Indian River County Purchasing Division
purchasing@ircgov.com

ADDENDUM NO. 2

Issue Date:	April 25, 2023
Project Name:	Phase I – Cell 3 Site Preparation Class 1 Landfill – Segment 3 Expansion
Bid Number:	2023040
Bid Opening Date:	May 5, 2023

This addendum is being released to answer questions received. The information and documents contained in this addendum are hereby incorporated in the invitation to bid. **This addendum must be acknowledged where indicated on the bid form, or the bid may be declared non-responsive.**

Questions and Answers

1. In the table of contents there is a dewatering spec but that section does not appear to be in the specs. Is there to be any dewatering required for this project?
   Dewatering will not be required for this project since the work involved is placing fill and groundwater level is approximately 1.5 to 6 ft below existing grades.

2. What space is available for stockpiling, if any?
   The Owner and/or Engineer will designate areas for stockpiling. It is anticipated that stripped and other "unsuitable" material will be stockpiled in an area of future Cell 7 footprint (see Attachment A.) For off-site borrow material to be used as fill, this can be stockpiled or staged in either Cell 4 footprint area (if the Option Bid is not exercised) or also future Cell 7 footprint area (if the Option Bid is exercised). The exact location, dimensions, and required site preparation will be coordinated with the successful bidder.

3. Should the work related to Cell 3 be the base bid for the work? If so, shouldn't there be a bid total or subtotal line after Item #7 on the bid form?
   Please see bid form updated in Addendum 1.

4. Where should strippings from the work area be stockpiled?
   Please refer to response to Item 2.

5. In the Engineer's calculations for the amount of fill needed to complete the work, what stripping depth of existing vegetation was considered across the work area?
   Stripping is defined in Section 02110 of the Technical Specifications. Even though clearing and grubbing is included in this Section, and also on the Bid Form, stripping will be the major

component required for this work.

6. Would it be possible to provide the CADD files to the Bidders in order to perform quantity takeoffs electronically?
Please see Addendum 1.

7. If unsuitable materials are encountered in the subgrade after stripping, how would removal and replacement be compensated?
The Owner and Engineer do not foresee any significant volume of unsuitable soils to be encountered within the footprint of construction (see Cell 3 Geotechnical Investigation Report in Attachment B). Therefore, Part 3.07E of Section 02200 is typical earthwork construction requirement. Should unsuitable material be encountered deeper than 2 ft and in significant quantities than as indicated in Part 3.07.E, the Owner will be open to a design change based on the Engineer's recommendations. Section 02200 has also been revised to include subgrade proof rolling requirements (Attachment C).

8. The current contract includes ninety calendar days from the time of the start until the Substantial Completion of the project. We believe that the import of material to complete the project will take longer than this timeline anticipates. Please consider extending the contract timeframe from ninety days to one hundred and fifty days.
The days to substantial completion will be increased to 120 days, with 150 days for final completion.

9. If the Owner opts to have the Contractor perform the optional Cell 4 work, how much additional contract time will be added to the project?
An additional 120 days will be provided in the agreement, if Cell 4 work is awarded.

10. There are currently several containers, as well as a good deal of stockpile material that appear to be in the future Cell 4 footprint. Is it correct to assume that the Owner will remove all of these materials and containers from the work area prior to the start of construction on the project?
Yes

11. Is it correct to assume that the abandonment/relocation of all monitoring wells in and around the project area will be done prior to the start of work on this project?
Please see Addendum 1.

12. For Bid Item 5B, Perimeter Ditch (Fill), does this item include fill for the entire length of the perimeter ditch around Cells 3 and 4?
Yes

13. With regard to Bid Item 5B, Perimeter Ditch (Fill), would the ditch simply daylight to existing grades along the inside perimeter in the event that the optional Cell 5 fill work is not performed under this contract? We are looking to verify the 6,800 cubic yard quantity for this work that is listed on the bid form.
Please see bid form updated by Addendum 1.

14. Under Specification Section 02200, Earthwork, Item 1.05, Construction Quality Assurance, it

appears that the Independent Testing Laboratory (provided and paid for by the Owner) will be responsible for conformance testing of Contractor-provided soil material and that the Owner's CQA Consultant will perform in-place density testing on the soils during placement. Is it correct to assume that the Owner will pay for all soil conformance and in-place density testing?
Yes, but Contractor is responsible for providing certification and pre-qualification test results of each source of fill material for approval. Contractor will also be responsible for performing its own quality control testing. See revised Sections 01410 and 02200 in Attachment C.

15. The Legend on Drawing 3 shows both an "Existing Forcemain" and a "Leachate Forcemain". The plan also shows a line that appears to be a forcemain. However, there is no call out or any other mention of this forcemain on any of the other drawings, nor are there any details. Also, there appears to be no mention of any work associated with a forcmeain in the specifications. Please confirm that we will not be required to perform any work with any forcemain, existing, proposed, or otherwise.
No force main work will be required. These are existing force main as part of Existing Site Conditions.

16. In Spec 01410 it says the contractor will employ an Independent testing lab but in spec 02200 it says the owner shall retain an independent testing lab to perform soil conformance. Who is responsible for the testing for this project?
See response to question 14.

17. The proposed schedule shows earthwork being complete between 30 to 90 calendar days does this mean we are not allowed to start before 30 days after the NTP?
The agreement will be updated to reflect earthwork may begin 10 days after NTP.

Attachment A: Potential Stockpiling Areas
Attachment B: Cell 3 Geotechnical Investigation Report
Attachment C: Section 01410, Rev. 1 and Section 02200, Rev. 1

Attachment A

PAVED ACCESS ROAD
MH 10
MH 9
LEACHATE TRANSMISSION SYSTEM MANHOLE (2/23)
LANDFILL PERIMETER BERM WITH DITCH A (1/17)
ENTRANCE ROAD
SCALES
LEACHATE COLLECTION TRENCH (1/15)
ADMINISTRATION AREA
LANDFILL PERIMETER BERM WITH DITCH B (2/17)
PAVED ACCESS ROAD
SEGMENT 1/INFILL/ SEGMENT 2 LANDFILL (CLASS I) (ACTIVE)
CELL 1 (10.37 AC)
CELL 2 (10.56 AC)
CELL 3 (10.54 AC)
CELL 4 (9.22 AC)
BIOSOLIDS FACILITY (CONSTRUCTED)
STORM WATER POND
CELL 1 C & D LANDFILL (INACTIVE)
LANDFILL PERIMETER BERM WITH DITCH C (3/17)
CELL 8 (8.86 AC)
CELL 7 (9.34 AC)
CELL 6 (9.34 AC)
CELL 5 (7.92 AC)
LEACHATE TRANSMISSION SYSTEM MANHOLE (2/23)
IRCWCD C-6 CANAL
N 1180000
N 1179500
N 1179000
N 1178500
N 1178000
E 821500
E 822000
E 822500
E 823000
E 823500
E 824000

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND ELEVATION (FEET, NGVD)
- BASE ELEVATION (FEET, NGVD)
- FINAL COVER ELEVATION (FEET, NGVD)
- OBSCURED EXISTING GROUND ELEVATION (FEET, NGVD)
- DEPRESSION GROUND CONTOUR
- PAVED ROAD
- UNPAVED ROAD
- TREE LINE
- FENCE
- UTILITY POLE
- CULVERT
- SPOT ELEVATION (FEET, NGVD)
- PERMITTED LIMIT OF WASTE
- N 1178500 / E 824000 STATE PLANE COORDINATES
- EXISTING GRAVITY LINE
- EXISTING FORCEMAIN
- PROPOSED ACCESS ROAD

NOTES:

1. AERIAL TOPOGRAPHIC BASE MAP WAS PREPARED BY PICKETT & ASSOCIATES AND COMPILED FROM PHOTOGRAPHS DATED 8 MAY 2009.
2. HORIZONTAL COORDINATES VALUES ARE BASED UPON THE NORTH AMERICAN DATA OF 1983 (NAD83), ADJUSTED TO 1999 COORDINATE SYSTEM, FLORIDA EAST ZONE.
3. CONTOURS AND SPOT ELEVATION ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).

0 120' 240'
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP

Geosyntec consultants
1200 RIVERPLACE BOULEVARD, SUITE 710
JACKSONVILLE, FLORIDA 32207 USA
PHONE: 904.858.1818 – FAX: 904.396.1143
CERTIFICATE OF AUTHORIZATION NO. 4321

1325 74th AVENUE SW
VERO BEACH, FLORIDA 32968 USA
PHONE: 772.770.5112

TITLE: BASE GRADING PLAN – SEGMENT 3 EXPANSION

PROJECT: RENEWAL PERMIT APPLICATION FOR A CLASS I LANDFILL

SITE: INDIAN RIVER COUNTY LANDFILL

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

SIGNATURE

DATE

KWASI BADU-TWENEBOAH
LICENSE NO. 42460

DESIGN BY:	WT	DATE:	MARCH 2010
DRAWN BY:	JJA	PROJECT NO.:	FL1363.03
CHECKED BY:	KBT	FILE:	FL1363.03P07B
REVIEWED BY:	JFB	DRAWING NO.:	5 OF 33
APPROVED BY:	KBT		

PERMIT DRAWING

P:\AR-CAD\INDIAN RIVER CLASS I LANDFILL LATERAL EXPANSION FL1363.03\REVISION 8\FL1363.03P07B

Attachment B

SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION INDIAN RIVER COUNTY CLASS I LANDFILL PROPOSED SEGMENT NO. 3 CELL NO. 3 INDIAN RIVER COUNTY, FLORIDA

AACE FILE NO. 22-255

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

834 SW Swan Avenue
Port St. Lucie, Florida 34983
Ph: 772-807-9191 Fx: 772-807-9192
www.aaceinc.com

TABLE OF CONTENTS

SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION INDIAN RIVER COUNTY CLASS I LANDFILL PROPOSED SEGMENT NO. 3 CELL NO. 3 INDIAN RIVER COUNTY, FLORIDA

AACE FILE NO. 22-255

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.
Geotechnical Engineering
Construction Materials Testing
Environmental Consulting

AACE File No. 22-255
January 25, 2023

Indian River County Solid Waste Disposal District
1325 74th Avenue SW
Vero Beach, FL 32698

Attention: Mr. Ronnie T. Jones

SUBSURFACE SOIL EXPLORATION AND
GEOTECHNICAL ENGINEERING EVALUATION
INDIAN RIVER COUNTY CLASS I LANDFILL
PROPOSED SEGMENT NO. 3 CELL NO. 3
INDIAN RIVER COUNTY, FLORIDA

1.0 INTRODUCTION

In accordance with your request and authorization, Andersen Andre Consulting Engineers, Inc. (AACE) has completed a subsurface exploration and geotechnical engineering analyses for the above referenced project. The purpose of performing this exploration was to explore shallow soil types and groundwater levels as they relate to the proposed landfill cell construction, and restrictions which these soil and groundwater conditions may place on the proposed landfill expansion. Our work included Standard Penetration Test (SPT) borings, laboratory testing, and engineering analyses. This report documents our explorations and tests, presents our findings, and summarizes our conclusions and recommendations.

