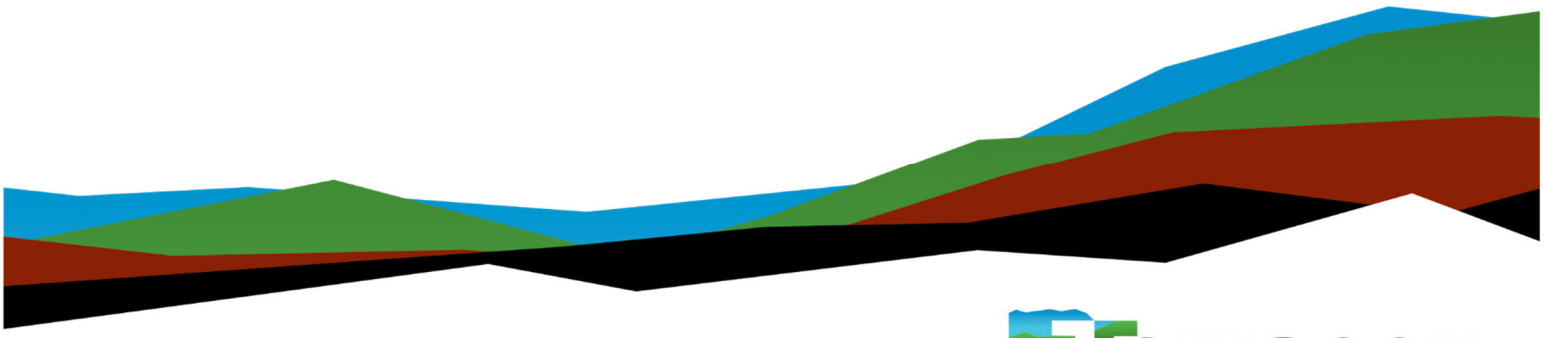
Twin Oaks Villas – Lagoon Slopes

Geotechnical Exploration Report

July 5, 2024 | Terracon Project No. ES245149

Prepared for:

Twin Oaks Villas Horizontal Property Regime
55 New Orleans Road, Suite 211
Hilton Head Island, South Carolina 29928



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July 5, 2024

Twin Oaks Villas Horizontal Property Regime
55 New Orleans Road, Suite 211
Hilton Head Island, South Carolina 29928

Attn: Ms. Ronda Durham
P: (843) 295-8763
E: ronda@hightideassociates.com

Re: Geotechnical Exploration Report
Twin Oaks Villas – Lagoon Slopes
Plantation Drive
Hilton Head Island, SC
Terracon Project No. ES245149

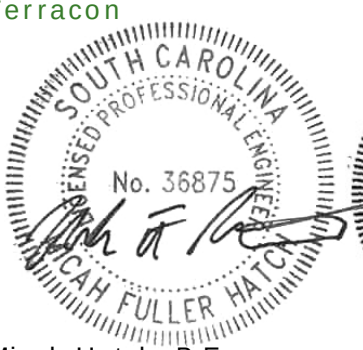
Dear Ms. Durham:

We have completed the scope of the Geotechnical Exploration services for the above referenced project in general accordance with Terracon Proposal No. PES245149 dated May 24, 2024. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning the slopes and drainage for the subject site.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon



Micah Hatch, P.E.
Geotechnical Department Manager

Guoming Lin, Ph.D., P.E., D.GE
Senior Consultant

Table of Contents

Attachments

Note: This report was originally delivered in a web-based format. Blue Bold text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

Report Summary

Topic [1]	Overview Statement [2]
Site Conditions	■ There is some minor damage and deformation to the landscape block wall in the slope face behind Villa 191-195. ■ Some localized erosion was observed behind the block wall around roof drain discharge pop-ups.
Subsurface Investigation	■ The hand auger borings encountered approximately 6 inches of topsoil. The topsoil thickness may reach deeper below the ground surface (BGS) in some areas. ■ The site contains sands and silty sands in the upper 5 feet below the ground surface. ■ Depth to groundwater was observed at approximately 3.3 to 4.5 feet BGS at the hand auger borings.
Evaluation and Recommendations	■ Based on observations of existing site conditions, our geotechnical test results, and review of available aerial imagery, the slopes behind Villas 181-185, to the side and behind Villas 186-190, and behind Villas 191-195 appear stable and are considered at minimal risk for global slope failure. ■ The existing landscape block wall in the slope face behind Villas 191-195 is not integral to maintaining the stability of the slope and can be removed. ■ To reduce erosion potential from roof runoff drainage, we recommend that a lateral collector pipe be installed and discharge away from the slope face. If the block wall is removed, the lateral collector pipe could be placed in the opening left by the wall blocks.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Exploration services performed to evaluate the overall stability of the slope and explore the cause for the observed distress to the existing landscaping block wall behind villas 191-195 located at Twin Oaks Villa within Sea Pines off Plantation Drive in Hilton Head Island, SC.

