 2022

September 23, 2022

Mr. Jacob Beren
Hunters Ridge Acquisition and Development, LLC
880 Airport Road, Suite 113
Ormond Beach, Florida 32174

ECS Project No. 56:1610

Reference: Preliminary Subsurface Exploration and Geotechnical Engineering Report
Ironwood at Hunter's Ridge
Hunter's Ridge Development
Ormond Beach, Florida

Dear Mr. Beren:

ECS Florida, LLC (ECS) has completed the subsurface exploration, laboratory testing, and preliminary geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed-to scope of work. This report briefly presents our understanding of the anticipated construction, describes the preliminary field exploration performed, presents the data obtained, and provides our preliminary geotechnical engineering evaluation of the site and subsurface conditions at the property.

It has been our pleasure to be of service to **Hunters Ridge Acquisition and Development, LLC** during the preliminary phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS Florida, LLC.

Jared Pitts, P.E.
Senior Geotechnical Project Manager
Registered Florida No 92090
JPitts@esclimited.com

David Spangler, P.E.
Chief Engineer
Registered Florida No 58770
DSpangler@ecslimited.com

Cc: Kimberly A. Buck, P.E. – The Alann Engineering Group, Inc

IV. SOILS REPORT

ECS Florida, LLC.

Preliminary Geotechnical Engineering Report

Ironwood at Hunter's Ridge

Hunter's Ridge Development
Ormond Beach, Florida

ECS Project Number 56:1610

September 23, 2022

September 23, 2022

Mr. Jacob Beren
Hunters Ridge Acquisition and Development, LLC
880 Airport Road, Suite 113
Ormond Beach, Florida 32174

ECS Project No. 56:1610

Reference: Preliminary Subsurface Exploration and Geotechnical Engineering Report
Ironwood at Hunter's Ridge
Hunter's Ridge Development
Ormond Beach, Florida

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ECS Florida, LLC.

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Registered Florida No 92090
JPitts@esclimited.com

David Spangler, P.E.
Chief Engineer
Registered Florida No 58770
DSpangler@ecslimited.com

Cc: Kimberly A. Buck, P.E. – The Alann Engineering Group, Inc

TABLE OF CONTENTS

APPENDICES

APPENDIX A – Drawings & Reports

Site Location Diagram
Boring Location Diagram
Subsurface Soil Profiles

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APPENDICES

EXECUTIVE SUMMARY

The following summarizes the main findings of the preliminary geotechnical exploration for the proposed Ironwood at Hunter's Ridge Development, particularly those that may have a cost impact on the planned development. Information gleaned from the executive summary should not be utilized in lieu of reading the entire geotechnical report.

- A shallow layer of clayey soils (SC) was encountered at boring B-05 at a depth of 2 feet below the ground surface. We recommend a vertical separation of at least 2 feet be maintained between the foundation bearing depths and pavement limerock base material and the top of the clayey soils. Depending on the proposed grading at the site, some over-excavation of clayey soils and replacement with structural fill soil may be required.
- We consider the subsurface conditions at the site adaptable for support of the proposed residential structures on properly designed conventional shallow foundation systems with a maximum allowable bearing pressure in the range of 2,000 psf to 2,500 psf. Buildings pads and footings should be constructed on properly prepared subgrade soils.
- We consider the subsurface conditions at the site adaptable for support of flexible and rigid pavement sections when constructed on properly prepared subgrade soils. Adequate separation between the normal seasonal high groundwater level and the bottom of the base course should be maintained.
- The predominant fine sand (SP), fine sand with silt (SP-SM) and fine sand with clay (SP-SC) encountered in the upper 25 feet are considered suitable for use as structural fill soil. Where silty fine sand (SM) and clayey fine sand (SC) is encountered in the near surface and exhibit less than 20 percent fines, they may also be used as structural fill is properly moisture conditioned and compacted as recommended.
- The borings encountered groundwater at depths varying from 0.0 (the ground surface) feet to 0.8 feet below the existing ground surface at the boring locations at the time of our exploration. We estimate the normal seasonal high groundwater level at the boring locations to be as noted on the boring logs in Appendix B; this level is estimated to be at, or above the existing ground surface at some locations. The height to which the seasonal high water level could stage above the ground surface should be determined by the drainage engineer. Groundwater control is expected to be required for subgrade and/or footing compaction and utility excavations at the site, when performing excavation and compaction within 2 feet of groundwater.
- Additional field testing will be necessary to formulate detailed foundation design and site preparation and earthwork construction recommendations. We recommend that additional soil test borings be conducted within the building footprints areas, prior to the final design.

1.0 INTRODUCTION

1.1 GENERAL

The purpose of this study was to provide a preliminary geotechnical exploration and engineering evaluation for the proposed single-family residential development. The development is expected to include residential buildings exhibiting heights one- to-two story, residential roadways and stormwater management facilities (wet ponds). Once the final site plan is completed, ECS should be notified to perform a final subsurface exploration, as appropriate, and provide a final geotechnical report.

The recommendations developed for this report are based on project information supplied by Kimberly A. Buck, P.E. via email on July 1, 2022. This report contains the results of our preliminary subsurface explorations and laboratory testing program, site characterization, preliminary engineering analyses and recommendations relative to any adverse effects the subsurface conditions may impose on the proposed development. Once the final site plan is completed, ECS should be notified to perform a final subsurface exploration, as appropriate, and provide a final geotechnical report.

1.2 SCOPE OF SERVICES

To obtain the geotechnical information required for our preliminary evaluation, soil test borings were performed at locations selected by ECS. These borings were located at relatively regular intervals across the site area. A laboratory-testing program was also implemented to characterize the physical and engineering properties of the subsurface soils.

This report discusses our exploratory and testing procedures, presents our findings and evaluations and includes the following.