2.0 SITE INFORMATION AND PROJECT UNDERSTANDING

2.1 Site Location and Description

The Indian River County municipal solid waste landfill (i.e. the site) is located at 1325 74th Avenue in Vero Beach, Indian River County, Florida (within Section 25, Township 33 South, Range 38 East). The location of the site is graphically depicted on the Site Vicinity Map (2021 aerial photograph) as well as on a reproduction of the USGS Quadrangle Map of "Oslo, Florida", both presented as our Figure No. 1. The USGS Quadrangle Map depicts the subject property as being relatively level with an average surface elevation of about 25 feet relative to the National Geodetic Vertical Datum of 1929.

2.2 Review of USDA Soil Survey

According to the USDA NRCS Web Soil Survey, the predominant surficial, natural soil types in the area where the site is located are as follows:

- EauGallie fine sand (USDA NRCS Map Unit 3)
- Oldsmar fine sand (USDA NRCS Map Unit 6)
- Pepper sand (USDA NRCS Map Unit 9)
- Wabasso-Wabasso, wet, fine sand, 0 to 2 percent slopes (USDA NRCS Map Unit 13)
- Manatee mucky loamy fine sand, depressional (USDA NRCS Map Unit 53)
- Floridana mucky fine sand, frequently ponded, 0 to 1 percent slopes (USDA NRCS Map Unit 55)

In brief, these soil types are all noted to consist of sandy and loamy marine deposits found within flatwoods and depressions on historic marine terraces, with fine sands/sands, sandy clay loam, loamy sand/sandy loam sands and fine sandy loam present to depths in excess of 80 inches. Further, the Manatee and Floridana soil types are noted to include a 4-6 inch surface layer of "mucky loamy sand".

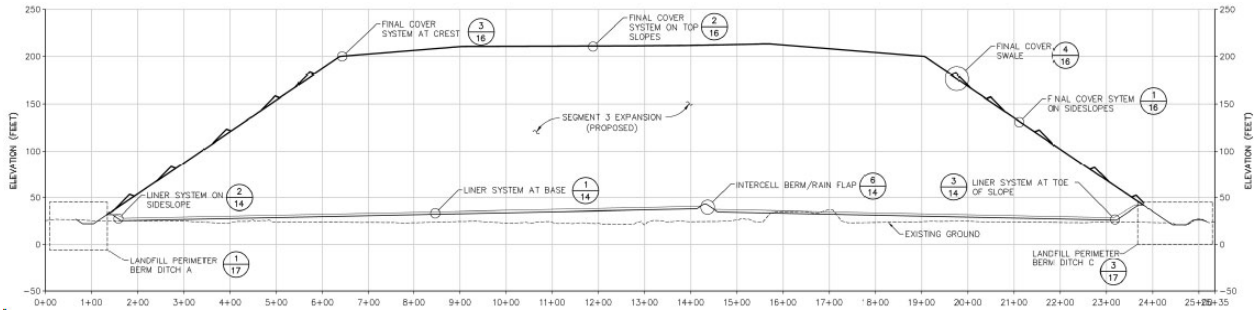
The approximate location of the subject site is shown superimposed on an aerial photograph (obtained from the USDA Web Soil Survey) on Figure No. 1. Further, excerpts from the USDA Web Soil Survey summary report are included in Appendix I.

2.3 Project Understanding

Based on our review of the forwarded project-related information, we understand that the proposed ±10.5-acre Cell No. 3 will have a height of about 175 feet (approximate elevation 200 ft NGVD-29).

It is further our understanding that the proposed landfill cell will be constructed with an impervious liner and a leachate collection and removal system (LCRS) under it. The cell will have exterior side slopes of 3 horizontal to 1 vertical towards the north, east and south, and the refuse will be placed against the existing cell to the west.

A proposed north-south cross-section obtained from the provided plans (by Geosyntec) is presented below.



3.0 FIELD EXPLORATION PROGRAM

To explore subsurface conditions at the site, eleven (11) Standard Penetration Test (SPT) borings [ASTM D1586] were performed at the locations shown on the Field Work Location Plan, Figure No. 2. Three (3) SPT borings were completed at depths of 125 feet, and eight (8) borings at depths of 30 feet below the existing ground surface.

Our site visits and field exploration program were completed in the period September 10-20, 2022. The field work locations shown on Figure No. 2 were determined in the field by our field crew using the provided project-related information, aerial photographs, existing site features, and a hand-held GPS instrument. The locations should be considered accurate only to the degree implied by the method of measurement used. We preliminarily anticipate that the actual locations are within 15 feet of those shown on Figure No. 2.

Summaries of AACE's field procedures are presented on Sheet No. 1 and the individual boring profiles are presented on the attached on Sheets No. 2 through 4. Samples obtained during performance of the borings were visually classified in the field, and representative portions of the samples were transported to our laboratory in sealed sample jars for further classification. The soil samples recovered from our explorations will be kept in our laboratory for 60 days from the issuance of this report, then discarded unless you specifically request otherwise.

4.0 OBSERVED SUBSURFACE CONDITIONS

4.1 General Soil Conditions

Detailed subsurface conditions are illustrated on the soil boring profiles presented on the attached Sheets No. 2 through 4. The stratification of the boring profiles represents our interpretation of the field boring logs and the results of laboratory examinations of the recovered samples. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

As shown by the soil boring profiles on Sheets No. 2 through 4, the soils on the site at the locations and the depths explored consist generally of a few inches of topsoil (fine sands with roots/organics) followed by loose to medium dense/dense fine sands (SP) and slightly clayey to clayey fine sands (SP-SC/SC) to depths of about 60-65 feet, in turn followed by medium dense to dense/very dense fine sands (SP) and slightly silty fine sands (SP-SM) to depths of about 80-85 feet below grade. At this depth, loose to moderately dense clayey to very clayey fine sands (SC) were encountered to depths of about 85-95 feet below grade, in turn followed by various strata of medium dense to dense fine sands (SP), silty fine sands (SM), and slightly clayey to clayey fine sands (SP-SC/SC) reaching the termination depths of our borings. Shell and occasionally cemented fragments were also encountered in our borings throughout the explored depths.

No soft compressible deposits of organics were encountered in any of our borings, and no strata with fine-grained soils (i.e. clays, silt, etc.) were encountered.

The above soil profile is outlined in general terms only. Please refer to the attached Sheets No. 2 through 4 for individual soil profile details.

4.2 Measured Groundwater Level

The groundwater table depth as encountered in the borings during the field investigations is shown adjacent to the soil profiles on the attached Sheets No. 2 through 4. As can be seen, the groundwater table was generally encountered at depths ranging from about 1.5 to 6 feet below the existing grades, with this depth range likely attributable to similar variations in site topography. Fluctuations in groundwater levels should be anticipated throughout the year primarily due to seasonal variations in rainfall and other factors that may vary from the time the borings were conducted.

5.0 LABORATORY TESTING PROGRAM

Our drillers observed the soil recovered from the SPT samplers, placed the recovered soil samples in moisture proof containers, and maintained a log for each boring. The recovered soil samples, along with the field boring logs, were transported to our Port St. Lucie soils laboratory where they were visually examined by AACE's project engineer to determine their engineering classification. The visual classification of the samples was performed in accordance with the Unified Soil Classification System, USCS.

Representative samples were selected for limited index laboratory testing, consisting of moisture content tests (ASTM D2216) and percent fines tests (ASTM D1140). These tests were performed to aid in classifying the soils and to help evaluate the general engineering characteristics of the site soils. The results of our classifications and laboratory analyses are presented on the soil boring profiles on Sheets No. 2 through 4.

6.0 GEOTECHNICAL ENGINEERING EVALUATION

Based on the findings of our site exploration, our evaluation of subsurface conditions, and judgment based on our experience with similar projects, we conclude that the soils underlying this site are generally satisfactory to support the proposed landfill cell expansion.

6.1 Bearing Capacity and Estimated Settlements

The underlying granular landfill cell foundation materials can be considered to be cohesionless in nature, with an angle of internal friction of 30 degrees and a dry density in excess of 100 pounds per cubic foot (pcf). The bearing capacity of these soils is considered well in excess of the loading that is expected from a landfill cell of the proposed dimensions, which is estimated to be on the order of 4.5-5 tsf.

In terms of settlements, the future landfill cell base will settle due to compression of the foundation soils. Settlements on the top of the landfill due to compression or decomposition of the solid waste itself (refuse settlement) are not of consequence to the performance of the bottom liners and the LCRS and hence are not considered further, except to the extent that solid waste compression and degradation would increase the unit weight of the waste material as discussed later.

Minor consolidation of the clayey sand layers encountered in our borings will occur. However, we expect that the majority (90 percent or more) of the landfill foundation soil settlements will be due to immediate elastic settlement plus minor creep settlements of the granular soil layers. The settlement of the foundation soils that support the landfill cell will deform the landfill/foundation contact into the shape of a shallow bowl. Deformations will normally be largest in the center of the fill area and significantly less along the cell edges and at the cell corners. The liner would tend to elongate to fit the contours of the bowl. Other liner elongations will occur as the rising landfill pushes the toes of the exterior slopes outward. Settlements will change the invert elevations of the pipes for the LCRS and affect their performance. The settlement estimates presented below are provided so that suitable allowances can be made in order to prevent unsatisfactory LCRS and underdrain performance.

Landfill Parameters for Settlement Estimation:
- In-situ refuse fill unit weight: 1,400 lbs/yd^3 (approximately 50 pcf)
- Height of landfill: 175 feet
- Approximate base dimensions: 350 feet by 1,250 feet
- Side slopes: 3H:1V

The above unit weight value was used to compute the landfill load applied to the ground surface. Normally we expect that with time the refuse unit weight will increase primarily for two reasons: Water contents will likely increase as the refuse absorbs rainwater, and the refuse will compress as additional lifts are placed over existing ones. For these reasons we increased the refuse unit weight to 60 pcf in our settlement estimations.

Overall, the following estimates of settlements are provided for a north-south cross-section of the proposed landfill cell as follows:

- Toe: 2 inches
- Crest: 17 inches
- Center: 20 inches

It is recommended that a minimum factor of safety of 1.5 be utilized for the estimated settlements.

6.2 Site Preparation Recommendations

It is our understanding that the proposed Cell No. 3 will be constructed in a similar manner as the existing cells, with liners so as to prevent any downward migration of leachate into the underlying groundwater. Also, a leachate collection and removal system (LCRS) will be installed. We expect that the proposed LRCS design will provide for leachate gravity flow beneath the cell expansion discharging into a collector header pipe and then into a leachate collection sump. Note that the existing collector header pipes and the existing leachate collection sumps may not be designed for the new increased leachate flow.

The proposed landfill cell area within lines at least 10 feet outside its perimeters should be cleared, grubbed and stripped of all surface vegetation, topsoil, pavement, roots, underground pipes, etc. Following clearing, the landfill area should be proofrolled with a 15 ton vibratory roller; any soft, yielding soils detected should be excavated and replaced with clean, compacted backfill that conforms with the recommendations below. Sufficient passes should be made during the proofrolling operations to produce dry densities not less than 95 percent of the modified Proctor (ASTM D1557) maximum dry density of the compacted material to depths of 2 feet below the compacted surface. The landfill cell area should receive not less than 10 overlapping passes, half of them in each of two perpendicular directions, and each pass should overlap the previous pass by 30 percent so as to insure complete coverage.