The geotechnical engineering Scope of Services for this project included site visits by our engineers, the advancement of four hand auger (HA) borings with dynamic cone penetration (DCP) tests, and preparation of this report.

Drawings showing the site and boring locations are shown on the Site Location and Exploration Plan, respectively. The Photography Log presents representative conditions observed during our site visit.

Site Conditions

We visited the site to perform visual observation of the slopes and to perform subsurface testing. The following description of site conditions is derived from our site visits.

Item	Description
Parcel Information	The project is located at Twin Oaks Villas within Sea Pines off Plantation Drive in Hilton Head Island, SC. Latitude: 32.1331°, Longitude: -80.8093° See Site Location
Existing Improvements	The slopes are grass covered. The slope behind Villas 191-195 has an existing landscaping wall consisting of 2-3 courses of block. Based on information provided during the May 7th conference call, a wooden bulkhead wall was previously installed along the toe of the slope at the lagoon interface.
Current Ground Cover	Grass and landscaped area.
Existing Topography	The site slopes down to the lagoon from the Villa back patio areas.

Subsurface Investigation and Findings

Subsurface Profile

From the hand auger borings, the material in the upper 5 feet below ground surface, BGS, appears to be sand and silty sands that become denser at approximately 5 feet BGS. Groundwater was encountered between 3 and 4.5 feet BGS. These soil and groundwater conditions are typical to the area. Conditions encountered at each exploration location are indicated on the individual exploration logs in the Exploration Results.

Site Observations

We visited the site to observe the slope conditions behind villas 181-185, 186-190, and 191-195. The slopes appeared generally intact and stable. No observable erosion along the lagoon/slope interface was noted during our site visit.

The landscape block wall in the slope behind villas 191-195 had some observable damage and deformation. There were also signs of localized erosion around roof drain discharge pop-ups behind the block wall.

Evaluation and Recommendations

Based on our observations, results of our testing, and review of available aerial imagery, the slopes behind Villas 181-185, to the side and behind Villas 186-190, and behind Villas 191-195 appear stable and are considered at minimal risk for global slope failure.

The existing landscape block wall behind Villas 191-195 was observed to not be integral to the overall stability of the slope and can be removed. The observed deformation of the wall face could have been caused multiple factors, including quality of wall construction, water and earth pressure acting on the wall, and insufficient base friction and passive resistance from soil in front of the wall.

To reduce potential for future localized erosion on the slope surface from roof runoff of the villas, we recommend that the roof runoff drains connect to a lateral collector pipe running approximately parallel to the lagoon. The discharge points of the lateral pipe should be away from the slope face and discharge onto riprap or directly into the lagoon. If the block wall is removed, the lateral connector pipe could be installed in the opening left by the removed blocks.

Additionally, we recommend that grass and vegetation cover be maintained along the slope faces to reduce erosion potential of the sandy soils.

General Comments

As the project progresses, we address assumptions by incorporating information provided by the design team, if any. Revised project information that reflects actual conditions important to our services is reflected in the final report. The design team should collaborate with Terracon to confirm these assumptions and to prepare the final design plans and specifications. This facilitates the incorporation of our opinions related to the implementation of our geotechnical recommendations.

Any information conveyed prior to the final report is for informational purposes only and should not be considered or used for decision-making purposes.

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.

Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended.

Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost

estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost.

Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development.

If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Type of Exploration	Maximum Boring/Test Depth (feet)	Location
4	Hand Auger Boring (HA) with Dynamic Cone Penetrometer (DCP) Testing	8	Slope and Landscape Wall Area

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: Hand auger borings were conducted in general accordance with ASTM D 1452, Standard Practice for Soil Investigation and Sampling by Auger Borings. In this test, hand auger borings are drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils are classified in accordance with ASTM D2488.