- Our understanding of the proposed development and project requirements.
- A brief review and description of our field and laboratory test procedures and the results of testing conducted.
- A review of surface topographical features and site conditions.
- A review of area and site geologic conditions.
- A review of subsurface soil stratigraphy with pertinent available physical properties.
- Final copies of our soil test boring logs.
- A preliminary engineering evaluation of the site relative to the proposed construction.
- Evaluation of the suitability of the encountered soils to be used as structural fill.

1.3 AUTHORIZATION

Our services were provided in accordance with our Proposal No. 56-1489, dated July 13, 2022, authorized July 15, 2022 by Mr. Beren, which includes our Terms and Conditions of Service.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION

The project site is located generally south of Airport Road and north of Granada Boulevard SR 40 in Ormond Beach, Flagler Beach, Florida. The site is bordered to the north and west by Airport Road followed by woodland, to the south by woodland and is bound to the east by woodland and a stormwater pond. A figure showing the general site location is provided below, and on Figure 1 in Appendix A.

Site Location

2.2 CURRENT SITE CONDITIONS

At the time of our exploration, the site was undeveloped and wooded, with surface cover consisting of trees and various types of underbrush. A portion of an existing stormwater pond is located on the northeastern portion of the site. From topographic information available online through Google Earth, the site is relatively level with elevations between approximately El. 25 to El. 31 feet. These elevation estimates are not based on a site-specific survey; and thus, should not be used in project design.

2.3 PAST SITE HISTORY/USES

ECS has reviewed aerial photographs of the subject site on Historic Aerials and Google Earth. The aerial photographs reviewed were dated 1995, 1999, 2004, 2005, 2007, 2008, 2009, 2010, 2011 2012, 2016, 2017, 2019, 2021 and 2022. From 1995 to 2009, the aerial photographs showed the

site as woodland with dense trees and underbrush and a trail on the west side. In 2010, aerial photographs show Airport Road fully constructed to the north and west of the site along with two stormwater ponds. Also, to the east side of the site, aerial photographs show clearing and grubbing, where in 2021, aerial photographs show single-family homes being constructed.

2.4 WEB SOIL SURVEY

Based on the Web Soil Survey for Flagler County, Florida, as prepared by the U.S. Department of Agriculture Natural Resource Conservation Service, the predominant soil types existing within the site area are described in the following table. The site area is illustrated superimposed on the USDA-NRCS Soil Survey Map included as the following figure:

Web Soil Survey

Soil Type	Constituents	Drainage Class	Water Table
2 – Riviera fine sand, 0 to 2 percent slopes	Fine sand, fine sandy loam, sandy clay loam	Poorly drained	3 to 18 inches
12 – Placid, Basinger, and St. Johns soils, depressional	Fine sand	Very poorly drained	0 to 12 inches
40 – Pomona fine sand, 0 to 2 percent slopes	Fine sand, fine sandy loam	Poorly drained	6 – 18 inches

Soil mapping of the site vicinity included soil types and numbers are presented in below, obtained from the USDA Web Soil site.

Site Soil Survey

2.5 PROPOSED CONSTRUCTION

Based on an email dated July 1, 2022, and the provided Hunter's Ridge Conceptual Master Plan, we understand that single-family residential buildings will be constructed along with residential roadways and stormwater management facilities (wet ponds) located south of Airport Road and north of Granada Boulevard (SR 40) in Ormond Beach, Florida. Although structural loading information was not provided, based on our experience with similar residential projects we presume the single-family residential structures will have maximum column and wall loads less than 50 kips and 3 kips per linear foot (klf).

3.0 FIELD EXPLORATION

3.1 FIELD EXPLORATION PROGRAM

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field and laboratory data to assist in the determination of geotechnical recommendations.

We performed 8 Standard Penetration Test (SPT) borings drilled to a depth of 25 feet below the existing ground surface, in general accordance with the methodology outlined in ASTM D1586. The purpose of the borings was to explore the subsurface conditions within the area of the proposed construction. Split-spoon 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.

3.2 LABORATORY TESTING

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)) and ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures), including USCS classification symbols. 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.

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples and included percent fines (ASTM D1140) and moisture content (ASTM D2216).

4.0 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following table provides generalized characterizations of the soil strata encountered during our subsurface exploration. For subsurface information at a specific location, refer to the boring logs in Appendix B.

Generalized Subsurface Stratigraphy

Approximate Depth Range (ft)	Stratum	Description	Ranges of SPT[(1)] N-values (bpf)
0 - 0.5	-	Topsoil	-
0.5 - 25	I	Very Loose to Very Dense, Fine Sand (SP), Fine Sand with Silt (SP-SM), Fine Sand with Clay (SP-SC), Silty Fine Sands (SM) and Clayey Fine Sand (SC)	2 to 68

Notes: (1) Standard Penetration Test.

4.1 GROUNDWATER OBSERVATIONS

Groundwater levels were measured during our field exploration and are presented in our boring logs in Appendix B. Groundwater depths measured at the time of drilling ranged from 0.0 feet (the ground surface) to 0.8 feet below the ground surface. Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

The normal seasonal high groundwater level is affected by a number of factors, such as the drainage characteristics of the soils, tidal fluctuations, land surface elevation, relief points such as drainage ditches, lakes, rivers, swamp areas, etc., and distance to relief points are some of the more important factors influencing the seasonal high groundwater level.

Based on our interpretation of the site conditions, including the boring logs and Web Soil Survey, we preliminarily estimate the normal seasonal high groundwater level at the boring locations to be at the ground water levels encountered during our exploration. We note some of the borings encountered groundwater at the existing ground surface, resulting in standing water in some areas of the site. The height to which the seasonal high-water level could stage above the ground surface should be determined by the drainage engineer. It is possible that groundwater levels may exceed the estimated normal seasonal high groundwater level as a result of significant or prolonged rains.

