Appendix F
Geotechnical Evaluation

1. Introduction

CDM Smith Inc. (previously Camp Dresser & McKee) has been retained to provide professional engineering services for the Trail Ridge Landfill Expansion Project under the direction of the City of Jacksonville, Florida. As part of the evaluation, CDM Smith conducted a geotechnical subsurface exploration program and performed geotechnical analyses for the proposed expansion site, as presented in this report. The exploration was concentrated on an area to the north of the existing landfill, where the proposed expansion will be constructed.

The purpose of this evaluation is to present the results of CDM Smith's geotechnical explorations and analyses in fulfillment of the requirements in F.A.C. 62-701. Specifically, the evaluation discusses the subsurface conditions at the site and presents estimates of the foundation bearing capacity, the anticipated foundation settlements, and the global stability for the proposed expansion.

The existing ground surface in the area of the planned expansion ranges from about elevation 135 feet on the west side to 105 feet on the east. All elevations given in this summary report are in feet and are referenced to the 1929 National Geodetic Vertical Datum (NGVD 29).

2. Project Information

The proposed project consists of a northern expansion of the existing Phase I Trail Ridge Landfill site including future Phase II and Phase III.

The Trail Ridge Landfill site is located in Duval County, Florida within Sections 18 and 19 of Township 3 South, Range 23 East. The site is bounded to the west by Baker County; undeveloped lands border the landfill to the north, east and south. Principal access to the landfill is by US Highway 301, which is east of the site.

The expansion necessitates the capture of storm water from the west side of the future landfill and conveyance to the storm water facility on the east (low) side for treatment and attenuation prior to ultimate discharge offsite. Two storm water management facilities with a combined area of approximately 44 acres are proposed to serve the proposed improvements. Flows from offsite sources will be intercepted by a western bypass ditch and routed around the northern side of the proposed facility into a 20-acre detention facility for attenuation prior to discharge from the site.

3. Subsurface Conditions

3.1 General

This report is supported by the results of prior field investigations and laboratory testing, and information that was provided in the "Trail Ridge Landfill Geotechnical Data Report" prepared by CDM Smith dated February, 2012. A copy of the Geotechnical Data Report is included on a CD ROM in **Attachment A**, and it includes the following:

- A review of readily available geologic, hydrogeological, and geotechnical information for the active landfill and future expansion areas, existing wetlands, and existing features adjacent to the landfill that could influence landfill design;
- A summary of the field work performed between March to November, 2011;
- The results of geotechnical and hydrogeological field exploration programs to evaluate subsurface conditions in the areas of the expansion, specifically those conditions that could impact settlement, slope stability, and ground water modeling;
- The results from geotechnical laboratory tests on selected samples performed to assist with soil classification and evaluation of engineering properties of the soils; and
- A summary of the subsurface conditions encountered at the site.

Based on the Geotechnical Data Report, the subsurface soils at the site generally consist of the following four major layers in order of their occurrence below the ground surface:

- Layer 1 – Sandy soils with trace to little fines, extends from ground surface to depths of 59 to 133 feet (EL. 49 to EL 11), SPT N-values ranged from 1 to over 100 blows per foot (bpf).
- Layer 2 – Sandy soils with some silt of clay and silts, depth from 59 to 133 feet, SPT N-values ranged from 2 to greater than 100 bpf.
- Layer 3 - Limestone with varying degrees of weathering. The upper surface of Layer 3 slopes down from between El. 30 and El. 39 in the northeast and northwest corners of the expansion area, respectively, to El. 14 in the southeast corner and below El. 2.5 in the southwest corner. The thickness of the limestone layer varied from 4 feet to 22 feet, SPT N-values ranged from 36 to greater than 100 bpf.
- Layer 4: Sandy soils with some silt and clay, corresponding to the Hawthorne Group Formation. The upper surface of Layer 4 slopes down from above El. 25 at the north end of the landfill expansion to below El. 0 on the south end. SPT N-values ranged from 41 to greater than 100 bpf.