Dynamic cone penetrometer, DCP, testing borings were performed in accordance with ASTM D6951. In this test a 17.6-pound hammer is lifted and dropped along a rod a set distance. The number of blows to drive the cone into the soil is recorded and used to determine the relative density of the soils.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. The groundwater level is shown on the attached boring logs. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location Plan

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY GOOGLE EARTH

Exploration Plan

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY GOOGLE EARTH

Exploration Results

Contents:

HA Boring Logs (HA1-HA4, 4 pages)
Kessler DCP Logs (HA1-HA4, 4 pages)

Note: All attachments are one page unless noted above.

Twin Oaks Lagoon Slopes
Plantation Drive | Hilton Head Island, SC
Terracon Project No. ES245149

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. HA01

Location: See Exploration Plan

Latitude: 32.1330° Longitude: -80.8095°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type
	0.5	**TOPSOIL**, with roots			
	4.5	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine grained, brown, moist wet dark brown	1 2 3 4	▽	
	5.0	**POORLY GRADED SAND (SP)**, fine grained, light gray, wet	5		
		Boring Terminated at 5 Feet			

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations

▽ Groundwater encountered @ 4.5 ft BGS

Mottling not encountered

Drill Rig
Hand Auger

Driller
MM

Logged by
MH

Boring Started
06-17-2024

Boring Completed
06-17-2024

Notes

Advancement Method
Manual hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Twin Oaks Lagoon Slopes
Plantation Drive | Hilton Head Island, SC
Terracon Project No. ES245149

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. HA02

Location: See Exploration Plan

Latitude: 32.1331° Longitude: -80.8094°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type
	0.5	**TOPSOIL**, with grass			
	2.0	**SILTY SAND (SM)**, fine grained, brown, moist	1		
	4.0	**POORLY GRADED SAND (SP)**, with trace silt, fine grained, light brown/tan, moist	2		
	5.0	**SILTY SAND (SM)**, fine grained, dark brown, wet	3	▽	
		Boring Terminated at 5 Feet	4		
			5		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations

▽ Groundwater encountered @ 4 ft BGS

Mottling not encountered

Drill Rig
Hand Auger

Driller
MM

Logged by
MH

Boring Started
06-17-2024

Boring Completed
06-17-2024

Notes

Advancement Method
Manual hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Twin Oaks Lagoon Slopes
Plantation Drive | Hilton Head Island, SC
Terracon Project No. ES245149

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. HA03

Location: See Exploration Plan

Latitude: 32.1331° Longitude: -80.8093°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type
	0.3	**TOPSOIL**, with grass			
	5.0	**SILTY SAND (SM)**, fine grained, brown, moist dark brown wet	1 2 3 4	▽	
		Boring Terminated at 5 Feet	5		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
▽ Groundwater encountered @ 4.5 ft BGS
Mottling not encountered

Drill Rig
Hand Auger

Driller
MM

Logged by
MH

Boring Started
06-17-2024

Boring Completed
06-17-2024

Notes

Advancement Method
Manual hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Twin Oaks Lagoon Slopes
Plantation Drive | Hilton Head Island, SC
Terracon Project No. ES245149

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. HA04

Location: See Exploration Plan

Latitude: 32.1332° Longitude: -80.8093°

Graphic Log	Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type
	TOPSOIL, with grass			
	0.3			
	SILTY SAND (SM), fine grained, dark brown, moist	1		
		2		
		3	▽	
	tan/light brown, wet	4		
	5.0	5		
	Refusal due to cave in at 5 Feet			