5.0 PRELIMINARY DESIGN RECOMMENDATIONS

Our preliminary geotechnical engineering evaluation of the site and subsurface conditions at the property, with respect to the anticipated construction, are based upon 1) our site observations; 2) the limited field data obtained; and 3) our understanding of the project information as presented in this report. As the project progresses and more definitive information becomes available concerning the locations and proposed final grades for the buildings, pavement areas and stormwater management areas, and detailed structural loadings become known, we recommend this information be supplied to us so that detailed foundation design and site preparation/earthwork construction recommendations can be provided prior to final design. In this regard, additional field testing, which we feel is necessary to formulate detailed foundation design and site preparation and earthwork construction recommendations, should be conducted prior to final design.

5.1 STRUCTURES

The results of our preliminary exploration indicate that, with proper site preparation, the existing soils, as encountered at the boring locations, are suitable for supporting one to two story residential building structures. It appears maximum allowable soil bearing pressures for shallow foundations supporting the proposed structures may be on the order of 2,000 to 2,500 psf. Preliminarily, site preparation for these structures is anticipated to consist of surficial densification of the cleared and grubbed subgrade, and we anticipate that sufficient densification may be achievable by compacting the cleared and grubbed/stripped ground surface with conventional compaction equipment. Based on the results of the borings, sufficient densification should be achievable by compacting the cleared and grubbed/stripped ground surface with conventional compaction equipment (i.e. heavy vibratory drum roller). The relatively shallow clayey fine sand (SC) encountered at Boring B-05 may need partial removal depending on final site grades and soil characteristics (fines and plasticity).

5.2 PAVEMENT AREAS

The majority of the encountered shallow soils are considered adaptable for the support of flexible and rigid pavement. It is anticipated that proposed pavement areas will be constructed predominantly with flexible pavement (i.e., asphalt wearing surface supported on limerock). Satisfactory performance of the pavement is dependent on the integrity of the base layer beneath the asphalt. Adequate separation (2 feet) between the normal seasonal high groundwater level and the bottom of the limerock base course should be maintained. Where the estimated normal seasonal high groundwater is at shallow depths, the required separation can be achieved by elevating the pavement areas using structural fill soils or use of pavement underdrains.

Depending on the final roadway grades the relatively shallow clayey fine sand (SC) encountered at Boring B-05 may need partial removal to maintain a separation of 2 feet between this material and the roadway base

5.3 STORMWATER MANAGEMENT AREAS

Based on the boring results and classification of the soil samples, the fine sands (SP), fine sands with silt (SP-SM), and fine sand with clay (SP-SC) encountered in the borings are considered suitable for use as fill soil. The soils containing surficial organic material will require removal and are unsuitable as structural fill. The organic soils could be used in landscape berms.

The silty fine sands (SM) and clayey fine sands (SC) that exhibit less than 20 percent fines may also be used as structural fill; however, we note that these soils will be more difficult to compact due to

their tendency to retain soil moisture and will most likely require drying. Depending on the soil moisture content and anticipated time for completing the site work portion of the project and the drying time required to reduce the potential for pumping and yielding of these soils during placement and compaction operations, these soils may not be feasible for use as fill material.

We do not recommend reuse of silty fine sands (SM) and clayey fine sands (SC) that exhibit more than 20 percent fines as structural fill material because of their high plasticity and high affinity for moisture.

It should be anticipated that the soils in the proposed pond areas below the groundwater level will have moisture contents in excess of the Modified Proctor optimum moisture content. This will require stockpiling or spreading to drain the excess moisture. Generally, the wet soils should be dried to bring the soil moisture content within ±2 percent of the soil's optimum moisture content to facilitate placement and compaction.

5.4 OTHER CONSIDERATIONS

Because of the need for stripping and clearing of the topsoil materials and potential over-excavation of the clayey soils, it may be necessary to install temporary groundwater control measures to dewater the area to facilitate the clearing and compaction processes.

As previously mentioned, additional field testing, if any, which we feel is necessary to formulate detailed foundation design and the site preparation and earthwork construction recommendations, should be conducted prior to final design.

6.0 CLOSING

Our geotechnical exploration has been performed, our findings obtained, and our preliminary 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.

Our scope of services was intended to evaluate the soil conditions within the zone of soil influenced by the foundation system. Our scope of services does not address geologic conditions, such as sinkholes or soil conditions existing below the depth of the soil borings.

If any of the project description information discussed in this report is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted immediately in order that we can review the report in light of the changes and provide additional or alternate recommendations as may be required to reflect the proposed construction.