After the exposed surface has been proofrolled and tested to verify that the desired dry density has been obtained, any fill needed to raise the site grades should be placed in uniform layers not exceeding 12 inches in loose thickness. Each layer should be compacted to a dry density not less than 95 percent of its modified Proctor (ASTM D1557) maximum value.

6.3 Quality Control

We recommend establishing a comprehensive quality control program to verify that all site preparation is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Andersen Andre Consulting Engineers, Inc.

7.0 CLOSURE

The geotechnical evaluation submitted herein is based on the data obtained from the soil boring profiles presented on Sheets No. 2 through 4, and our understanding of the project as previously described. Limitations and conditions to this report are presented in Appendix IV.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices for the exclusive use of the Indian River County BOCC and the Indian River County Solid Waste Disposal District. No other warranty, expressed or implied, is made.

We are pleased to be of assistance to you on this phase of your project. When we may be of further service to you or should you have any questions, please contact us.

Sincerely,
ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

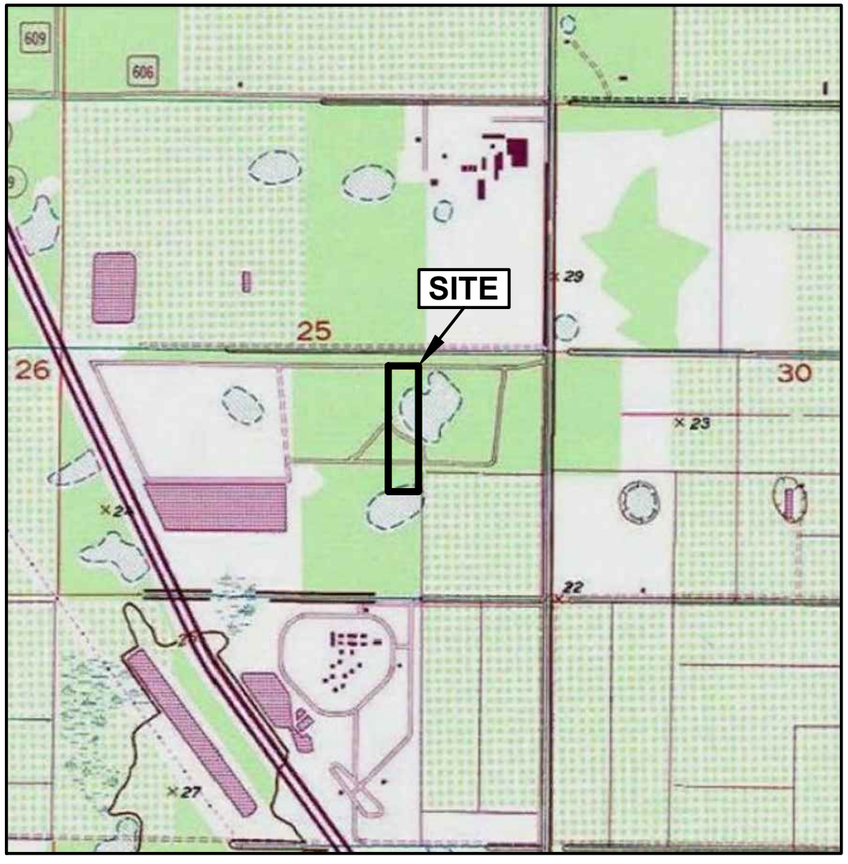
Peter G. Andersen, P.E.
Principal Engineer
Fla. Reg. No. 57956

David P. Andre, P.E.
Principal Engineer
Fla. Reg. No. 53969

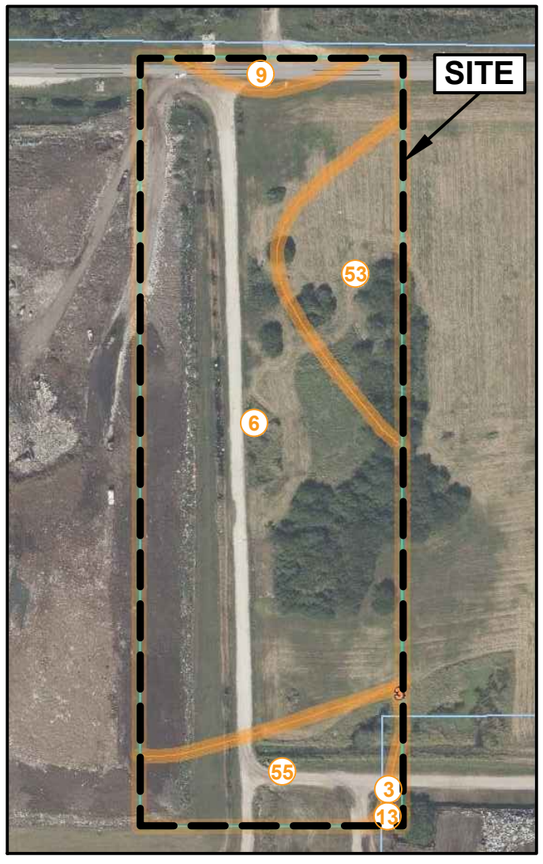
This report has been digitally signed by Peter G. Andersen, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

2021 AERIAL PHOTOGRAPH

USGS TOPOGRAPHIC QUADRANGLE MAP OF "OSLO, FL"



USDA SOIL SURVEY MAP



NORTH

NOT TO SCALE

Graphical sources:
- Google Earth Pro
- QUADS/Earth Survey
- USDA NRCS Web Soil Survey

PUBLIC LAND SURVEY SYSTEM

Section 25, Township 33 South, Range 38 East

USDA NRCS SOIL TYPES WITHIN SITE

3: EauGallie fine sand
6: Oldsmar fine sand
9: Pepper sand
13: Wabasso-Wabasso, wet, fine sand, 0 to 2 percent slopes
53: Manatte mucky loamy fine sand, depressional
55: Floridana mucky fine sand, frequently ponded, 0 to 1 percent slopes

AACE

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com

SITE VICINITY MAPS

SUBSURFACE SOIL EXPLORATION AND
GEOTECHNICAL ENGINEERING EVALUATION
INDIAN RIVER COUNTY CLASS I LANDFILL
PROPOSED SEGMENT 3 CELL NO. 3
INDIAN RIVER COUNTY, FLORIDA

Drawn by: PGA	Date: January 2023
Checked by: DPA	Date: January 2023
AACE File No: 22-255	**Figure No. 1**

LEGEND

TB-# Standard Penetration Test Boring

NOTES

Shown boring locations are approximate and were located using the provided conceptual site plan, aerial photographs, existing site features, and a hand-held GPS instrument. Atmospheric disturbances, forest canopy cover, local weather conditions, etc. may affect the accuracy of the GPS instrument readings. The shown boring locations should be considered accurate only to the degree implied by the method of measurement used.

NORTH

NOT TO SCALE

Graphical sources:
- Proposed Site Plan (Hazen, May 2022)

AACE **ANDERSEN ANDRE CONSULTING ENGINEERS, INC.** 834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com	**FIELD WORK LOCATION PLAN**	SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION INDIAN RIVER COUNTY CLASS I LANDFILL PROPOSED SEGMENT 3 CELL NO. 3 INDIAN RIVER COUNTY, FLORIDA	Drawn by: PGA Checked by: DPA AACE File No: 22-255	Date: January 2023 Date: January 2023 **Figure No. 2**

SOIL BORING, SAMPLING AND TESTING METHODS

(abbreviated version for project specific methods and soil conditions)

GENERAL

Andersen Andre Consulting Engineers, Inc. (AACE) borings describe subsurface conditions only at the locations drilled and at the time drilled. They provide no information about subsurface conditions below the bottom of the boreholes. At locations not explored, surface conditions that differ from those observed in the borings may exist and should be anticipated.

The information reported on our boring logs is based on our drillers' logs and on visual examination in our laboratory of disturbed soil samples recovered from the borings. The distinction shown on the logs between soil types is approximate only. The actual transition from one soil to another may be gradual and indistinct.

The groundwater depth shown on our boring logs is the water level the driller observed in the borehole when it was drilled. These water levels may have been influenced by the drilling procedures, especially in borings made by rotary drilling with bentonitic drilling mud. An accurate determination of groundwater level requires long-term observation of suitable monitoring wells. Fluctuations in groundwater levels throughout the year should be anticipated.

The absence of a groundwater level on certain logs indicates that no groundwater data is available. It does not mean that groundwater will not be encountered at that boring location at some other point in time.

HAND AUGER BORINGS

Hand auger borings are used, if soil conditions are favorable, when the soil strata are to be determined within a shallow (approximately 5-foot) depth or when access is not available to power drilling equipment. A 3-inch diameter hand bucket auger with a cutting head is simultaneously turned and pressed into the ground. The bucket auger is retrieved at approximately 6-inch interval and its contents emptied for inspection. On occasion post-hole diggers are used, especially in the upper 3 feet or so. Penetrometer probings can be used in the upper 5 feet to determine the relative density of the soils. The soil sample obtained is described and representative samples put in bags or jars and transported to the AACE soils laboratory for classification and testing, if necessary.

POWER AUGER BORINGS

Auger borings (ASTM D1452) are used when a relatively large, continuous sampling of soil strata close to the ground surface is desired. A 3- to 4-inch diameter, continuous flight, helical auger with a cutting head at its end is screwed into the ground in 5-foot sections. It is powered by the rotary drill rig. The sample is recovered by withdrawing the auger our of the ground without rotating it. The soil sample so obtained, is classified in the field and representative samples placed in bags or jars and returned to the AACE soils laboratory for classification and testing, if necessary.

When estimating the depth of muck during the performance of muck probes, soils that are easily penetrated with the probe are typically considered muck since the recovery of a sample is not always possible. Muck may consist of soft and plastic very clayey or silty soils, or organic deposits such as peat, all of which are typically considered unsuitable with regards to supporting structures, utilities, roadways, etc.

STANDARD PENETRATION TEST

The Standard Penetration Test (SPT) is a widely accepted method of in situ testing of foundation soils (ASTM D1586). A 2-foot long, 2-inch O.D. split-barrell sampler attached to the end of a string of drilling rods is driven 24 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches increments penetration is recorded. The sum of the blows required for penetration of the middle two 6-inch increments of penetration constitutes the test result of N-value. After the test, the sampler is extracted from the ground and opened to allow visual description of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load. The following tables relate N-values to a qualitative description of soil density for cohesionless soils:

Cohesionless Soils:	N-Value	Description
	0 to 4	Very loose
	4 to 10	Loose
	10 to 30	Medium dense
	30 to 50	Dense
	Above 50	Very dense

Cohesive Soils:	N-Value	Description	Qu
	0 to 2	Very soft	Below 0.25 tsf
	2 to 4	Soft	0.25 to 0.50 tsf
	4 to 8	Medium stiff	0.50 to 1.0 tsf
	8 to 15	Stiff	1.0 to 2.0 tsf
	15 to 30	Very stiff	2.0 to 4.0 tsf
	Above 30	Hard	Above 4.0 tsf

The tests are usually performed at 5 foot intervals. However, more frequent or continuous testing is done by AACE through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid. After completion of a test borings, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed by backfilling, either with accumulated cuttings or lean cement.