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations

▽ Groundwater encountered @ 3.3 ft BGS

Mottling not encountered

Drill Rig
Hand Auger

Driller
MM

Logged by
MH

Boring Started
06-17-2024

Boring Completed
06-17-2024

Notes

Advancement Method
Manual hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

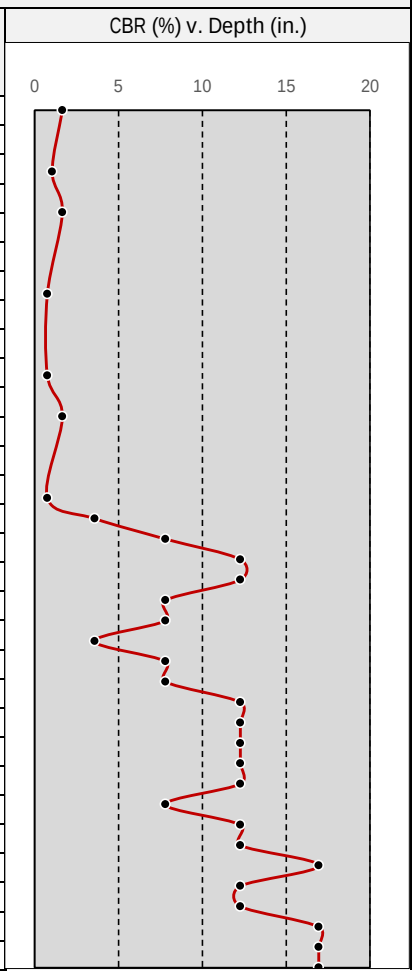
Dynamic Cone Penetrometer Log

Project Name: Twin Oaks Lagoon Slopes
Project No.: ES245149
Project Location: Hilton Head Island, SC

Test Date: 06-17-2024
Completed by: MM/MH

HA1

Depth (in.)	Depth (ft.)	Blows	Penetration (in.)	DCP Index (Inch/blow)	CBR (%)
4	0.33	1	4	4.00	2
10	0.83	1	6	6.00	1
14	1.17	1	4	4.00	2
22	1.83	1	8	8.00	1
30	2.50	1	8	8.00	1
34	2.83	1	4	4.00	2
42	3.50	1	8	8.00	1
44	3.67	1	2	2.00	4
46	3.83	2	2	1.00	8
48	4.00	3	2	0.67	12
50	4.17	3	2	0.67	12
52	4.33	2	2	1.00	8
54	4.50	2	2	1.00	8
56	4.67	1	2	2.00	4
58	4.83	2	2	1.00	8
60	5.00	2	2	1.00	8
62	5.17	3	2	0.67	12
64	5.33	3	2	0.67	12
66	5.50	3	2	0.67	12
68	5.67	3	2	0.67	12
70	5.83	3	2	0.67	12
72	6.00	2	2	1.00	8
74	6.17	3	2	0.67	12
76	6.33	3	2	0.67	12
78	6.50	4	2	0.50	17
80	6.67	3	2	0.67	12
82	6.83	3	2	0.67	12
84	7.00	4	2	0.50	17
86	7.17	4	2	0.50	17
88	7.33	4	2	0.50	17



ASTM D6951

CBR (%) = 292 / (DCP x 25.4)$^{1.12}$

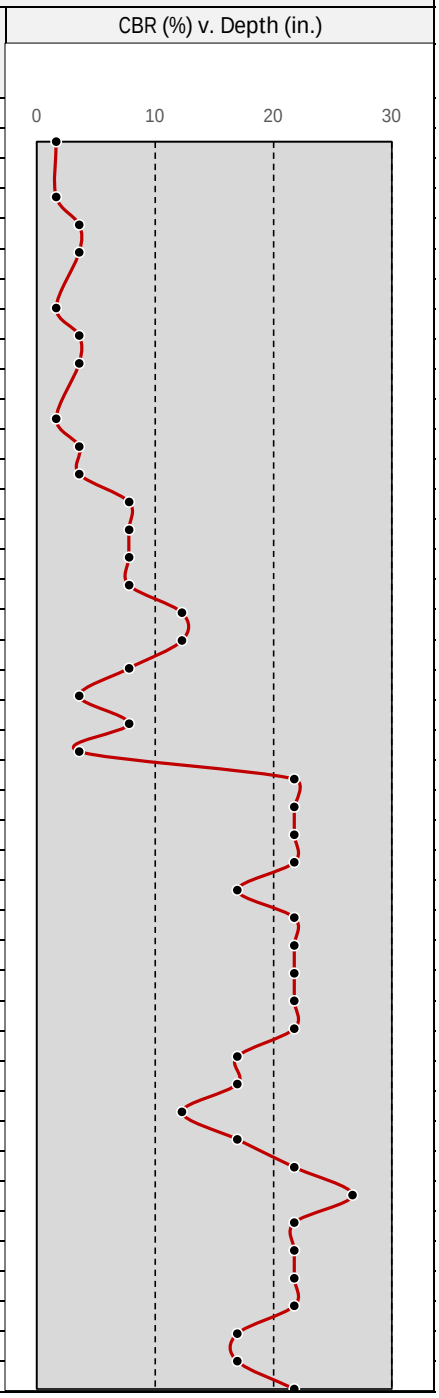
Dynamic Cone Penetrometer Log

Project Name: Twin Oaks Lagoon Slopes
Project No.: ES245149
Project Location: Hilton Head Island, SC