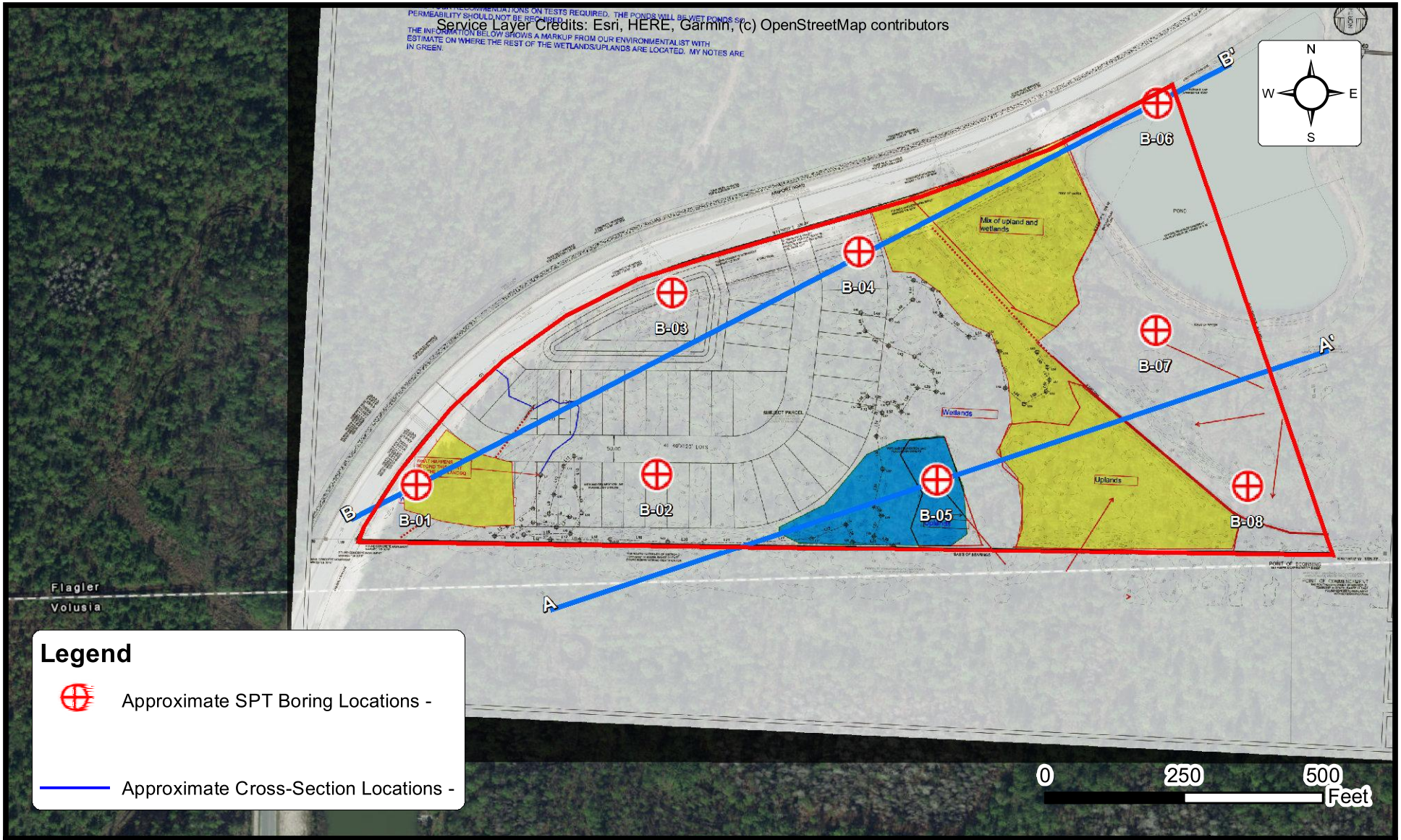
As previously mentioned, additional field testing, if any, which we feel is necessary to formulate detailed foundation design and site preparation and earthwork construction recommendations, should be conducted prior to final design.

APPENDIX A – Drawings & Reports

Site Location Diagram
Boring Location Diagram
Subsurface Soil Profiles

SITE LOCATION DIAGRAM
HUNTERS RIDGE - IRONWOOD BASE - UPLAND & WETLANDS
AIRPORT ROAD & HUNTERS RIDGE BLVD.
HUNTERS RIDGE ACQUISITION AND DEVELOPMENT LLC