Representative split-spoon samples from each sampling interval and from different strata are brought to our laboratory in air-tight jars for classification and testing, if necessary. Afterwards, the samples are discarded unless prior arrangement have been made.

LABORATORY TEST METHODS

Soil samples returned to the AACE soils laboratory are visually observed by a geotechnical engineer or a trained technician to obtain more accurate description of the soil strata. Laboratory testing is performed on selected samples as deemed necessary to aid in soil classification and to help define engineering properties of the soils. The test results are presented on the soil boring logs at the depths at which the respective sample was recovered, except that grain size distributions or selected other test results may be presented on separate tables, figures or plates as discussed in this report. The soil descriptions shown on the logs are based upon visual-manual procedures in accordance with local practice. Soil classification is performed in general accordance with the United Soil Classification System (ASTM D2487) and is also based on visual-manual procedures.

THE PROJECT SOIL DESCRIPTION PROCEDURE FOR SOUTHEAST FLORIDA

For use with the ASTM D2487 Unified Soil Classification System

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

BOULDERS (>12") and COBBLES (3" to 12"):

GRAVEL: Coarse Gravel: 3/4" to 3"
Fine Gravel: No. 4 (4.75 mm) Sieve to 3/4" (19 mm)

Descriptive adjectives:
0 - 5% - no mention of gravel in description
5 - 15% - trace
15 - 29% - some
30 - 49% - gravelly (shell, limerock, cemented sands)

SANDS:

COARSE SAND: No. 10 (2 mm) Sieve to No. 4 (4.75 mm) Sieve
MEDIUM SAND: No. 40 (425 μm) Sieve to No. 10 (2 mm) Sieve
FINE SAND: No. 200 (75 μm) Sieve to No. 40 (425 μm) Sieve

Descriptive adjectives:
0 - 5% - no mention of sand in description
5 - 15% - trace
15 - 29% - some
30 - 49% - sandy

SILT/CLAY: < #200 (75μm) Sieve

SILTY OR SILT: PI < 4
SILTY CLAYEY OR SILTY CLAY: $4 \leq PI \leq 7$
CLAYEY OR CLAY: PI > 7

Descriptive adjectives:
< - 5% - clean (no mention of silt or clay in description)
5 - 15% - slightly
16 - 35% - clayey, silty, or silty clayey
36 - 49% - very

ORGANIC SOILS:

Organic Content	Descriptive Adjectives	Classification
0 - 2.5%	Usually no mention of org.	See Above
2.6 - 5%	slightly organic	add "with organic fines" to group name
5 - 30%	organic	SM with organic fines
		Organic Silt (OL)
		Organic Clay (OL)
		Organic Silt (OH)
		Organic Clay (OH)

DRILLING NOTES:

TB-#	STANDARD PENETRATION TEST [SPT] BORING (ASTM D1586)
N	SPT RESISTANCE IN BLOWS PER FOOT
+X.X'	GROUNDWATER TABLE DEPTH (FT-BLS) AT TIME OF DRILLING
HA	HAND AUGER FOR UTILITY CLEARANCE
EOB	END OF BORING
BLS	BELOW LAND SURFACE
FRGM	FRAGMENTS
SP, SP-SC, SC, CH	UNIFIED SOIL CLASSIFICATION SYSTEM [USCS] USCS GROUPS DETERMINED BY VISUAL CLASSIFICATION EXCEPT FOR NOTED LABORATORY TESTS
MC	NATURAL MOISTURE CONTENT IN PERCENT (ASTM D2216)
-200	PERCENT FINES PASSING THE NO. 200 SIEVE (ASTM D1140)

DRILL CREW CHIEF: DT
DRILL RIG: CME-45
DRILLING METHOD: ROTARY-WASH/BENTONITE SLURRY
CASING: NOT NEEDED
SPLIT-SPOON SAMPLER:
INSIDE DIAMETER: 1.375"
OUTSIDE DIAMETER: 2.0"
LENGTH: 24"
SPT HAMMER:
AVERAGE DROP: 30"
WEIGHT: 140 LBS
TYPE: SAFETY/MANUAL

SOIL GRAPHICAL LEGEND:

- FINE SAND (SP)
- SLIGHTLY CLAYEY FINE SAND (SP-SC)
- CLAYEY TO VERY CLAYEY FINE SAND (SC)
- SLIGHTLY SILTY FINE SAND (SP-SM)
- SILTY FINE SAND (SM)

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com

GENERAL NOTES

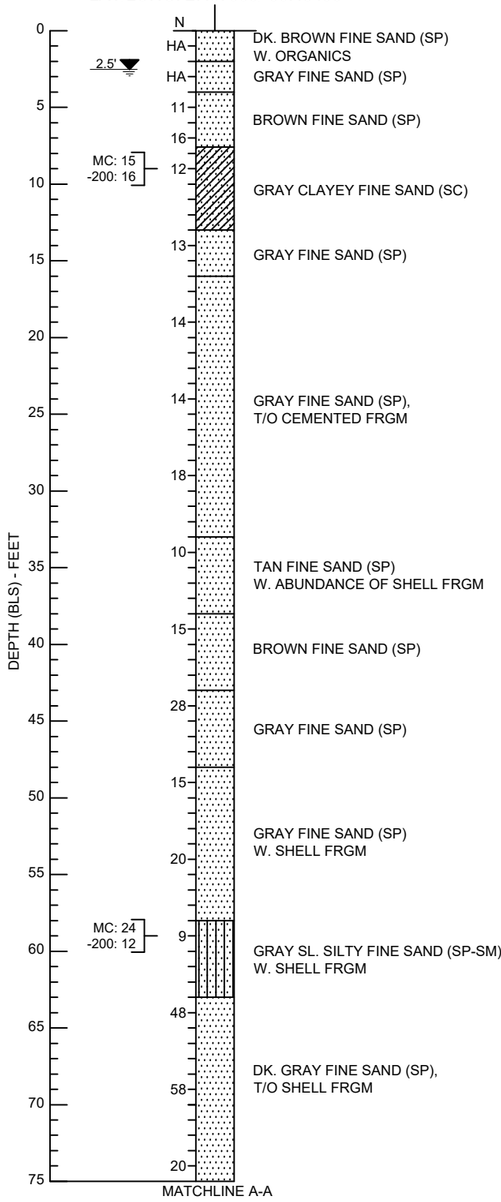
SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION INDIAN RIVER COUNTY CLASS I LANDFILL PROPOSED SEGMENT 3 CELL NO. 3 INDIAN RIVER COUNTY, FLORIDA

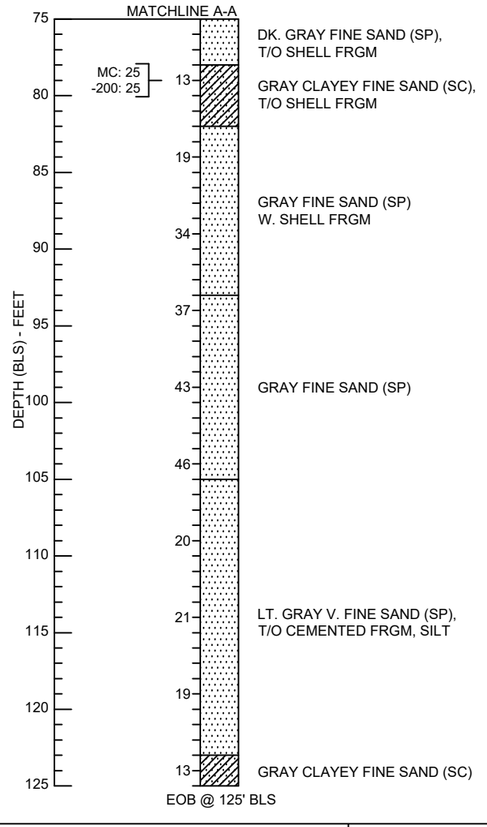
Drawn by: PGA	Date: January 2023
Checked by: DPA	Date: January 2023
AACE File No: 22-255	Sheet No. 1

SOIL GRAPHICAL LEGEND:

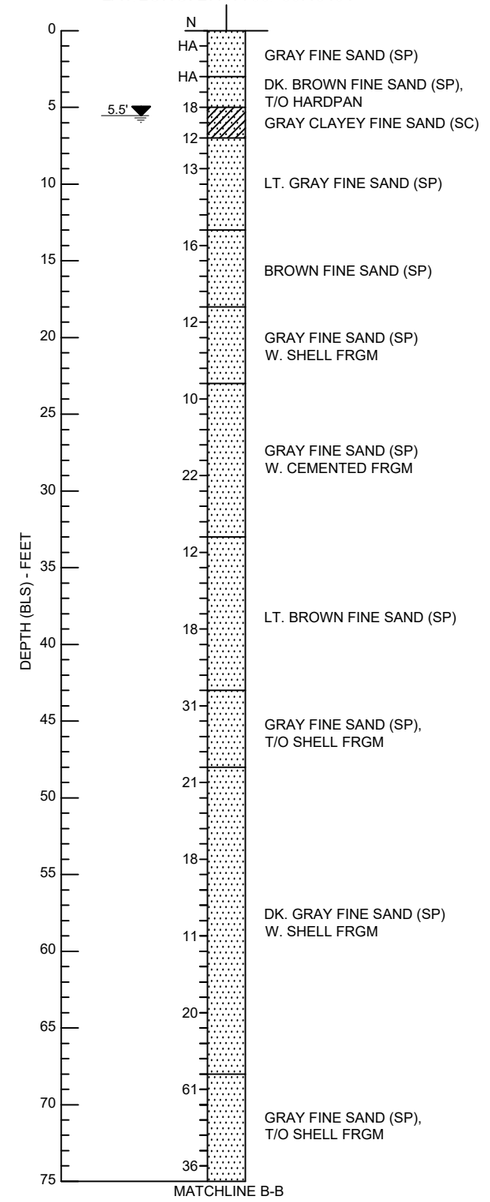
- FINE SAND (SP)
- SLIGHTLY CLAYEY FINE SAND (SP-SC)
- CLAYEY TO VERY CLAYEY FINE SAND (SC)
- SLIGHTLY SILTY FINE SAND (SP-SM)
- SILTY FINE SAND (SM)

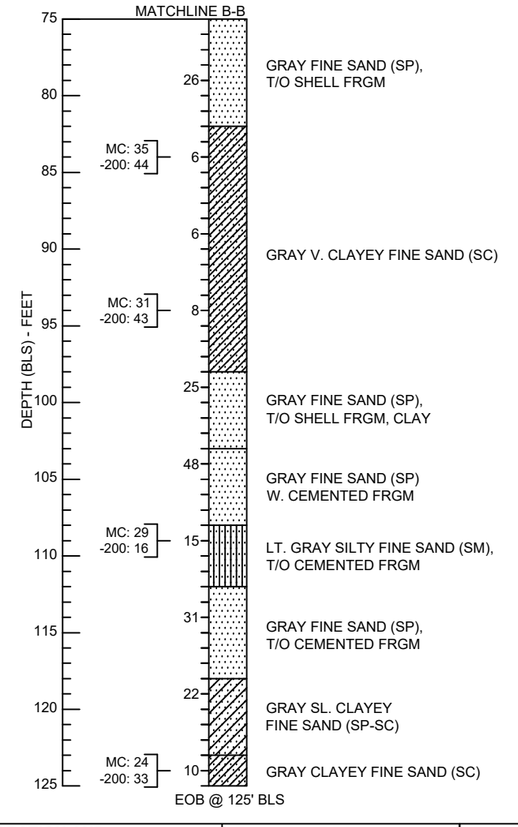
TB-1
DATE: 09/15/22
LAT/LONG: 27.57936/-80.48496