Test Date: 06-17-2024
Completed by: MM/MH

HA2

Depth (in.)	Depth (ft.)	Blows	Penetration (in.)	DCP Index (Inch/blow)	CBR (%)
4	0.33	1	4	4.00	2
8	0.67	1	4	4.00	2
10	0.83	1	2	2.00	4
12	1.00	1	2	2.00	4
16	1.33	1	4	4.00	2
18	1.50	1	2	2.00	4
20	1.67	1	2	2.00	4
24	2.00	1	4	4.00	2
26	2.17	1	2	2.00	4
28	2.33	1	2	2.00	4
30	2.50	2	2	1.00	8
32	2.67	2	2	1.00	8
34	2.83	2	2	1.00	8
36	3.00	2	2	1.00	8
38	3.17	3	2	0.67	12
40	3.33	3	2	0.67	12
42	3.50	2	2	1.00	8
44	3.67	1	2	2.00	4
46	3.83	2	2	1.00	8
48	4.00	1	2	2.00	4
50	4.17	5	2	0.40	22
52	4.33	5	2	0.40	22
54	4.50	5	2	0.40	22
56	4.67	5	2	0.40	22
58	4.83	4	2	0.50	17
60	5.00	5	2	0.40	22
62	5.17	5	2	0.40	22
64	5.33	5	2	0.40	22
66	5.50	5	2	0.40	22
68	5.67	5	2	0.40	22
70	5.83	4	2	0.50	17
72	6.00	4	2	0.50	17
74	6.17	3	2	0.67	12
76	6.33	4	2	0.50	17
78	6.50	5	2	0.40	22
80	6.67	6	2	0.33	27
82	6.83	5	2	0.40	22
84	7.00	5	2	0.40	22
86	7.17	5	2	0.40	22
88	7.33	5	2	0.40	22
90	7.50	4	2	0.50	17
92	7.67	4	2	0.50	17
94	7.83	5	2	0.40	22



ASTM D6951
CBR (%) = 292 / (DCP x 25.4)$^{1.12}$

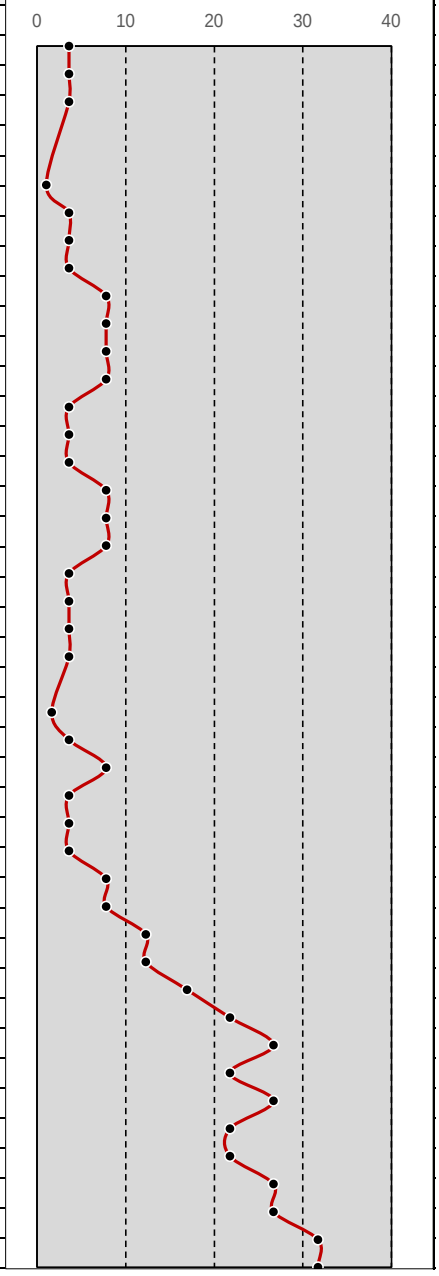
Dynamic Cone Penetrometer Log

Project Name: Twin Oaks Lagoon Slopes
Project No.: ES245149
Project Location: Hilton Head Island, SC