ENGINEER	DS05
SCALE	AS NOTED
PROJECT NO.	56:1610
FIGURE	1
DATE	8/2/2022

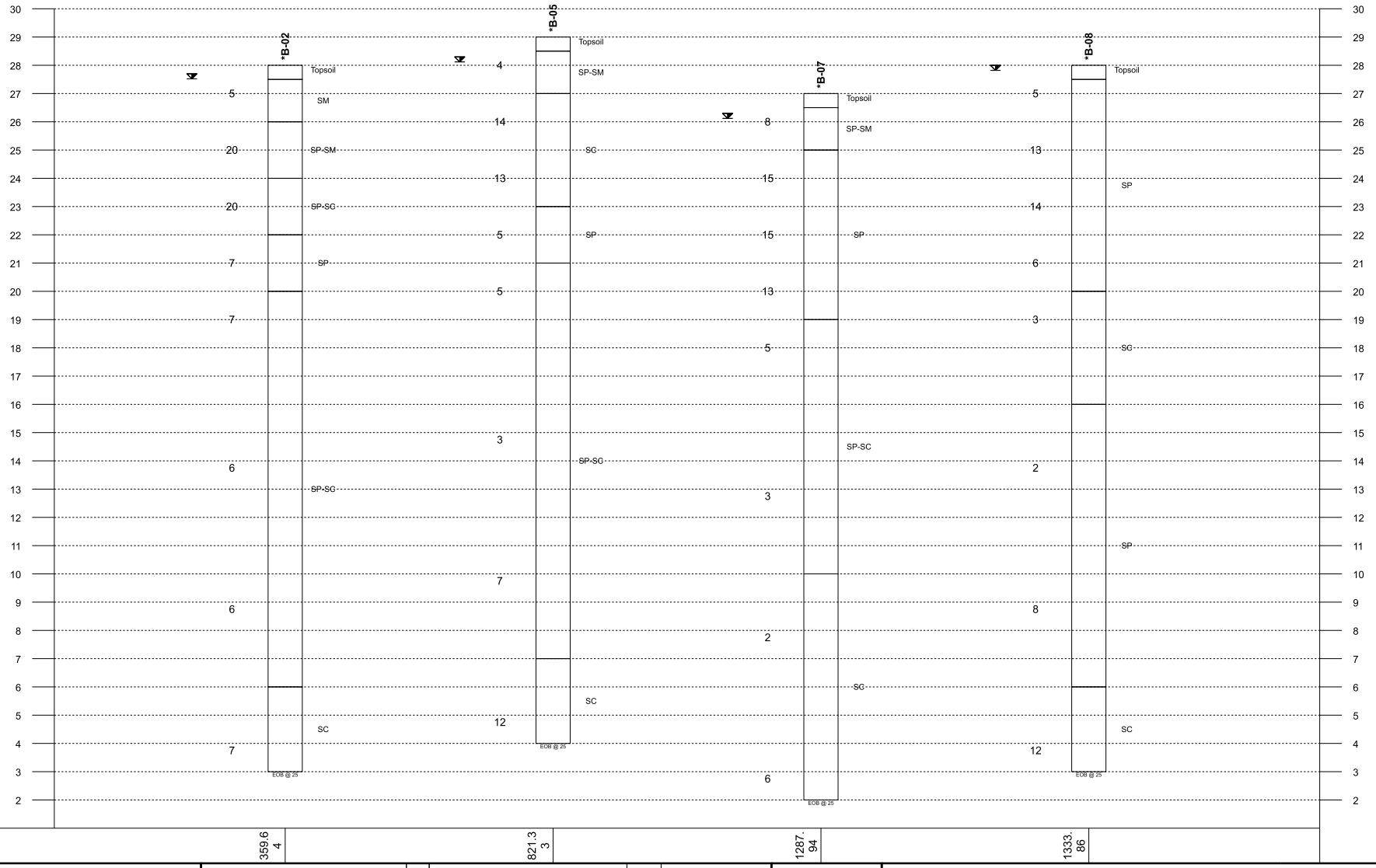


BORING LOCATION DIAGRAM
HUNTERS RIDGE - IRONWOOD BASE - UPLAND & WETLANDS

AIRPORT ROAD & HUNTERS RIDGE BLVD., ORMOND BEACH, FLORIDA

HUNTERS RIDGE ACQUISITION AND DEVELOPMENT LLC

ENGINEER	DS05
SCALE	AS NOTED
PROJECT NO.	56:1610
FIGURE	2
DATE	9/16/2022



Legend Key

- Topsoil
- SP-SM
- SM
- SP
- SC
- SP-SC

1.00

Notes:

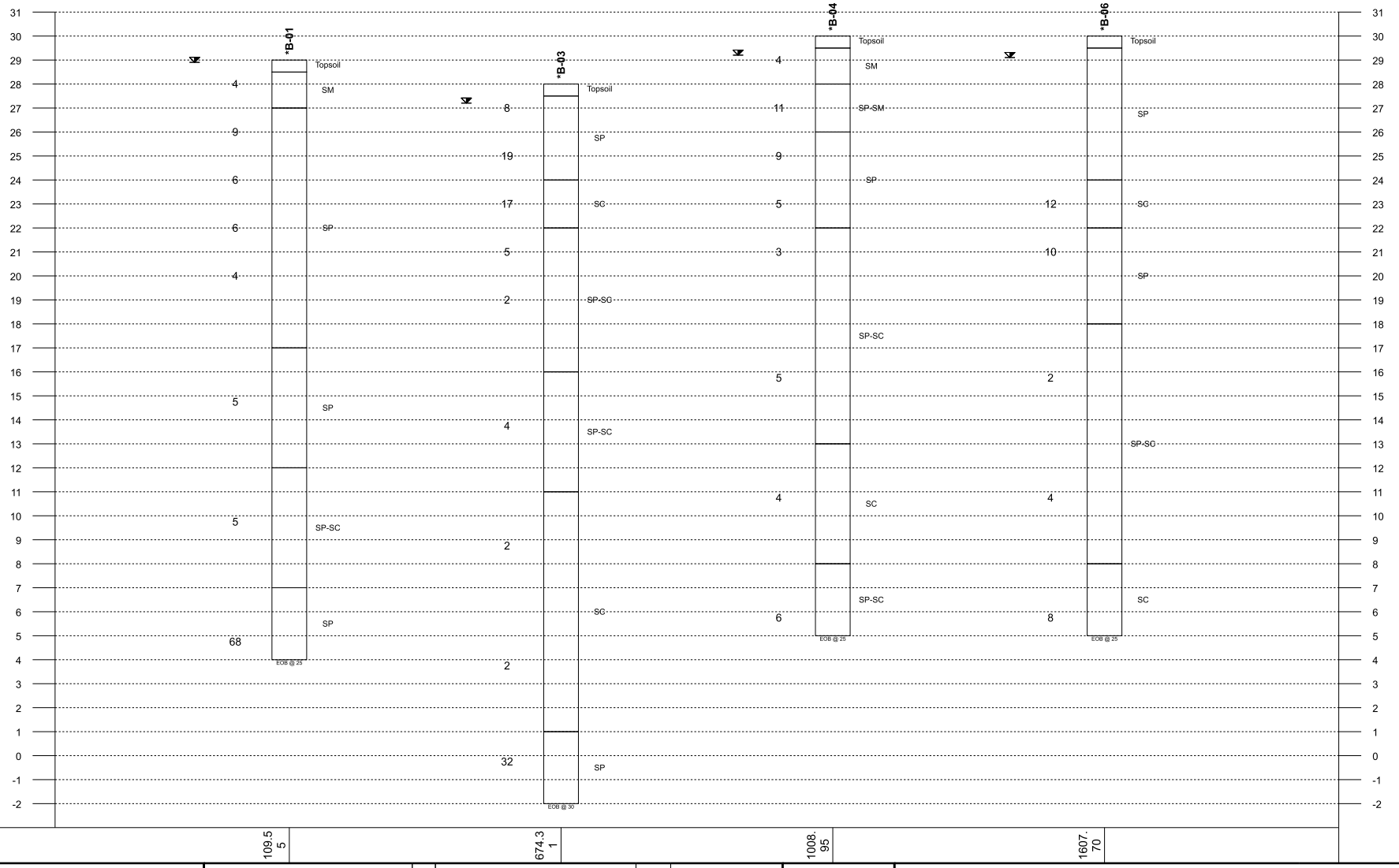
1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit Water Content Liquid Limit X—●—△	WL (First Encountered)		Fill
[FINES CONTENT %]	WL (Completion)		Possible Fill
BOTTOM OF CASING	WL (Seasonal High Water)		Probable Fill
100% LOSS OF CIRCULATION	WL (Stabilized)		Rock