3.2 Expected Variations in Subsurface Conditions

Interpretations of general soil conditions presented herein are based on soil and groundwater conditions observed at the boring locations, however it is noted that subsurface conditions may vary between exploration locations. If conditions are found to be different than those described herein, then the data and interpretations contained in this report should be reevaluated by CDM Smith and confirmed in writing. Water levels measured in the explorations should not necessarily be considered to represent stabilized groundwater levels. Actual groundwater levels encountered during construction may be different from those observed at the time of the exploration.

4. Potential Sinkhole Analysis

The potential for sinkhole development in the vicinity and under the proposed expansion cells for the TRLF was evaluated. This evaluation has utilized the results of prior field investigations and laboratory testing that was provided in the "Trail Ridge Landfill Geotechnical Data Report" prepared by CDM Smith dated February, 2012.

Based on this evaluation, the potential for sinkhole development in or near the Trail Ridge Landfill site is very low. Our opinion is supported by historical data which includes, an annual aerial survey of the site, and data from the Florida Geological Survey (FGS) and U.S. Geological Survey (USGS). This information indicates a very low risk for sinkhole development within 15 to 25 mile of the Trail Ridge Landfill site. A memorandum summarizing the sinkhole analyses is included as **Attachment B**.

5. Foundation Bearing Capacity

The allowable bearing capacity of the foundation soils below the footprint of expansion area was computed using a friction angle for the foundation soils of 31 degrees. Based on the Geotechnical Data Report, the subsurface soils are generally medium dense to dense sandy soils underlain by very dense partially weathered limestone and the Hawthorn Group soils, so using an overall friction angle of 31 degrees for foundation soils is considered to be conservative.

The facility will be a Class I landfill with a total footprint of approximately 10,000 by 2,300 feet after future expansions. The maximum height of the landfill is to be less than 230 feet. Class I municipal solid waste (MSW) is estimated to have a density of 1,600 pounds per cubic yard (pcy). Approximately 15 percent of the landfill volume consists of soil (daily and final cover material) that could have a density of up to about 120 pounds per cubic foot (pcf). The overall density of the waste and soil is generally assumed to be on the order of 70 pcf. The maximum load at the center of the landfill is estimated to be about 17 kips per square foot (ksf).

For the 10,000 by 2,300 foot total landfill area, the calculated allowable bearing capacity is 302 ksf. The calculation is included in **Attachment C**.

6. Settlement Analyses

6.1 General

CDM Smith performed analyses for the final proposed geometry of the landfill expansion to estimate the amount of settlement that would occur from the foundation soils under the load of the proposed fill, waste, and final closure cap materials. The foundation settlement estimates were calculated at the center, the east and west crests, and the east and west toes of the slope of the landfill in the expansion area.

The purpose of the foundation settlement analyses is to show that the leachate collection and liner system grades meet or exceed the minimum specified slope requirements during post-settlement conditions. Since the new expansion area is immediately adjacent to the current landfill cells, it is expected that some portion of the foundation settlement may have already occurred due to the waste placement in the existing landfill; however, for the purpose of maintaining adequate drainage for the final closure cap and leachate collection systems, estimated settlements are conservatively assumed to occur after landfill construction is complete.

6.2 Foundation Settlement Analyses

As described in Section 3.1, the foundation soils at the site generally consist of sandy soils (Layer 1 and 2) underlain by partially weathered limestone (Layer 3) and Hawthorne Group Formation (Layer 4). Although within Layer 1 and Layer 2 there are occasional lenses of fine-grained soils, those soils only have a very limited thickness/extent comparing with the sandy soils, so consolidation settlement from these fine-grained soils is expected to be minimal and can be ignored.