Test Date: 06-17-2024
Completed by: MM/MH

HA3

Depth (in.)	Depth (ft.)	Blows	Penetration (in.)	DCP Index (Inch/blow)	CBR (%)
2	0.17	1	2	2.00	4
4	0.33	1	2	2.00	4
6	0.50	1	2	2.00	4
12	1.00	1	6	6.00	1
14	1.17	1	2	2.00	4
16	1.33	1	2	2.00	4
18	1.50	1	2	2.00	4
20	1.67	2	2	1.00	8
22	1.83	2	2	1.00	8
24	2.00	2	2	1.00	8
26	2.17	2	2	1.00	8
28	2.33	1	2	2.00	4
30	2.50	1	2	2.00	4
32	2.67	1	2	2.00	4
34	2.83	2	2	1.00	8
36	3.00	2	2	1.00	8
38	3.17	2	2	1.00	8
40	3.33	1	2	2.00	4
42	3.50	1	2	2.00	4
44	3.67	1	2	2.00	4
46	3.83	1	2	2.00	4
50	4.17	1	4	4.00	2
52	4.33	1	2	2.00	4
54	4.50	2	2	1.00	8
56	4.67	1	2	2.00	4
58	4.83	1	2	2.00	4
60	5.00	1	2	2.00	4
62	5.17	2	2	1.00	8
64	5.33	2	2	1.00	8
66	5.50	3	2	0.67	12
68	5.67	3	2	0.67	12
70	5.83	4	2	0.50	17
72	6.00	5	2	0.40	22
74	6.17	6	2	0.33	27
76	6.33	5	2	0.40	22
78	6.50	6	2	0.33	27
80	6.67	5	2	0.40	22
82	6.83	5	2	0.40	22
84	7.00	6	2	0.33	27
86	7.17	6	2	0.33	27
88	7.33	7	2	0.29	32
90	7.50	7	2	0.29	32



ASTM D6951
CBR (%) = 292 / (DCP x 25.4)$^{1.12}$

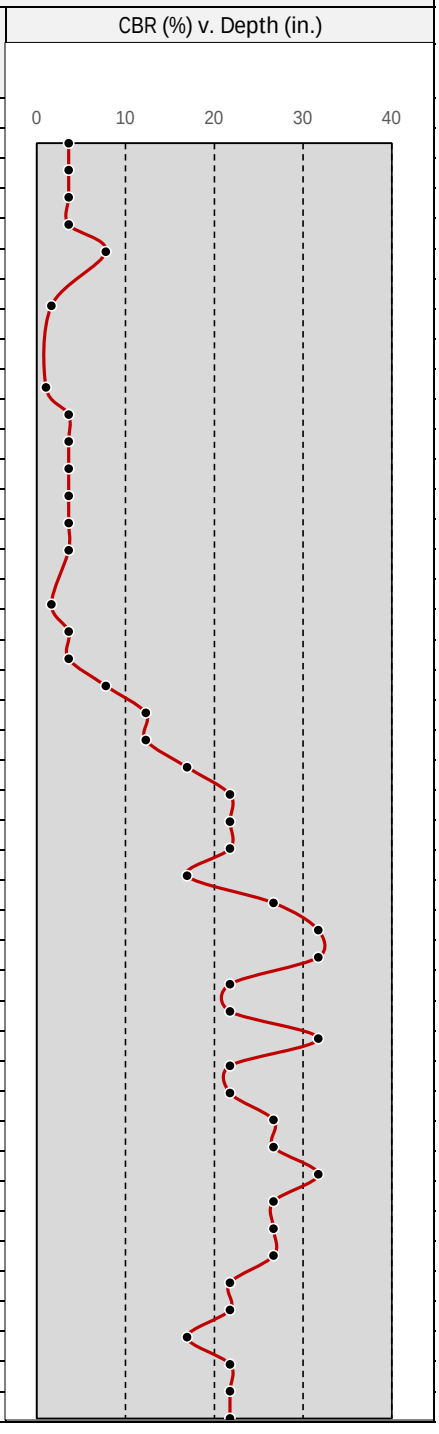
Dynamic Cone Penetrometer Log

Project Name: Twin Oaks Lagoon Slopes
Project No.: ES245149
Project Location: Hilton Head Island, SC