TB-2
DATE: 09/16/22
LAT/LONG: 27.57799/-80.48491



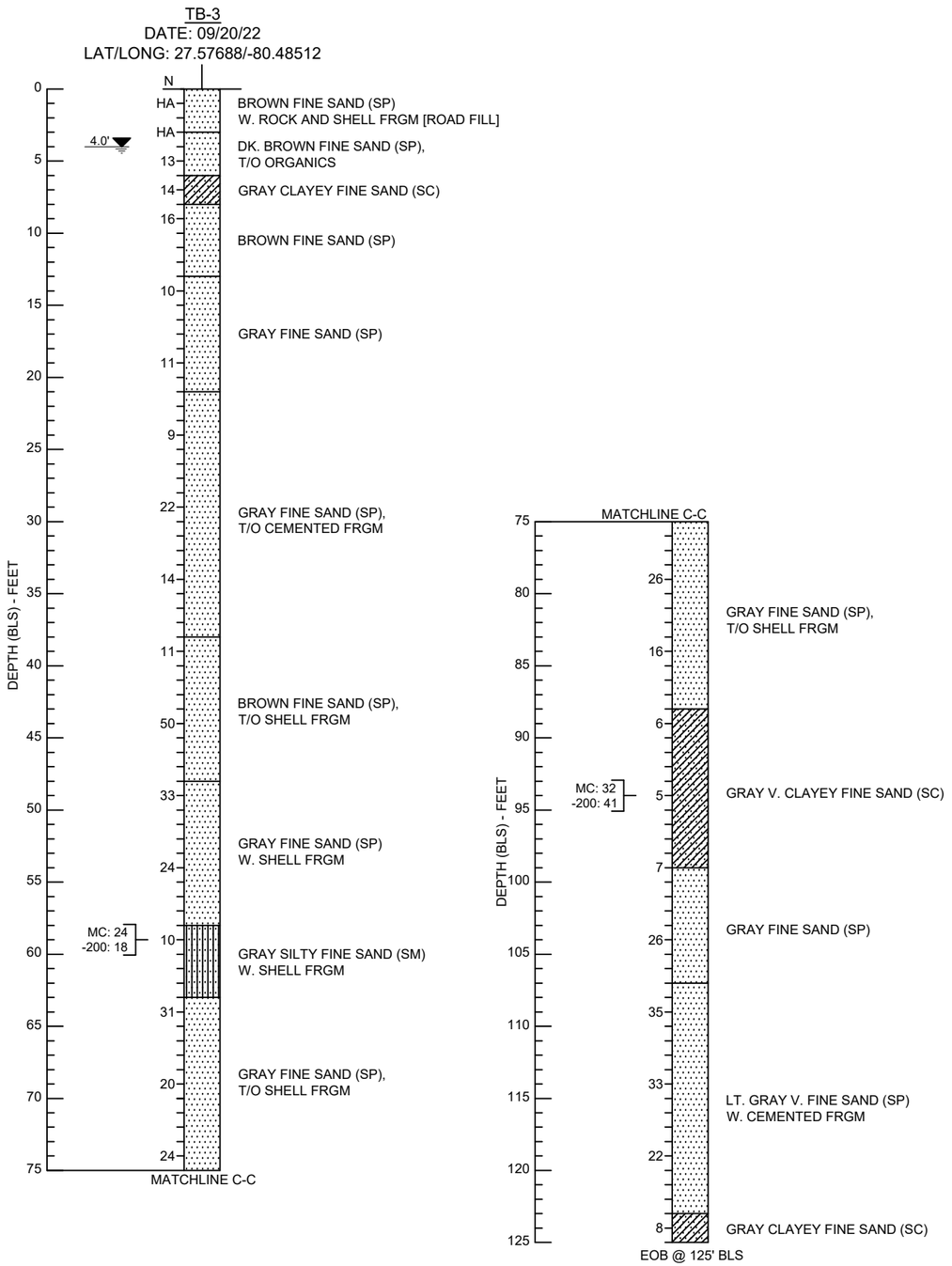


ANDERSEN ANDRE CONSULTING ENGINEERS, INC.
834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com

SOIL BORING PROFILES

SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION INDIAN RIVER COUNTY CLASS I LANDFILL PROPOSED SEGMENT 3 CELL NO. 3 INDIAN RIVER COUNTY, FLORIDA

Drawn by: PGA	Date: January 2023
Checked by: DPA	Date: January 2023
AACE File No: 22-255	**Sheet No. 2**



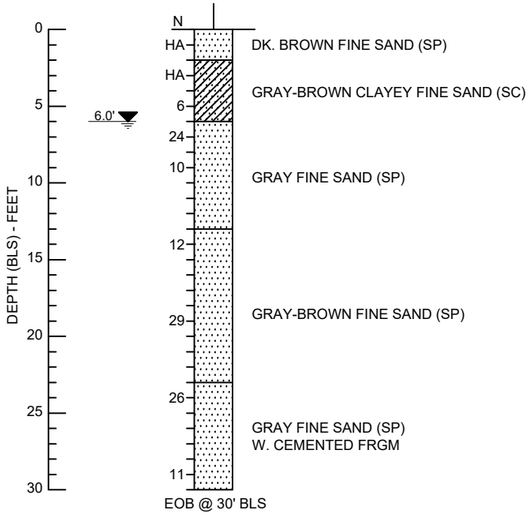
SOIL GRAPHICAL LEGEND:

- FINE SAND (SP)
- SLIGHTLY CLAYEY FINE SAND (SP-SC)
- CLAYEY TO VERY CLAYEY FINE SAND (SC)
- SLIGHTLY SILTY FINE SAND (SP-SM)
- SILTY FINE SAND (SM)

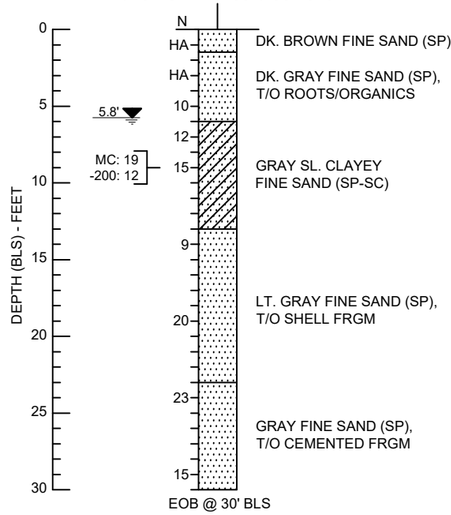
BALANCE OF SHEET LEFT BLANK INTENTIONALLY

ANDERSEN ANDRE CONSULTING ENGINEERS, INC. 834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com	**SOIL BORING PROFILES**	SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION INDIAN RIVER COUNTY CLASS I LANDFILL PROPOSED SEGMENT 3 CELL NO. 3 INDIAN RIVER COUNTY, FLORIDA	Drawn by: PGA	Date: January 2023
			Checked by: DPA	Date: January 2023
			AACE File No: 22-255	**Sheet No. 3**

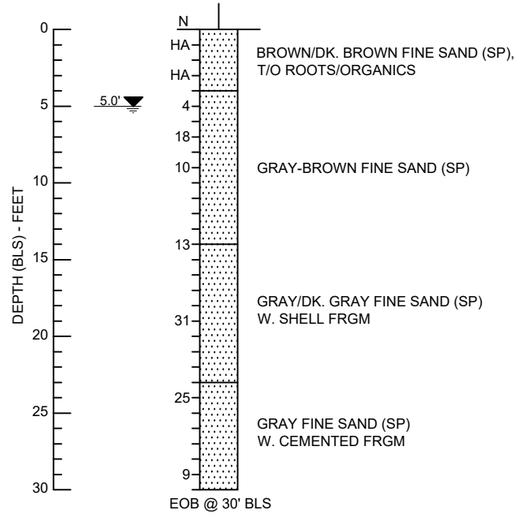
TB-4
DATE: 09/15/22
LAT/LONG: 27.57975/-80.48534



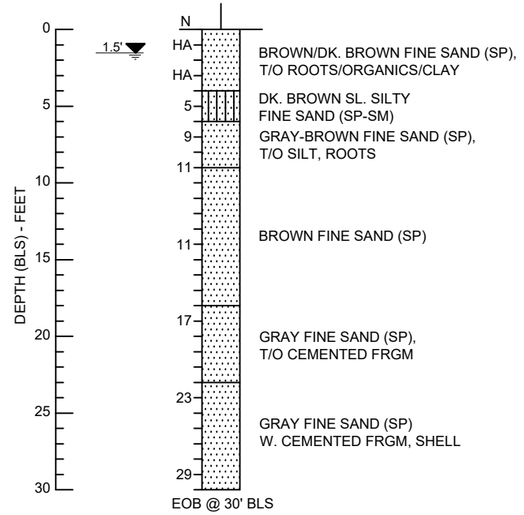
TB-5
DATE: 09/15/22
LAT/LONG: 27.57992/-80.48454



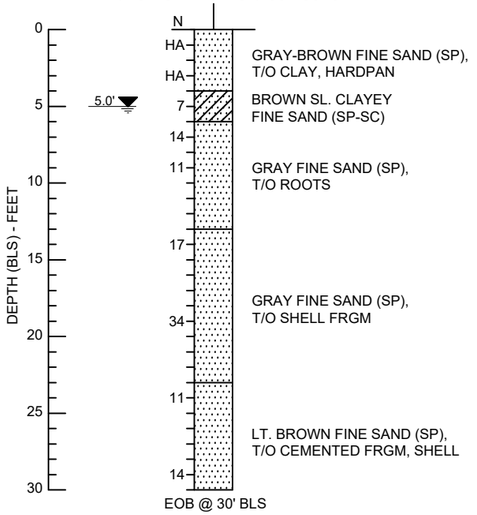
TB-6
DATE: 09/15/22
LAT/LONG: 27.57845/-80.48534



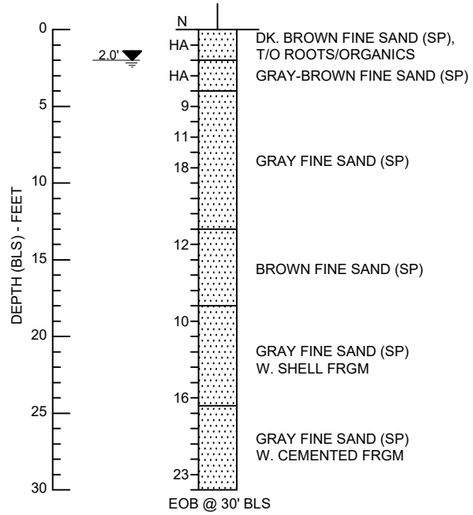
TB-7
DATE: 09/16/22
LAT/LONG: 27.57896/-80.48451