Also, the majority of Layer 3 and Layer 4 are very dense soils with SPT N-values greater than 100 bpf. It is assumed that these layers are incompressible and any settlement attributed to them can be ignored.

Therefore, the compressible soils at the site are assumed to include Layer 1 and Layer 2. The total settlement under the final loads is expected to be primarily composed of immediate (elastic) settlement from these layers.

As noted above settlement was calculated at the center, at the west/east crests, and at east/west toes of the landfill under final waste loading after expansion. The calculation is based upon SPT N-values collected from recent and previous borings performed at the site. For comparing purposes, at each location two sets of SPT N-values were used to estimate settlement. The two data sets were selected from either the average data of a group of borings nearby or from a specific boring in this area.

The calculated settlements at each location are summarized in **Table 1**, and the settlement calculations are contained in **Attachment D**.

6.3 Conclusion

The foundation soils will tend to settle differentially with the maximum settlement occurring in the center of the landfill. This will result in flatter cross-slopes along the liner bottom at the downslope side and a reduction in leachate pipe grades for the east half (downslope side) of the landfill. However, the expected magnitudes of differential settlements are not expected to result in a reversal of grade or leachate ponding.

Table 1: Summary of Settlement Analyses

Location	Boring Information Used for Settlement Calculations	Landfill Bottom Elevation, ft	Top of Limestone (Layer 3) Elevation, ft.	Compressible Layer Thickness, ft	Settlement, inches
West Toe	CDM-5	143.5	10	133.5	1.7
	CDM-6	143.5	10	133.5	1.8
West Crest	CDM-9	136.5	11	125.5	21.2
	Average of CDM-5, CDM-6, CDM-9, B-3 and B-16	136.5	11	125.5	22.4
Center	B-17	132	13	119	30.5
	Average of CDM-9, CDM-10, B-10, B-17 and B-19	132	13	119	23.3
East Crest	CDM-10	127	14	113	27.9
	Average of CDM-10, B-10 and B-19	127	14	113	25.9
East Toe	Average of CDM-1 and B-7	121	17.5	103.5	0.6
	Average of CDM-1, CDM-10, B-7, B-10 and B-19	121	17.5	103.5	0.5

7. Global Slope Stability Analyses

7.1 General

Slope stability analyses were performed for the future expanded landfill cells as currently shown on the permit drawings in **Appendix B**. In accordance with FAC 62-701.400(2), the minimum required factor of safety to reduce the potential for failures of side slopes, deep-seated failures through waste, failures along liner systems, and failures through foundation soils is 1.5 using peak strength values. Analyses were performed for the east and west face of the proposed expansion.

7.2 Geometry

The existing grade in the footprint of the proposed expansion ranges from about EL 105 on the east to EL 135 on the west. Side slopes of the landfill expansion will be 3H:1V with intermediate, alternating 15-foot and 20-foot wide benches resulting in an overall side slope of approximately 3.4H:1V. The maximum vertical height between the benches will be 40 feet. The proposed build-out top elevation of the landfill is El. +350.

A stormwater collection ditch and perimeter road will be built at the toe of the slopes. A Stormwater Management Pond and a Bypass Pond will be built at east side of the expansion area. The distances from the east toe-of-slope of the landfill expansion to the west top-of-slope of the Stormwater Management Pond and the Bypass Pond are approximately 50 and 440 feet, respectively.

It should be noted that, although these ponds were included in the slope stability models to account for their potential impacts on the overall landfill stability, the slope stability analyses presented herein is for landfill cells only and not for pond. The seepage and slope stability analyses performed specifically for those pond berms was included as part of a submittal to Environmental Resources Permit (ERP) in the memorandum titled "Preliminary Geotechnical Design Memorandum for Environmental Resource Permit (ERP) Submittal, Trail Ridge Landfill Expansion", prepared by CDM Smith on April 12, 2013.