Test Date: 06-17-2024
Completed by: MM/MH

HA4

Depth (in.)	Depth (ft.)	Blows	Penetration (in.)	DCP Index (Inch/blow)	CBR (%)
2	0.17	1	2	2.00	4
4	0.33	1	2	2.00	4
6	0.50	1	2	2.00	4
8	0.67	1	2	2.00	4
10	0.83	2	2	1.00	8
14	1.17	1	4	4.00	2
20	1.67	1	6	6.00	1
22	1.83	1	2	2.00	4
24	2.00	1	2	2.00	4
26	2.17	1	2	2.00	4
28	2.33	1	2	2.00	4
30	2.50	1	2	2.00	4
32	2.67	1	2	2.00	4
36	3.00	1	4	4.00	2
38	3.17	1	2	2.00	4
40	3.33	1	2	2.00	4
42	3.50	2	2	1.00	8
44	3.67	3	2	0.67	12
46	3.83	3	2	0.67	12
48	4.00	4	2	0.50	17
50	4.17	5	2	0.40	22
52	4.33	5	2	0.40	22
54	4.50	5	2	0.40	22
56	4.67	4	2	0.50	17
58	4.83	6	2	0.33	27
60	5.00	7	2	0.29	32
62	5.17	7	2	0.29	32
64	5.33	5	2	0.40	22
66	5.50	5	2	0.40	22
68	5.67	7	2	0.29	32
70	5.83	5	2	0.40	22
72	6.00	5	2	0.40	22
74	6.17	6	2	0.33	27
76	6.33	6	2	0.33	27
78	6.50	7	2	0.29	32
80	6.67	6	2	0.33	27
82	6.83	6	2	0.33	27
84	7.00	6	2	0.33	27
86	7.17	5	2	0.40	22
88	7.33	5	2	0.40	22
90	7.50	4	2	0.50	17
92	7.67	5	2	0.40	22
94	7.83	5	2	0.40	22
96	8.00	5	2	0.40	22



ASTM D6951

CBR (%) = 292 / (DCP x 25.4)$^{1.12}$

Supporting Information

Contents:

Photography Log
Aerial Imagery Available from Beaufort County GIS
General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.