GENERALIZED SUBSURFACE SOIL PROFILE Section A-A'

Hunters Ridge - Ironwood Base - Upland & Wetlands
Hunters Ridge Acquisition and Development LLC
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174

Project No: 56:1610 Date: 09/23/2022



Legend Key

- Topsoil
- SM
- SP
- SP-SM
- SC
- SP-SC

-3.00

Notes:

1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit Water Content Liquid Limit X—●—△	WL (First Encountered)		Fill
[FINES CONTENT %]	WL (Completion)		Possible Fill
BOTTOM OF CASING	WL (Seasonal High Water)		Probable Fill
LOSS OF CIRCULATION	WL (Stabilized)		Rock

GENERALIZED SUBSURFACE SOIL PROFILE Section B-B'

Hunters Ridge - Ironwood Base - Upland & Wetlands
Hunters Ridge Acquisition and Development LLC
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174

Project No: 56:1610 Date: 09/23/2022

APPENDIX B – Field Operations

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

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 1.5-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.

REFERENCE NOTES FOR BORING LOGS

MATERIAL[1,2]

	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
GW	WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
GP	POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
GM	SILTY GRAVEL gravel-sand-silt mixtures
GC	CLAYEY GRAVEL gravel-sand-clay mixtures
SW	WELL-GRADED SAND gravelly sand, little or no fines
SP	POORLY-GRADED SAND gravelly sand, little or no fines
SM	SILTY SAND sand-silt mixtures
SC	CLAYEY SAND sand-clay mixtures
ML	SILT non-plastic to medium plasticity
MH	ELASTIC SILT high plasticity
CL	LEAN CLAY low to medium plasticity
CH	FAT CLAY high plasticity
OL	ORGANIC SILT or CLAY non-plastic to low plasticity
OH	ORGANIC SILT or CLAY high plasticity
PT	PEAT 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, Q_P[4]	SPT[5] (BPF)	CONSISTENCY[7] (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

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	<5	<5
With	10 - 20	10 - 25
Adjective *(ex: "Silty")*	25 - 45	30 - 45

WATER LEVELS[6]

- WL (First Encountered)
- WL (Completion)
- WL (Seasonal High Water)
- WL (Stabilized)

FILL AND ROCK

FILL | POSSIBLE FILL | PROBABLE FILL | ROCK

[1]Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2]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.

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

[4]Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5]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.

[6]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.

[7]Minor deviation from ASTM D 2488-17 Note 14.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-01**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112088.4	**3028296.8**		**29.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Thickness[6.00"] (SM) SILTY FINE SAND, dark brown, saturated, very loose	▼		2-2-2-3 (4)
	S-2	SS	24	24	(SP) FINE SAND, trace clay, gray, saturated, loose to very loose			3-4-5-6 (9)
5	S-3	SS	24	24			24	3-3-3-4 (6)
	S-4	SS	24	24				4-3-3-3 (6)
	S-5	SS	24	24				2-2-2-3 (4)
10					(SP) FINE SAND, gray, saturated, loose		19	
	S-6	SS	18	18				3-2-3 (5)
15							14	
					(SP-SC) FINE SAND WITH CLAY, gray, saturated, loose			
	S-7	SS	18	18				3-2-3 (5)
20							9	
					(SP) FINE SAND, with significant shell, gray, saturated, very dense			
	S-8	SS	18	18				36-33-35 (68)
25					**END OF BORING AT 25 FT**		4	
30							-1	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] %
(10 20 30 40 50)

[12.2%] 24.1

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **0.00**	BORING STARTED: **Aug 31 2022**		CAVE IN DEPTH:
▼ WL (Completion)	BORING COMPLETED: **Aug 31 2022**		HAMMER TYPE: **Manual**
▼ WL (Seasonal High Water) **0.00**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-02**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112121.1	**3028727.8**		**28.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Thickness[6.00"] (SM) SILTY FINE SAND, trace organics, dark brown, saturated, loose	▽	28	2-2-3-3 (5)
	S-2	SS	24	24	(SP-SM) FINE SAND WITH SILT, dark brown, saturated, medium dense			5-8-12-13 (20)
5	S-3	SS	24	24	(SP-SC) FINE SAND WITH CLAY, gray, saturated, medium dense		23	13-12-8-6 (20)
	S-4	SS	24	24	(SP) FINE SAND, gray, saturated, loose			4-4-3-3 (7)
	S-5	SS	24	24	(SP-SC) FINE SAND WITH CLAY, gray, saturated, loose			4-4-3-2 (7)
10							18	
	S-6	SS	18	18				3-2-4 (6)
15							13	
	S-7	SS	18	18				2-3-3 (6)
20							8	
					(SC) CLAYEY FINE SAND, gray, saturated, loose			
	S-8	SS	18	18				3-3-4 (7)
25					**END OF BORING AT 25 FT**		3	
30							-2	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] %
(10 20 30 40 50)