Since the bottom of expanded landfill will generally slope down from west to east, and all three side slopes (east, west and north) in the expansion area have the same 3H:1V slope, the east-west section was considered to be the most critical section to be analyzed. Two east-west sections were selected for analyses along the proposed expanded landfill. The north section is across the proposed Bypass Pond, and the south section is across the proposed Stormwater Management Pond. These two cross sections were considered as the most critical sections along the expanded landfill.

The bottom of the expanded landfill will be covered with a liner system as shown in **Appendix B**. The liner system will include the components listed in **Table 2** in order of their occurrence from top to bottom.

Table 2: Bottom Liner System Components

Layer Number	Material
1	2-foot-thick drainage sand layer
2	LCS Geocomposite single sided
3	Primary Geomembrane Liner (60 mil textured HDPE)
4	Geosynthetic Clay Liner
5	LDS Single sided Geocomposite net
6	Secondary Geomembrane (60 mil textured HDPE)
7	Geosynthetic Clay Liner
8	Compacted Subgrade

7.3 Material Parameters

Soils - The strength parameters and densities used for the foundation soils are based upon subsurface explorations as described in the Geotechnical Data Report **(Attachment A).** Based on the borings performed, there are a few thin layers/lenses of the lower-permeability soils classified as SM, SC, CL/CH or ML/MH. Those soils are included in the Layer 1 of the model as sub-layers 1A, 1B, 1C and 1D. Also, the models split Layer 1 below the center of the of the Stormwater Ponds into Layer 1 and Layer 1 East to accommodate the soil permeability and strength differences based on subsurface investigation data. More details on soil layering can be found in "Preliminary Geotechnical Design Memorandum for Environmental Resource Permit (ERP) Submittal, Trail Ridge Landfill Expansion", prepared by CDM Smith on April 12, 2013. In general, the strength parameters were selected based on SPT N-values and in-situ tests collected during the investigation; however the friction angle associated with Layer 2 was reduced to 26 degrees for the analyses to account for a few very low N-values that occurred in this layer in several borings.

Waste - The waste is Class I municipal solid waste (MSW). The assigned strength value, angle of internal friction of 27.5 degrees, is based on a literature review and previous CDM Smith experience with landfill projects in Florida. A unit weight for the landfill waste at the Trail Ridge site of 2,000 pcy or 74 pcf was provided by Waste Management Inc. This number includes the daily and final cover soils.

Bottom Liner System – The strength parameters used for the bottom liner system are based on laboratory tests and literature search of the interface friction angles performed for similar liner systems. The friction angles between different layers are summarized in **Table 3**. In performing the slope stability analyses, the various geosynthetic materials are considered to be one layer with a friction angle corresponding to the lowest interfacial friction value, which is 14.5 degrees. The density of the composite liner system was assumed to be 59 pounds per cubic foot.

Table 3: Friction Angles for Different Interfaces of Bottom Liner System

Description of Liner Layers	Interface between Layer Nos.	Peak Friction Angle, degrees	Data Source
Drainage Sand / Geocomposite	1&2	26	Previous similar projects
Geocomposite / 60 mil textured HDPE	2&3 5&6	14.5	Lab tests
Geocomposite / Geosynthetic Clay Liner	4&5	22.7	Lab tests
Internal Shear - Geosynthetic Clay Liner	n/a	16	Literature(1)
60 mil textured HDPE / Geosynthetic Clay Liner	3&4 6&7	18	Literature(1)
Geosynthetic Clay Liner / Subgrade Soil	7&8	28	Literature(1)

Reference:

(1) From GRI Report #30, "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interface", by George R. Koerner, dated June 14, 2005

Ground Water Level - The groundwater table under the expanded landfill cells was conservatively assumed to be at the bottom of the liner in the slope stability analyses. The water levels in the Stormwater Management Pond and the Bypass Pond were set at High Water Level (HWL) associated with the 100-year 24-hour storm event.

The material parameters used in the slope stability analyses are summarized in **Table 4**.