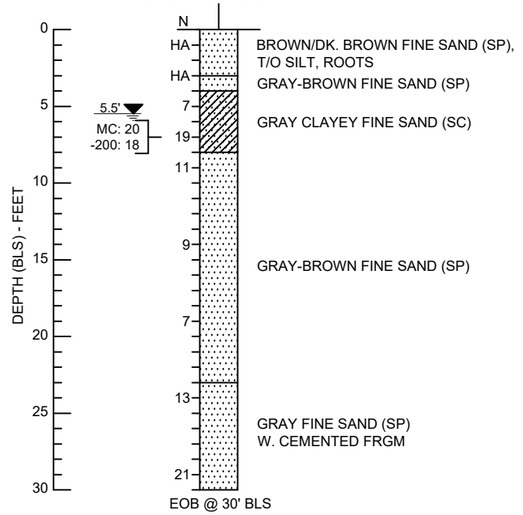
TB-8
DATE: 09/14/22
LAT/LONG: 27.57734/-80.48523



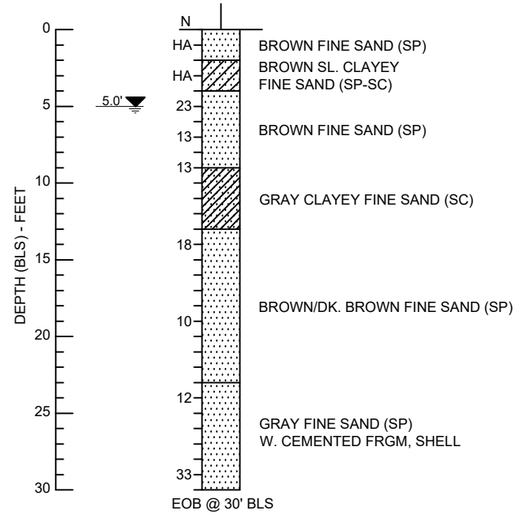
TB-9
DATE: 09/13/22
LAT/LONG: 27.57687/-80.48452



TB-10
DATE: 09/13/22
LAT/LONG: 27.57638/-80.48516



TB-11
DATE: 09/13/22
LAT/LONG: 27.57633/-80.48460



SOIL GRAPHICAL LEGEND:

- FINE SAND (SP)
- SLIGHTLY CLAYEY FINE SAND (SP-SC)
- CLAYEY TO VERY CLAYEY FINE SAND (SC)
- SLIGHTLY SILTY FINE SAND (SP-SM)
- SILTY FINE SAND (SM)

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.
834 SW Swan Avenue, Port St. Lucie, FL 34983 772-807-9191 www.AACEinc.com

SOIL BORING PROFILES

SUBSURFACE SOIL EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION INDIAN RIVER COUNTY CLASS I LANDFILL PROPOSED SEGMENT 3 CELL NO. 3 INDIAN RIVER COUNTY, FLORIDA

Drawn by: PGA	Date: January 2023
Checked by: DPA	Date: January 2023
AACE File No: 22-255	**Sheet No. 4**

APPENDIX I

USDA Soil Survey Information

United States Department of Agriculture

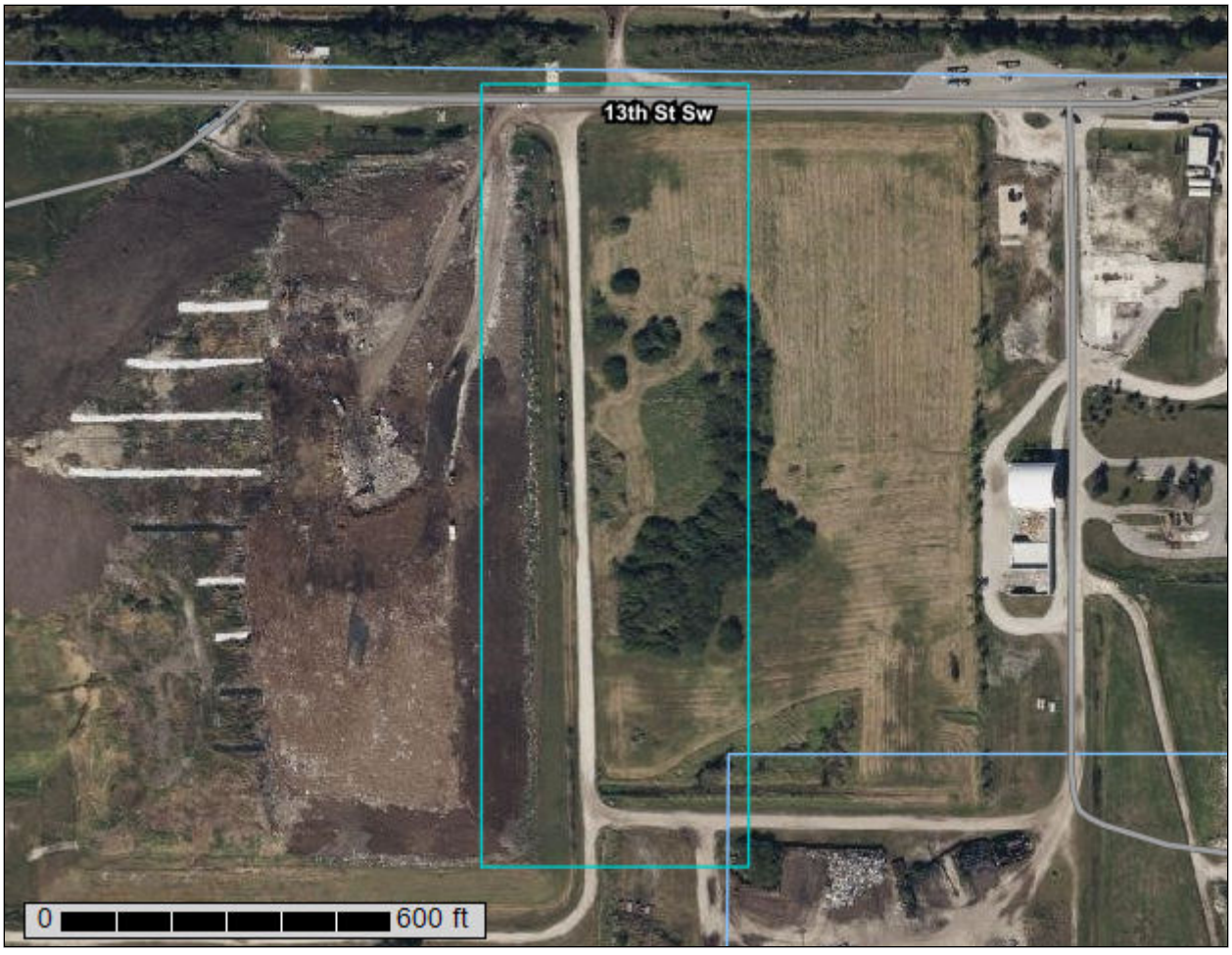
NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Indian River County, Florida

IRC Landfill Cell 3



October 11, 2022

Custom Soil Resource Report
Soil Map (IRC Landfill Cell 3)

Map Scale: 1:2,530 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

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 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Indian River 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 18, 2022—Jan 30, 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 (IRC Landfill Cell 3)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	EauGallie fine sand	0.1	0.4%
6	Oldsmar fine sand	11.4	72.4%
9	Pepper sand	0.3	2.0%
13	Wabasso-Wabasso, wet, fine sand, 0 to 2 percent slopes	0.0	0.2%
53	Manatee mucky loamy fine sand, depressional	2.0	12.6%
55	Floridana mucky fine sand, frequently ponded, 0 to 1 percent slopes	1.9	12.3%
Totals for Area of Interest		**15.8**	**100.0%**

Map Unit Descriptions (IRC Landfill Cell 3)

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

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

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

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Indian River County, Florida

3—EauGallie fine sand

Map Unit Setting

National map unit symbol: tdfl
Elevation: 20 to 200 feet
Mean annual precipitation: 52 to 60 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Eaugallie, non-hydric, and similar soils: 80 percent
Eaugallie, hydric, and similar soils: 10 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eaugallie, Non-hydric

Setting

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

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 26 inches: fine sand
Bh - 26 to 42 inches: fine sand
BE - 42 to 47 inches: fine sand
Btg - 47 to 62 inches: sandy clay loam
Cg - 62 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 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)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks

Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Description of Eaugallie, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 26 inches: fine sand
Bh - 26 to 42 inches: fine sand
BE - 42 to 47 inches: fine sand
Btg - 47 to 62 inches: sandy clay loam
Cg - 62 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: About 0 to 12 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 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Minor Components

Myakka, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks

Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Oldsmar, non-hydric
Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Pepper, non-hydric
Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Wabasso, non-hydric
Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

6—Oldsmar fine sand

Map Unit Setting
National map unit symbol: tdfp
Elevation: 20 to 200 feet
Mean annual precipitation: 52 to 60 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition
Oldsmar, non-hydric, and similar soils: 80 percent

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

Description of Oldsmar, Non-hydric

Setting

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

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 32 inches: fine sand
Bh - 32 to 50 inches: fine sand
Btg - 50 to 62 inches: sandy clay loam
Cg - 62 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 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)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Description of Oldsmar, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 32 inches: fine sand

Bh - 32 to 50 inches: fine sand
Btg - 50 to 62 inches: sandy clay loam
Cg - 62 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Minor Components

Holopaw

Percent of map unit: 3 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Eaugallie, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Malabar, non-hydric

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Dip

Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: Cabbage Palm Flatwoods (R155XY005FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Wabasso, non-hydric

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

9—Pepper sand

Map Unit Setting

National map unit symbol: tdfs
Elevation: 20 to 200 feet
Mean annual precipitation: 52 to 60 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Pepper, non-hydric, and similar soils: 70 percent
Pepper, hydric, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pepper, Non-hydric

Setting

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

Typical profile

A - 0 to 8 inches: sand
E - 8 to 22 inches: sand
Bh - 22 to 39 inches: sand
BE - 39 to 47 inches: sand
Btg - 47 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 22 to 32 inches to ortstein
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 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)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Description of Pepper, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 8 inches: sand
E - 8 to 22 inches: sand
Bh - 22 to 39 inches: sand
BE - 39 to 47 inches: sand
Btg - 47 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 22 to 32 inches to ortstein
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Minor Components

Myakka, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Oldsmar, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Malabar, hydric

Percent of map unit: 3 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Cabbage Palm Flatwoods (R155XY005FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Eaugallie, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Wabasso, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F156BY040FL - Sandy Pine Flatwoods and Hammocks
Other vegetative classification: South Florida Flatwoods (R155XY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

13—Wabasso-Wabasso, wet, fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2y9dx
Elevation: 0 to 150 feet
Mean annual precipitation: 43 to 60 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Wabasso and similar soils: 70 percent
Wabasso, wet, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wabasso

Setting

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

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 24 inches: fine sand
Bh - 24 to 35 inches: fine sand
Bw - 35 to 39 inches: fine sand
Btg - 39 to 80 inches: sandy clay 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 to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
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 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
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

Description of Wabasso, Wet

Setting

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

Typical profile

A - 0 to 7 inches: fine sand
E - 7 to 24 inches: fine sand
Bh - 24 to 35 inches: fine sand
Bw - 35 to 39 inches: fine sand
Btg - 39 to 80 inches: sandy clay 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 to high (0.57 to 1.98 in/hr)
Depth to water table: About 3 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
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 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
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: Yes