[8.2%] 20.0
[26.1%] 25.2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **0.40**	BORING STARTED: **Aug 31 2022**	CAVE IN DEPTH:	
▼ WL (Completion)	BORING COMPLETED: **Aug 31 2022**	HAMMER TYPE: **Manual**	
▼ WL (Seasonal High Water) **0.40**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-03**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112447.7	**3028745.6**		**28.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-1	SS	24	24	Topsoil Thickness[6.00"] (SP) FINE SAND, brown, saturated, loose to medium dense			2-3-5-8 (8)
	S-2	SS	24	24				8-9-10-11 (19)
5	S-3	SS	24	24	(SC) CLAYEY FINE SAND, gray, saturated, medium dense		23	6-8-9-10 (17)
	S-4	SS	24	24	(SP-SC) FINE SAND WITH CLAY, gray, saturated, loose to very loose			6-3-2-2 (5)
	S-5	SS	24	24				1-1-1-1 (2)
10							18	
					(SP-SC) FINE SAND WITH CLAY, gray, saturated, very loose			
	S-6	SS	18	18				2-1-3 (4)
15							13	
					(SC) CLAYEY FINE SAND, gray, saturated, very loose			
	S-7	SS	18	18				1-1-1 (2)
20							8	
	S-8	SS	18	18				1-1-1 (2)
25							3	
	S-9	SS	18	18	(SP) FINE SAND, with significant shell, gray, saturated, dense			13-15-17 (32)
30					**END OF BORING AT 30 FT**		-2	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] % (10 20 30 40 50)

[14.4%] 18.6

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **0.70**	BORING STARTED: **Aug 31 2022**		CAVE IN DEPTH:
WL (Completion)	BORING COMPLETED: **Aug 31 2022**		HAMMER TYPE: **Manual**
WL (Seasonal High Water) **0.70**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-04**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112532.4	**3029079.4**		**30.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Thickness[6.00"] (SM) SILTY FINE SAND, dark brown, saturated, very loose	▼	30	1-2-2-3 (4)
	S-2	SS	24	24	(SP-SM) FINE SAND WITH SILT, brown, saturated, medium dense			3-5-6-8 (11)
5	S-3	SS	24	24	(SP) FINE SAND, trace clay, gray, saturated, loose		25	4-4-5-6 (9)
	S-4	SS	24	24				3-3-2-1 (5)
	S-5	SS	24	24	(SP-SC) FINE SAND WITH CLAY, gray, saturated, very loose to loose			2-1-2-1 (3)
10							20	
	S-6	SS	18	18				2-3-2 (5)
15							15	
					(SC) CLAYEY FINE SAND, gray, saturated, very loose			
	S-7	SS	18	18				2-2-2 (4)
20							10	
					(SP-SC) FINE SAND WITH CLAY, gray, saturated, loose			
	S-8	SS	18	18				2-3-3 (6)
25					**END OF BORING AT 25 FT**		5	
30							0	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] % (10 20 30 40 50)
[10.6%] 26.7

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **0.70**	BORING STARTED: **Aug 31 2022**	CAVE IN DEPTH:	
▼ WL (Completion)	BORING COMPLETED: **Aug 31 2022**	HAMMER TYPE: **Manual**	
▼ WL (Seasonal High Water) **0.70**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-05**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112126.5	**3029231.6**		**29.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-1	SS	24	24	Topsoil Thickness[6.00"] (SP-SM) FINE SAND WITH SILT, dark brown, saturated, very loose			1-2-2-3 (4)
	S-2	SS	24	24	(SC) CLAYEY FINE SAND, gray, saturated, medium dense			4-6-8-7 (14)
5	S-3	SS	24	24			24	5-6-7-5 (13)
	S-4	SS	24	24	(SP) FINE SAND, gray, saturated, loose			4-3-2-3 (5)
	S-5	SS	24	24	(SP-SC) FINE SAND WITH CLAY, gray, saturated, very loose to loose			4-3-2-2 (5)
10							19	
	S-6	SS	18	18				1-2-1 (3)
15							14	
	S-7	SS	18	18				4-3-4 (7)
20							9	
					(SC) CLAYEY FINE SAND, gray, saturated, medium dense			
	S-8	SS	18	18				2-6-6 (12)
25					**END OF BORING AT 25 FT**		4	
30							-1	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] % (10 20 30 40 50)