Table 4: Summary of Material Properties

Layer	Strength		Unit Weight, pcf	Basis for Parameter Selection
	Friction Angle, degrees	Cohesion, psf		
Embankment & Pond Berm	32	-	120	Literature search and previous similar projects
Layers 1, 1A, and 1B	35	-	125	Average SPT N-value
Layer 1 East	33	-	120	Average SPT N-value
Sub-layer 1C	29	-	120	Average SPT N-value
Sub-layer 1D	-	500	115	In-situ test during field investigation
Layer 2	26	-	120	Average SPT N-value
Layers 3 and 4	38	-	130	Average SPT N-value
Class I Waste	27.5	-	74	Literature search and previous similar projects

Layer	Strength		Unit Weight, pcf	Basis for Parameter Selection
	Friction Angle, degrees	Cohesion, psf		
Drainage sand	30	-	120	Literature search and previous similar projects
Bottom liner system	14.5	-	59	Lab test data

7.4 Analyses and Results

Analyses for overall (global) stability was performed using the SLOPE/W 2007 modeling software package from GEOSLOPE International, Ltd. The in-put data for this computer program includes slope geometry, soil and waste properties, and the groundwater conditions to calculate the factors of safety against circular and block failures of the global landfill mass. While several calculation methods are available for SLOPE/W software, the Spencer method was selected for the analyses since it is a rigorous method and usually provides a more conservative result.

The computed minimum factors of safety for circular and block failure surfaces are presented in **Table 5**. All factors of safety are equal to or exceed the required value of 1.5. Details of the results from the SLOPE/W analyses are included in **Attachment E**.

Table 5: Results of Slope Stability Analyses

Run #	Cross Section Location	Failure Type	Computed Factor of Safety		Minimum Required Factor of Safety
			West Slope	East Slope	
N-1	North Section	Circular Failure	1.6	1.6	1.5
N-2		Block Failure	1.6	1.5	
S-1	South Section	Circular Failure	1.6	1.6	
S-2		Block Failure	1.6	1.5	

7.5 Conclusions

The computed factors of safety for the proposed geometry and liner system are greater than 1.5 for both circular failure surface and block failure along the liner component interface surface. These results meet the minimum required factor of safety for long-term static conditions.

8. Conclusions and Recommendations

8.1 Conclusions

Based on the results of the geotechnical analyses presented, CDM Smith concludes the following:

- The sinkhole analyses indicate that the potential for sinkhole development in or near Trail Ridge Landfill expansion area is very low.
- The results of bearing capacity calculation indicate the foundation soils can provide sufficient bearing capacity for the proposed landfill expansion.
- The results of the foundation settlement analysis indicate that post-settlement liner slopes will be adequate for performance of the leachate collection system to convey subsurface flows.

- The results of the global stability analysis indicate that the closure grade slopes of the expansion will meet the long-term static slope stability requirements.

8.2 Recommendations

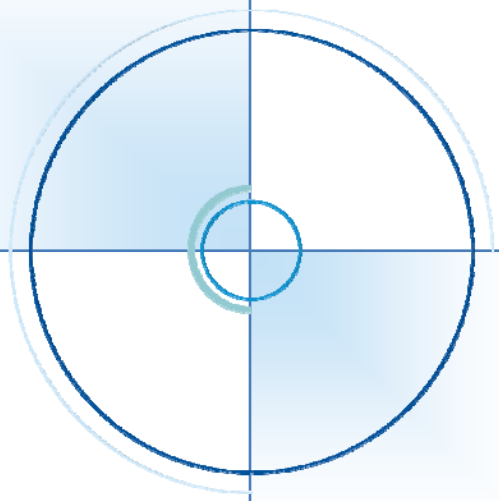
Prior to construction of the landfill expansion, laboratory testing should be performed for the actual liner materials and soil materials proposed for use in the landfill. Testing should consist of interface and internal strength testing of the liner system components. The material properties used in the stability analyses should be verified based upon these testing results.