Minor Components

Eaugallie
Percent of map unit: 5 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 soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: No

Riviera
Percent of map unit: 3 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy over loamy soils on flats of hydric or mesic lowlands (G155XB241FL)
Hydric soil rating: Yes

Malabar
Percent of map unit: 3 percent
Landform: Flats on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Slough (R155XY011FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

Aripeka
Percent of map unit: 2 percent
Landform: Rises on karstic marine terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Wetland Hardwood Hammock (R155XY012FL), Shallow or moderately deep, sandy or loamy soils on rises and ridges of mesic uplands (G155XB521FL)
Hydric soil rating: No

Paisley
Percent of map unit: 1 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Wetland Hardwood Hammock (R155XY012FL), Loamy and clayey soils on flats of hydric or mesic lowlands (G155XB341FL)
Hydric soil rating: Yes

Basinger

Percent of map unit: 1 percent
Landform: Depressions on flats on marine terraces
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on flats of mesic or hydric lowlands (G155XB141FL)
Hydric soil rating: Yes

53—Manatee mucky loamy fine sand, depressional

Map Unit Setting

National map unit symbol: tdh1
Elevation: 10 to 200 feet
Mean annual precipitation: 52 to 60 inches
Mean annual air temperature: 68 to 75 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Manatee

Setting

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

Typical profile

A - 0 to 8 inches: mucky loamy fine sand
Btg - 8 to 24 inches: fine sandy loam
BCg - 24 to 42 inches: sandy loam
Cg - 42 to 80 inches: loamy 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 (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None

Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
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 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Forage suitability group: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G156BC345FL)
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Loamy and clayey soils on stream terraces, flood plains, or in depressions (G156BC345FL)
Hydric soil rating: Yes

Minor Components

Riviera, depressional

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G156BC245FL)
Hydric soil rating: Yes

Holopaw, 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
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G156BC145FL)
Hydric soil rating: Yes

Malabar, hydric

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Cabbage Palm Flatwoods (R155XY005FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Floridana, 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
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G156BC245FL)
Hydric soil rating: Yes

Pineda, 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
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Freshwater Marshes and Ponds (R155XY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G156BC245FL)
Hydric soil rating: Yes

Chobee, 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
Ecological site: R156BY021FL - Mineral Isolated Swamps and Marshes
Other vegetative classification: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G156BC345FL)
Hydric soil rating: Yes

Samsula

Percent of map unit: 1 percent
Landform: Marshes on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R156BY020FL - Histisol Isolated Marshes and Swamps
Other vegetative classification: Organic soils in depressions and on flood plains (G156BC645FL)
Hydric soil rating: Yes

Winder

Percent of map unit: 1 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Ecological site: F156BY030FL - Wetland Hardwood Forests
Other vegetative classification: Wetland Hardwood Hammock (R155XY012FL), Loamy and clayey soils on flats of hydric or mesic lowlands (G156BC341FL)
Hydric soil rating: Yes

55—Floridana mucky fine sand, frequently ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2sm4y
Elevation: 0 to 90 feet
Mean annual precipitation: 45 to 63 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 335 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Floridana

Setting

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

Typical profile

A1 - 0 to 4 inches: mucky fine sand
A2 - 4 to 15 inches: fine sand
Eg - 15 to 32 inches: fine sand
Btg - 32 to 44 inches: sandy clay loam
BCg - 44 to 80 inches: sandy loam

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 low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 4 percent
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 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: C/D
Forage suitability group: Sandy over loamy soils on stream terraces, flood plains, or in depressions (G155XB245FL)
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

Minor Components

Holopaw
Percent of map unit: 5 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 soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

Gator
Percent of map unit: 4 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), Organic soils in depressions and on flood plains (G155XB645FL)
Hydric soil rating: Yes

Felda
Percent of map unit: 4 percent
Landform: Depressions on marine terraces, flats on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear
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

Placid
Percent of map unit: 2 percent
Landform: Drainageways on marine terraces, 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 soils on stream terraces, flood plains, or in depressions (G155XB145FL)
Hydric soil rating: Yes

APPENDIX II

AACE Project Limitations and Conditions

ANDERSEN ANDRE CONSULTING ENGINEERS, INC.

Project Limitations and Conditions

Andersen Andre Consulting Engineers, Inc. has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made herein. Further, the report, in all cases, is subject to the following limitations and conditions:

VARIABLE/UNANTICIPATED SUBSURFACE CONDITIONS

The engineering analysis, evaluation and subsequent recommendations presented herein are based on the data obtained from our field explorations, at the specific locations explored on the dates indicated in the report. This report does not reflect any subsurface variations (e.g. soil types, groundwater levels, etc.) which may occur adjacent or between borings.

The nature and extent of any such variations may not become evident until construction/excavation commences. In the event such variations are encountered, Andersen Andre Consulting Engineers, Inc. may find it necessary to (1) perform additional subsurface explorations, (2) conduct in-the-field observations of encountered variations, and/or re-evaluate the conclusions and recommendations presented herein.

We at Andersen Andre Consulting Engineers, Inc. recommend that the project specifications necessitate the contractor immediately notifying Andersen Andre Consulting Engineers, Inc., the owner and the design engineer (if applicable) if subsurface conditions are encountered that are different from those presented in this report.

No claim by the contractor for any conditions differing from those expected in the plans and specifications, or presented in this report, should be allowed unless the contractor notifies the owner and Andersen Andre Consulting Engineers, Inc. of such differing site conditions. Additionally, we recommend that all foundation work and site improvements be observed by an Andersen Andre Consulting Engineers, Inc. representative.

SOIL STRATA CHANGES

Soil strata changes are indicated by a horizontal line on the soil boring profiles (boring logs) presented within this report. However, the actual strata's changes may be more gradual and indistinct. Where changes occur between soil samples, the locations of the changes must be estimated using the available information and may not be at the exact depth indicated.

SINKHOLE POTENTIAL

Unless specifically requested in writing, a subsurface exploration performed by Andersen Andre Consulting Engineers, Inc. is not intended to be an evaluation for sinkhole potential.

MISINTERPRETATION OF SUBSURFACE SOIL EXPLORATION REPORT

Andersen Andre Consulting Engineers, Inc. is responsible for the conclusions and recommendations presented herein, based upon the subsurface data obtained during this project. If others render conclusions or opinions, or make recommendations based upon the data presented in this report, those conclusions, opinions and/or recommendations are not the responsibility of Andersen Andre Consulting Engineers, Inc.

CHANGED STRUCTURE OR LOCATION

This report was prepared to assist the owner, architect and/or civil engineer in the design of the subject project. If any changes in the construction, design and/or location of the structures as discussed in this report are planned, or if any structures are included or added that are not discussed in this report, the conclusions and recommendations contained in this report may not be valid. All such changes in the project plans should be made known to Andersen Andre Consulting Engineers, Inc. for our subsequent re-evaluation.

USE OF REPORT BY BIDDERS

Bidders who are reviewing this report prior to submission of a bid are cautioned that this report was prepared to assist the owners and project designers. Bidders should coordinate their own subsurface explorations (e.g.; soil borings, test pits, etc.) for the purpose of determining any conditions that may affect construction operations. Andersen Andre Consulting Engineers, Inc. cannot be held responsible for any interpretations made using this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which may affect construction operations.

IN-THE-FIELD OBSERVATIONS

Andersen Andre Consulting Engineers, Inc. attempts to identify subsurface conditions, including soil stratigraphy, water levels, zones of lost circulation, “hard” or “soft” drilling, subsurface obstructions, etc. However, lack of mention in the report does not preclude the presence of such conditions.

LOCATION OF BURIED OBJECTS

Users of this report are cautioned that there was no requirement for Andersen Andre Consulting Engineers, Inc. to attempt to locate any man-made, underground objects during the course of this exploration, and that no attempts to locate any such objects were performed. Andersen Andre Consulting Engineers, Inc. cannot be responsible for any buried man-made objects which are subsequently encountered during construction.

PASSAGE OF TIME

This report reflects subsurface conditions that were encountered at the time/date indicated in the report. Significant changes can occur at the site during the passage of time. The user of the report recognizes the inherent risk in using the information presented herein after a reasonable amount of time has passed. We recommend the user of the report contact Andersen Andre Consulting Engineers, Inc. with any questions or concerns regarding this issue.

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

IIGER03135.0MRP

Attachment C

SECTION 01410, Rev. 1

TESTING LABORATORY SERVICES

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 --GENERAL

1.01 REQUIREMENTS INCLUDED

A. Owner will employ and pay for the services of an independent testing laboratory through the CQA Consultant to perform certain specified testing in addition to what is called for in the Contract Documents. Owner shall pay for all additional testing.

1. Contractor shall cooperate with the CQA Consultant and testing laboratory to facilitate the execution of its required services.
2. Employment of the CQA Consultant and testing laboratory shall in no way relieve Contractor's obligations to perform the work of the Contract.

B. Contractor may employ and pay for the services of an independent testing laboratory to perform certain specified testing as quality control of its work.

1.02 RELATED REQUIREMENTS

A. General Conditions of the contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.

B. Respective sections of specifications: Certification of Products.

1.03 QUALIFICATION OF LABORATORY

A. Meet "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.

B. Meet basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."

C. Authorized to operate in the State in which the Project is located.

D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of Inspection, with memorandum of remedies of any deficiencies reported by the inspection.

E. Testing Equipment:

1. Calibrated at reasonable intervals by devices of accuracy traceable to either:
   a. National Bureau of Standards
   b. Accepted values of national physical constants.

1.04 LABORATORY DUTIES

A. Cooperate with Engineer and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling, and testing of materials and methods of construction:

1. Comply with specified standards
2. Ascertain compliance of materials with requirements of Contract Documents.

C. Promptly notify Engineer and Contractor of observed irregularities or deficiencies of work or products.

D. Promptly submit written report of each test and inspection; one copy each to Engineer, Owner, and Contractor, and one copy to Record Documents File. Each report shall include:

1. Date issued
2. Project title and number
3. Testing laboratory name, address, and telephone number
4. Name and signature of laboratory inspector
5. Date and time of sampling or inspection
6. Record of temperature and weather conditions
7. Date of test
8. Identification of product and specification section
9. Location of sample or test in the Project
10. Type of inspection or test
11. Results of tests and compliance with Contract Documents
12. Interpretation of test results, when requested by Engineer

E. Perform additional tests as required by Engineer or the Owner

1.05 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory in not authorized to:

1. Release, revoke, alter, or enlarge on requirements of Contract Documents
2. Approve or accept any portion of the work
3. Perform any duties of the Contractor

1.06 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel and provide access to work and to manufacturer's facilities.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Notify laboratory, in advance of operations to allow for laboratory assignments of personnel and scheduling of tests.

PART 2 -- PRODUCTS

Not applicable

PART 3 -- EXECUTION

Not applicable

**** END OF SECTION ****

SECTION 02200, Rev. 1

EARTHWORK

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 SCOPE

A. This section includes the requirements for site preparation, excavation, surface water control, excavation dewatering, stockpiling, subgrade preparation, general and structural fill, and earthwork materials.