[14.3%] 18.7

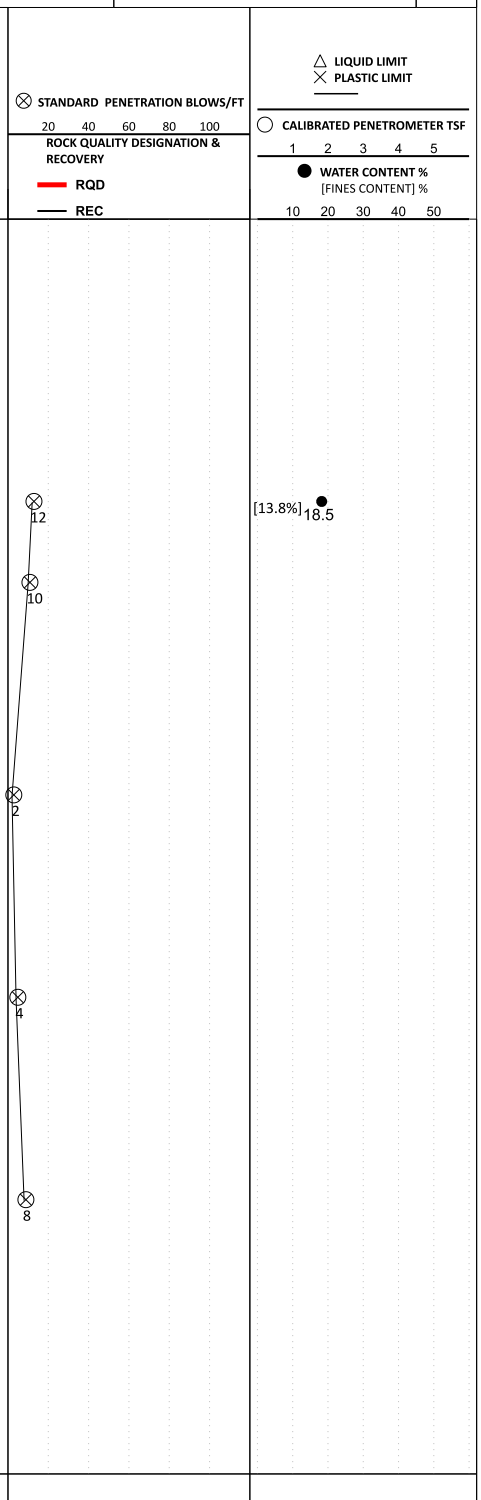
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **0.80**	BORING STARTED: **Aug 31 2022**		CAVE IN DEPTH:
WL (Completion)	BORING COMPLETED: **Aug 31 2022**		HAMMER TYPE: **Manual**
WL (Seasonal High Water) **0.80**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-06**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112815.5	**3029607.0**		**30.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	HA	0	0	Topsoil Thickness[6.00"]			
					(SP) FINE SAND, brown, saturated			
	~~S-2~~	~~HA~~	~~0~~	~~0~~				
	~~S-3~~	~~HA~~	~~0~~	~~0~~				
5	S-4	SS	24	24	(SC) CLAYEY FINE SAND, gray, saturated, medium dense		25	5-6-6-6 (12)
	S-5	SS	24	24	(SP) FINE SAND, gray, saturated, loose			4-6-4-4 (10)
10							20	
					(SP-SC) FINE SAND WITH CLAY, gray, saturated, very loose			
	S-6	SS	18	18				1-1-1 (2)
15							15	
	S-7	SS	18	18				1-2-2 (4)
20							10	
					(SC) CLAYEY FINE SAND, gray, saturated, loose			
	S-8	SS	18	18				4-2-6 (8)
25					**END OF BORING AT 25 FT**		5	
30							0	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered)	**0.80**	BORING STARTED: **Aug 31 2022**	CAVE IN DEPTH:	
WL (Completion)		BORING COMPLETED: **Aug 31 2022**	HAMMER TYPE: **Manual**	
WL (Seasonal High Water)	**0.80**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-07**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112406.7	**3029617.2**		**27.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Thickness[6.00"] (SP-SM) FINE SAND WITH SILT, dark brown, saturated, loose		27	3-3-5-5 (8)
	S-2	SS	24	24	(SP) FINE SAND, gray, saturated, medium dense			7-8-7-6 (15)
5	S-3	SS	24	24			22	7-8-7-6 (15)
	S-4	SS	24	24				6-6-7-6 (13)
	S-5	SS	24	24	(SP-SC) FINE SAND WITH CLAY, gray, saturated, loose to very loose			3-3-2-3 (5)
10							17	
	S-6	SS	18	18				2-1-2 (3)
15							12	
					(SC) CLAYEY FINE SAND, gray, saturated, very loose to loose			
	S-7	SS	18	18				1-1-1 (2)
20							7	
	S-8	SS	18	18				2-2-4 (6)
25					**END OF BORING AT 25 FT**		2	
30							-3	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] % (10 20 30 40 50)

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **0.80**	BORING STARTED: **Aug 31 2022**	CAVE IN DEPTH:	
WL (Completion)	BORING COMPLETED: **Aug 31 2022**	HAMMER TYPE: **Manual**	
WL (Seasonal High Water) **0.80**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Hunters Ridge Acquisition and Development LLC	**56:1610**	**B-08**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Hunters Ridge - Ironwood Base - Upland & Wetlands	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
Airport Road & Hunters Ridge Blvd., Ormond Beach, Florida, 32174			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
112131.7	**3029791.2**		**28.00**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Thickness[6.00"] (SP) FINE SAND, gray, saturated, loose to medium dense	▽	28	1-2-3-6 (5)
	S-2	SS	24	24				4-6-7-8 (13)
5	S-3	SS	24	24			23	6-7-7-8 (14)
	S-4	SS	24	24				6-4-2-1 (6)
	S-5	SS	24	24	(SC) CLAYEY FINE SAND, gray, saturated, very loose			2-1-2-3 (3)
10							18	
					(SP) FINE SAND, gray, saturated, very loose to loose			
	S-6	SS	18	18				1-1-1 (2)
15							13	
	S-7	SS	18	18				3-4-4 (8)
20							8	
					(SC) CLAYEY FINE SAND, gray, saturated, medium dense			
	S-8	SS	18	18				4-7-5 (12)
25					**END OF BORING AT 25 FT**		3	
30							-2	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] % (10 20 30 40 50)

[19.4%] 19.7

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **0.10**	BORING STARTED: **Aug 31 2022**	CAVE IN DEPTH:	
▼ WL (Completion)	BORING COMPLETED: **Aug 31 2022**	HAMMER TYPE: **Manual**	
▼ WL (Seasonal High Water) **0.10**	EQUIPMENT: **ATV**	LOGGED BY:	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

APPENDIX C – Laboratory Testing

Laboratory Testing Summary

Laboratory Testing Summary

Sample Source	Sample Number	Start Depth (feet)	End Depth (feet)	Sample Distance (feet)	MC[1] (%)	Soil Type[2]	Atterberg Limits[3]			Percent Passing No. 200 Sieve[4]	Moisture - Density (Corr.)[5]		CBR Value[6]	Organic Content
							LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)		
B-01	S-1	0.0	2.0	2.0	24.1	SM				12.2				
B-02	S-2	2.0	4.0	2.0	20.0	SP-SM				8.2				
B-02	S-8	23.5	25.0	1.5	25.2	SC				26.1				
B-03	S-3	4.0	6.0	2.0	18.6	SC				14.3				
B-04	S-5	8.0	10.0	2.0	26.7	SP-SC				10.6				
B-05	S-2	2.0	4.0	2.0	18.7	SC				14.3				
B-06	S-4	6.0	8.0	2.0	18.5	SC				13.8				
B-08	S-5	8.0	10.0	2.0	19.7	SC				19.4				

Notes: 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ration, OC: Organic Content (ASTM D 2974)

Project No. 56:1610
Project Name: Hunters Ridge - Ironwood Base - Upland
PM: Max Kemnitz
PE: David W. Spangler
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