The landfill should be operated in the same manner as Phase I (existing phase). The grading should be completed to reach liner base grades. After liner construction is complete, waste placement should continue in an even manner, bringing the entire landfill up to finished grade at one time.

Attachment A

Geotechnical Data Report

GEOTECHNICAL DATA REPORT



Trail Ridge Landfill Expansion

February 2012

CDM Smith

Geotechnical Data Report
Trail Ridge Landfill Expansion
City of Jacksonville, Florida

February 2012

Geotechnical Data Report

Geotechnical Data Report
Trail Ridge Landfill Expansion
City of Jacksonville, Florida

February 2012

Prepared By:

William L. Fox, P.E.
Geotechnical Engineer
Florida Registration No. 55385

Reviewed By:

Rebecca Grant Ascoli, P.E.
Senior Geotechnical Engineer
Florida Registration No. 51863

Michael S. Schultz, P.E.
Senior Vice President
Florida Registration No. 60680

Table of Contents

Section 1 Introduction

1.1 Introduction 1-1
1.2 Site Location 1-1
1.3 Purpose and Scope 1-1
1.4 Horizontal and Vertical Survey Datum 1-3
1.5 Expected Variations in Subsurface Conditions 1-3
1.6 Report Limitations 1-3

Section 2 Geotechnical Field Exploration Programs

2.1 Review of Available Information 2-1
2.1.1 USGS Quadrangle Map 2-1
2.1.2 Soil Survey Map 2-1
2.1.3 Review of Previous Geotechnical Explorations 2-1
2.2 Field Exploration Programs 2-7
2.2.1 Standard Penetration Test Borings 2-8
2.2.2 Hand Auger Borings and Manual Probes 2-11
2.2.3 Test Pit Excavations 2-11
2.2.4 Monitor Wells and Piezometers 2-11
2.2.5 Slug Tests 2-12

Section 3 Laboratory Testing Program

3.1 Introduction 3-1
3.2 Sample Transport and Storage 3-1
3.3 Laboratory Testing Program 3-1

Section 4 Subsurface Conditions

4.1 Regional and Site Geology 4-1
4.1.1 Undifferentiated Clastic Deposits 4-1
4.1.2 Hawthorn Group 4-1
4.1.3 Ocala Limestone 4-3
4.1.4 Avon Park Formation 4-3
4.1.5 Oldsmar Formation 4-3
4.1.6 Cedar Keys Formation 4-4
4.2 Subsurface Stratigraphy 4-4
4.3 Groundwater Levels 4-6
4.4 Expected Variations in Subsurface Conditions 4-6

Appendices

Key to Soil Classification
Appendix A **Previous Geotechnical Reports (CD)**
Appendix B **Standard Penetration Test (SPT) Boring Logs**
Appendix C **Hand Auger (HA) Boring Logs and Summary of Manual Probes (MP)**
Appendix D **Test Pit (TP) Logs**
Appendix E **Monitoring Wells, Piezometers and Groundwater Information**
Appendix F **Slug Test Results**
Appendix G **Laboratory Testing Results**
Appendix H **Cross Sections and Soil Profiles**

Figures

Figure 1-1 General Location Map
Figure 2-1 USGS Quadrangle Map
Figure 2-2 Soil Survey Map
Figure 2-3 Geotechnical Field Programs
Figure 4-1 East-West Hydrogeologic/Geologic Cross Section through Duval County, FL
Figure 4-2 Thickness of the Hawthorn Group in Northeast Florida
Figure 4-3 Top of Layer 3 Contour Elevations
Figure 4-4 Top of Layer 4 Contour Elevations

Tables

Table 2-1 Soil Survey Data
Table 2-2 Previous Geotechnical Explorations
Table 2-3 Survey Data for Phase I and Phase II Geotechnical Field Programs
Table 3-1 Summary of Laboratory Tests
Table 4-1 Summary of Subsurface Explorations Showing Layer Depths and Elevations

Section 1
Introduction

1.1 Introduction

CDM Smith is providing engineering services for the Trail Ridge Landfill Project, under the direction of the City of Jacksonville, Florida. This data report describes CDM Smith's geotechnical and hydrogeologic field and laboratory testing programs and presents the results of the data obtained from these programs.