1.02 RELATED SECTIONS AND PLANS

A. Section 01025 – Measurement and Payment

B. Section 01410 – Testing and Testing Laboratory Services

C. Section 02100 – Surveying

D. Section 02230 – Road Construction

E. Section 02245 – Riprap

F. Section 02290 – Erosion and Sediment Control

G. Section 02720 – Geotextiles

H. Section 02930 – Vegetation

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:

1. ASTM D 422. Standard Test Method for Particle Size Analysis of Soils.

2. ASTM D 698. Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

3. ASTM D 2487. Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

4. ASTM D 2937. Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.

5. ASTM D 6938. Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.04 SUBMITTALS

A. For each source of general and structural fill material, submit the following to the Engineer for review within 30 calendar days from Notice to Proceed:

1. the source of the material;

2. certification and test results from the supplier that the general and structural fill material meets the requirements of this Section; certification shall also include that tests were performed in accordance with ASTM D 422, ASTM D 698, and ASTM D 2487; and

3. 50-pound representative sample of the general and structural fill material from each source for visual examination, and testing, if necessary.

B. Within 15 calendar days from Notice to Proceed, the Contractor shall submit to the Engineer for review an Earthwork Work Plan. The Earthwork Work Plan shall include, at a minimum:

1. list of equipment proposed for the construction activities including earthwork and other scope of work specified or described in the contract documents;

2. construction methods for each construction activity;

3. dewatering methods and techniques;

4. coordination of survey requirements for the earthwork;

5. proposed locations of temporary soil stockpile areas;

6. coordination of earthwork activities with surface water management and erosion and sediment control measures;

7. schedule for earthwork activities; and

8. dust control measures.

1.05 CONSTRUCTION QUALITY ASSURANCE

A. The earthwork will be monitored and tested by the CQA Consultant as specified in Section 01410.

B. The CQA Consultant will perform soil conformance testing on general and structural fill to verify compliance with this Section. The Contractor shall provide all equipment and labor to assist the CQA Consultant in obtaining conformance samples from excavations and stockpiles.

C. The CQA Consultant will perform soil performance testing on the subgrade surface and general and structural fill lifts to evaluate compliance with this Section. The CQA Consultant will indicate any portion of the earthwork that does not meet the requirements of this Section and will delineate the extent of the nonconforming area.

D. The Contractor shall correct all deficiencies and non-conformances identified by the CQA Consultant at no additional cost to the Owner.

E. The Contractor shall be aware of the CQA Consultant's activities required by Section 01410 and this Section and shall account for these activities in the construction schedule.

1.06 EXISTING CONDITIONS

A. Existing site surface and subsurface conditions, based on available site data, are indicated on the Construction Drawings.

B. Contractor shall verify existing conditions as indicated in Section 02100.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Obtain material for general and structural fill from the off-site borrow sources approved by the Engineer.

B. General and structural fill material shall be free of debris, foreign objects, large rock fragments, organics, and other deleterious materials. General and structural fill material shall classify as GW, GC, GM, SW, SP, SM, or SC according to the Unified Soil Classification System (per ASTM D 2487).

C. No materials larger than 6 inches in particle size shall be allowed in general and structural fill material.

2.02 EQUIPMENT

A. Furnish compaction equipment to achieve the required minimum soil dry density within the range of acceptable moisture contents.

B. Furnish hand compaction equipment, such as a walk-behind compactor, hand tampers, or vibratory plate compactor, for compaction in areas inaccessible to large compaction equipment.

C. Furnish water trucks, pressure distributors, or other equipment designed to apply water uniformly and in controlled quantities to variable surface widths for required in-place moisture adjustment, to prevent drying of soil surfaces, and for dust control.

D. Furnish equipment such as excavators, scrapers, compactors, loaders, dozers, earth hauling equipment and all other equipment, as required for earthwork construction.

PART 3 - EXECUTION

3.01 GENERAL

A. All general and structural fill material to be compacted shall be at a moisture content that will readily facilitate effective compaction.

B. General and structural fill material placed wet that exhibit pumping shall not be accepted regardless of the in-place density or percent compaction. Wet materials shall not be placed and compacted. Wet materials, if used, shall be allowed to dry in place, if feasible, or removed and replaced with suitable materials as directed by the CQA Consultant or Engineer.

3.02 SITE PREPARATION

A. Install construction fence and barricades around open trenches and excavated areas.

B. Install erosion and sediment controls in relevant areas of construction as indicated on the Construction Drawings and as required by Section 02290. Maintain the erosion and sediment controls for the duration of the Contract or until the disturbed areas are vegetated in accordance with Section 02930. Accumulated sediment behind silt fences, in drainage ditches or in structures shall be removed in accordance with Section 02290, or as directed by the Engineer.

C. Prior to any earthwork activity, perform clearing, grubbing, and/or stripping as indicated on the Construction Drawings and in accordance with Section 02110.

3.03 SURFACE WATER CONTROL

A. Installation of surface water and erosion controls shall be in accordance with approved Surface Water Management and Erosion Control Plan as specified in Section 02290.

B. Install surface water and erosion controls in and around work areas to control runoff and erosion and to prevent surface water run-on into excavations. Perimeter controls may include shallow ditches, berms, or localized regrading.

3.04 EXCAVATION

A. Excavate designated areas to the subgrade elevations or excavation limits indicated on the Construction Drawings. Stockpile excavated material in areas designated by the Engineer for use in subsequent construction.

3.05 EXCAVATION DEWATERING

A. Anticipate seepage of groundwater, and accumulation of surface water runoff in excavations. Manage groundwater and surface water in excavations in accordance with this section.

B. Prevent surface water run-on from adjacent areas from entering the excavation.

C. All fill operations shall be performed in the dry. Contractor shall expect that groundwater is at or near the existing ground surface and shall be prepared to lower the groundwater in local areas as required to construct sumps and drainage structures. Contractor shall expect that work areas may be inundated with water and be prepared to dewater as required to perform work.

3.06 STOCKPILING

A. Separate stockpiles by material type.

B. Stockpile excavated soils at the areas indicated on the Construction Drawings or as designated by the Owner's Representative or the Engineer.

C. Construct stockpiles no steeper than 3H:1V (horizontal:vertical), grade to drain, seal by tracking perpendicular to the slope contours with a dozer, and dress daily during periods when fill is taken from the stockpile.

D. Silt fence or berms shall be constructed at the base of stockpiles that will not be immediately used.

E. Restore all areas used for stockpiling when stockpiles are removed as directed by the CQA Consultant or the Engineer.

3.07 SUBGRADE PREPARATION

A. Subgrade material shall consist of soil relatively free of debris, foreign objects, organics and other deleterious materials.

B. Compact all subgrade within the limits of construction to a minimum 95 percent of the Standard Proctor (ASTM D 698) maximum dry density at a moisture content approved by the Engineer.

C. In the presence of the CQA Consultant, perform subgrade proof rolling by driving a loaded dump truck (minimum weight of 10 tons per axle and minimum loaded weight of 20 tons) or other pneumatic-tired vehicle, back and forth across the area to confirm the firmness of subgrade surface. Overlap the passes such that one set of tires on each pass runs between the two sets of tire tracks from the previous pass. Soils shall not exhibit pumping or develop ruts more than two inches in depth. Minor rutting, defined as less than two inches in depth, shall be regraded or covered with general fill to match finish grade.

D. Subgrade for general and structural fill shall be scarified to a depth of 2 inches using equipment identified in this Section.

E. Unsuitable soils shall be removed and replaced with general and structural fill to a minimum depth of 2 feet below the proposed subgrade elevation. Suitable soil exhibiting pumping or developing ruts more than two inches in depth will be removed to a minimum depth of 1 foot or dried in place, if feasible. Compact the general and structural fill to a minimum 95 percent of standard Proctor (ASTM D 698) maximum dry density at a moisture content approved by the Engineer.

F. In excavations or other areas where water accumulates, implement measures to remove the water in accordance with this section. Maintain the subgrade surface free of standing water and in firm condition to meet proof rolling requirements of this section. Maintain dewatered areas until overlying construction is complete.

G. Manage surface water as described in Section 02290.

3.08 GENERAL AND STRUCTURAL FILL

A. Use general and structural fill material that meets the material requirements of this Section. Place the general and structural fill material to the limits and grades shown on the Construction Drawings.

B. Place general and structural fill material on surfaces that are free of debris, vegetation, or other deleterious material.

C. Place general and structural fill material in loose lifts with a thickness of 12 inches ± 1 inch. In areas where compaction is to be performed using hand operated equipment, place the fill material in loose lifts with a loose thickness of 6 inches ± 1 inch.

D. Prior to placing a succeeding lift of material over a previously compacted lift, thoroughly scarify the previous lift to a depth of 2 inches by discing, raking, or tracking with a dozer. Moisture condition the preceding lift if not within the acceptable moisture range.

E. The trafficking of scarified surfaces by trucks or other equipment, except compaction equipment, is not permitted.

F. Except as specified in this section, compact general and structural fill in each lift to at least 95 percent of its standard Proctor maximum dry density (ASTM D 698). Compact general and structural fill at moisture content as required to attain the specified density or as approved by the Engineer.

G. Do not place fill during periods of precipitation. Placement may occur during periods of misting or drizzle, but only as authorized by the Engineer.

H. Rework compacted general and structural fill that does not meet the required compaction.

I. Dust shall be controlled by the application of water to the general and structural fill surfaces.

3.09 CONSTRUCTION QUALITY REQUIREMENTS

A. The CQA Consultant will perform soil conformance testing on general and structural fill materials to confirm compliance with this Section. Conformance testing to be performed and minimum testing frequencies shall be in accordance with this Section and Section 01410. Contractor shall provide equipment and labor

to assist the CQA Consultant in obtaining conformance samples from stockpiles and off-site borrow sources.

B. Conformance samples and testing shall be performed for particle size analyses (ASTM D 422) and classification (ASTM D 2487) at the frequency of one (1) per 5,000 cubic yards for each borrow source material. Standard Proctor compaction (ASTM D 698) shall be performed at one (1) per 10,000 cubic yards for each borrow source material.

C. The CQA Consultant shall monitor earthwork activities in accordance with this Section.

D. The CQA Consultant shall perform performance testing on compacted general and structural fill lifts to confirm compliance with this Section. The performance testing to be performed and minimum testing frequencies shall be as follows:

1. in-situ density and moisture content (ASTM D 6938) at 5 tests per acre per lift with a minimum of two nuclear moisture and density tests each day of active construction work;

2. drive cylinder testing (ASTM D 2937) for density and moisture content correlation with the nuclear gage testing at one (1) test per 25 nuclear tests.

E. If tests indicate that any portion of the general and structural fill does not meet the requirements of this Section, the CQA Consultant shall delineate the extent of the nonconforming area. Rework the nonconforming area until it meets the requirements of this Section.

3.10 SURVEY CONTROL

A. Survey limits and elevations of excavations, top of subgrade, and top of berms in accordance with Section 02100.

3.11 TOLERANCES

A. Perform the earthwork construction to within ±0.3 feet of the grades indicated on the Construction Drawings except for roads for which earthwork construction shall be within -0.1 to +0.1 feet of the grades indicated.

B. Positively draining slopes shall be maintained during all construction.

[END OF SECTION]