Photography Log

Photo 1: Slope behind Villas 181-185

Photo 2: Slope behind Villas 181-185

Photo 3: Slope beside Villas 186-190

Photo 4: Slope behind Villas 186-190

Photo 5: Slope behind Villas 191-195

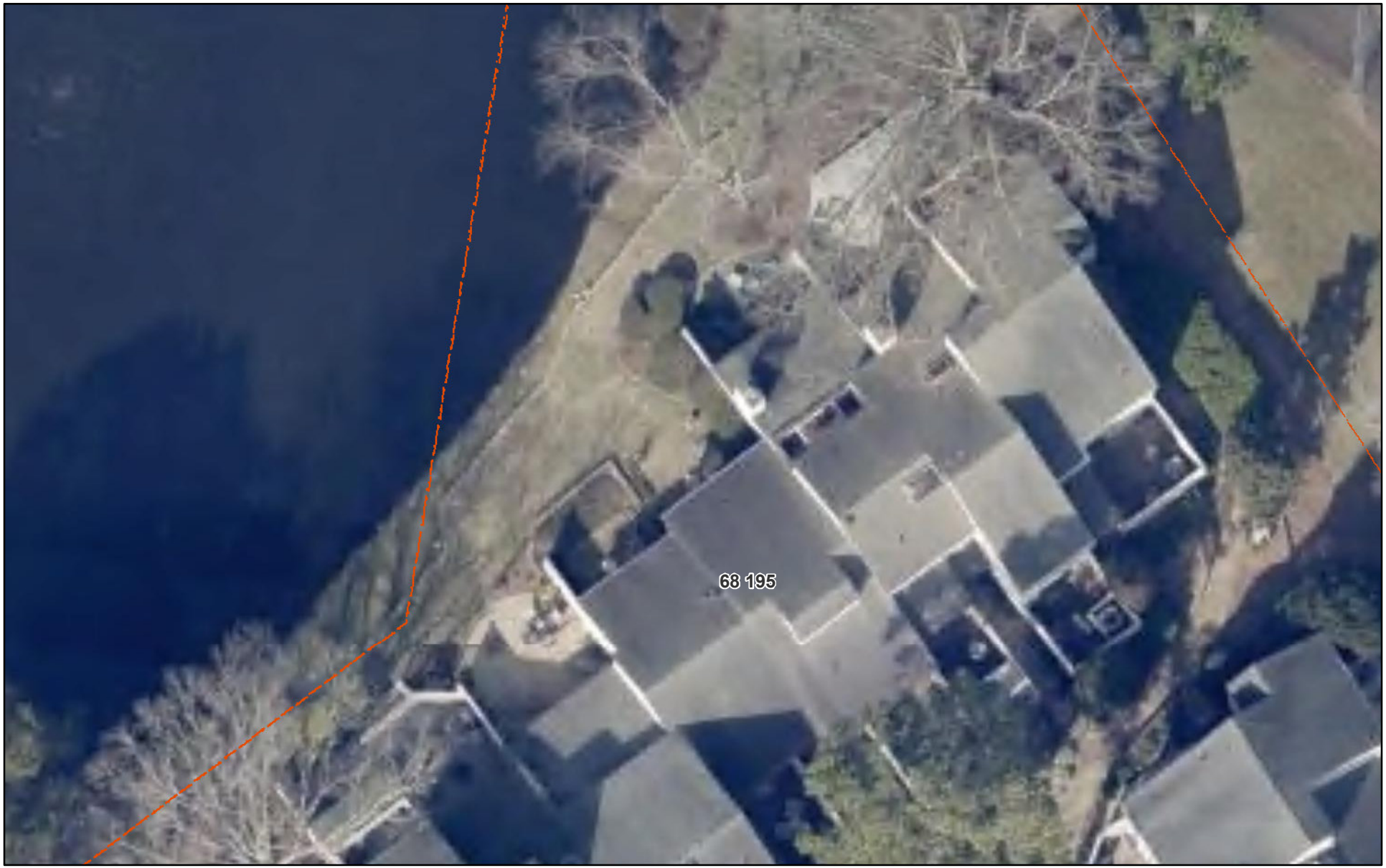
Photo 6: Slope behind Villas 191-195

Photo 7: Slope behind Villas 191-195

Photo 8: Slope behind Villas 191-195

Aerial Imagery from Beaufort County GIS
Project ES245149

2024 Aerial



6/25/2024, 1:57:06 PM

LiveParcels
Red: Band_1
Green: Band_2
Blue: Band_3

1:282

0 0.00225 0.0045 0.009 mi
0 0.00375 0.0075 0.015 km

2023 Aerial

6/25/2024, 1:56:24 PM

LiveParcels

1:282

0 0.00225 0.0045 0.009 mi

0 0.00375 0.0075 0.015 km

2021 Aerial

6/25/2024, 1:55:33 PM

LiveParcels

1:282

0 0.00225 0.0045 0.009 mi

0 0.00375 0.0075 0.015 km

2019 Aerial

6/25/2024, 1:54:48 PM

LiveParcels

1:282

0 0.00225 0.0045 0.009 mi

0 0.00375 0.0075 0.015 km

2017 Aerial

6/25/2024, 1:54:06 PM

LiveParcels

1:282

0 0.00225 0.0045 0.009 mi

0 0.00375 0.0075 0.015 km

2015 Aerial

6/25/2024, 1:52:50 PM

LiveParcels

1:282

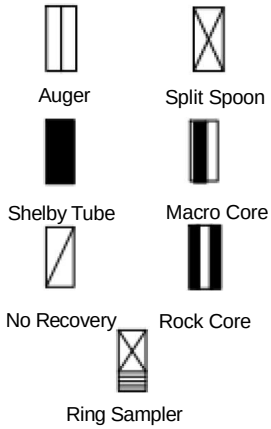
0 0.00225 0.0045 0.009 mi

0 0.00375 0.0075 0.015 km

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING



GROUNDWATER

- Groundwater Initially Encountered
- Groundwater Level After a Specified Period of Time
- Static Groundwater Level After a Specified Period of Time
- No Groundwater Observed

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Std. Penetration Resistance (blows per foot)	Descriptive Term (Consistency)	Undrained Shear Strength (kips per square foot)	Std. Penetration Resistance (blows per foot)
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium-Stiff	0.50 to 1.00	5 - 7
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	above 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Descriptive Term(s) of other constituents	Percent of Dry Weight
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 4 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried}$ < 0.75	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried}$ < 0.75	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.