1.2 Site Location

The 944-acre Trail Ridge Landfill site is located in Duval County, Florida within Sections 18 and 19 of Township 3 South, Range 23 East. The approximate location of the site is shown superimposed on a reproduction of the 2001 Maxville, Florida, USGS Quadrangle Map presented as the General Location Map, **Figure 1-1.** Note that the topographical lines shown on Figure 1 are in meters; elevation contours shown on the remaining figures are in feet.

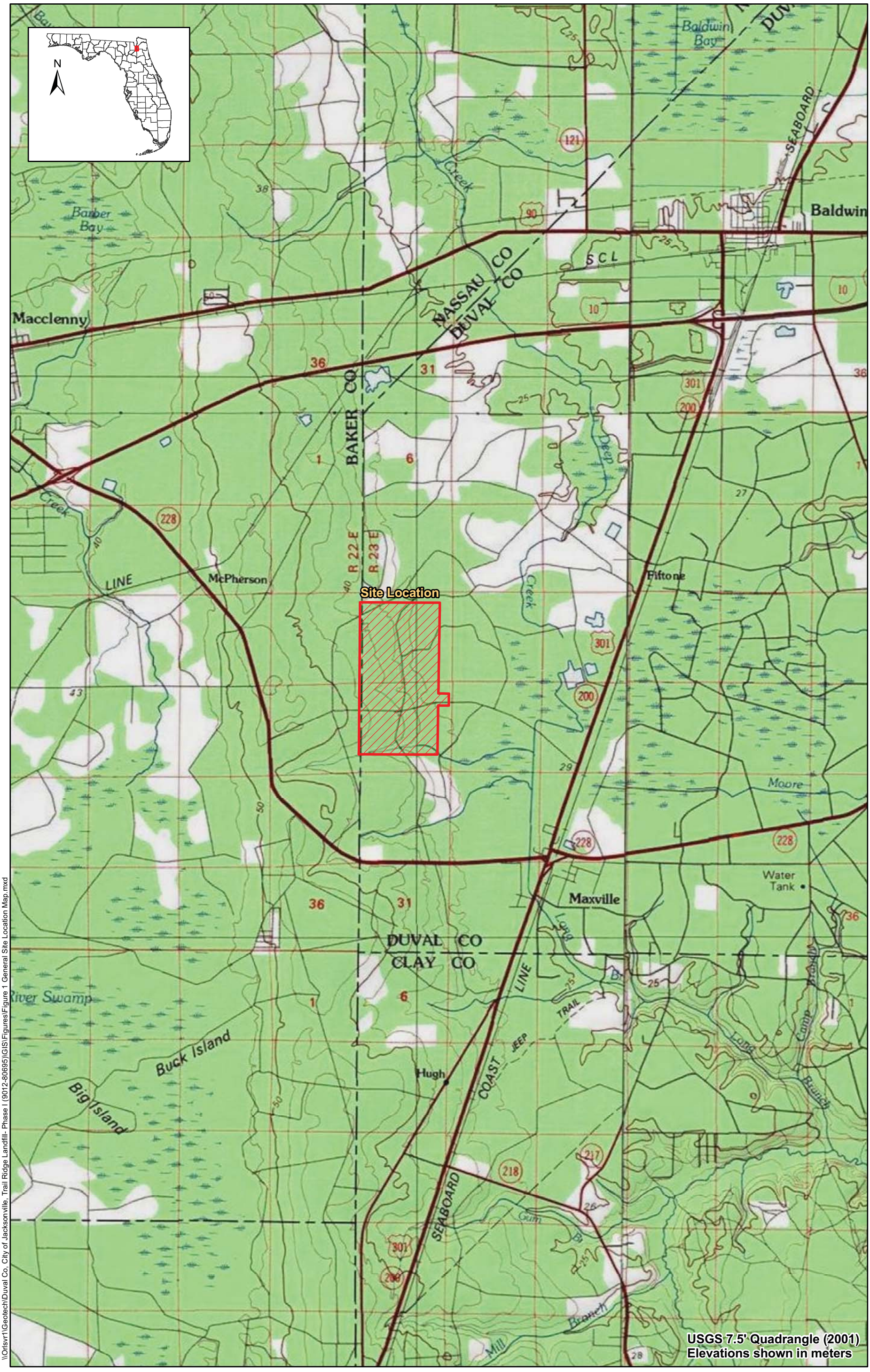
The west side of the site borders Baker County. The DuPont Titanium Technologies Plant has a mining operation on the land to the west of the site. Wooded, undeveloped lands border the landfill to the north and south. Designated wetlands are located to the east of the landfill expansion area. Principal access to the landfill site is by US Highway 301.

1.3 Purpose and Scope

Geotechnical and hydrogeologic field investigations were performed at the site to investigate subsurface conditions, obtain soil samples for laboratory testing, and measure hydraulic characteristics of the surficial aquifer. Data obtained and presented herein will be used to perform geotechnical and hydrogeologic engineering analyses and to develop recommendations for the future expansion of the landfill area.

The following tasks were performed for this phase of the project:

- Review readily available geologic, hydrogeologic, and geotechnical information regarding the active landfill and future expansion areas, existing wetlands, and existing features adjacent to the landfill that may influence landfill design;
- Perform site visits;
- Conduct geotechnical and hydrogeologic field exploration programs to evaluate subsurface conditions, specifically those conditions that could impact settlement, slope stability, and ground water modeling;
- Perform geotechnical laboratory testing to assist with soil classification and evaluation of engineering properties of the soils; and
- Prepare this Geotechnical Engineering Data Report which describes the field and laboratory testing programs and presents the results of data obtained from these programs.



\\Orlsvr1\Geotech\Duval Co, City of Jacksonville, Trail Ridge Landfill- Phase I (9012-80695)\GIS\Figures\Figure 1 General Site Location Map.mxd

CDM Smith

N W E S

0 0.5 1 Miles

Figure 1-1
General Location Map
Trail Ridge Landfill Expansion
Duval County, Florida

1.4 Horizontal and Vertical Survey Datum

The site surveys used the horizontal and vertical control network established by the National Geodetic Survey (NGS) District. Horizontal survey data in this report reference the East Zone of the Florida State Plane Coordinate System based on North American Datum (NAD) of 1983, 1927 adjustment. Elevations noted herein are in feet and are referenced to 1929 National Geodetic Vertical Datum (NGVD 29).

1.5 Expected Variations in Subsurface Conditions

Interpretations of subsurface conditions presented herein are based on soil types and groundwater levels observed at the boring and piezometer locations for this investigation. However, subsurface conditions may vary between these locations.

Measured water levels should not be considered to represent stabilized groundwater levels. Groundwater levels are expected to fluctuate with season, rainfall amounts, water levels in the adjacent ditches and water bodies, and other factors. Actual water levels during construction may be different from those observed at the time of the explorations.

1.6 Report Limitations

The information and data contained herein have been prepared for the proposed expansion of the Trail Ridge Landfill located in Duval County, Florida, as understood at this time and described in this report. This report has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

Section 2
Geotechnical Field Exploration Programs

2.1 Review of Available Information

2.1.1 USGS Quadrangle Map

Based on the 1997 Maxville, Florida USGS Quadrangle Map, the site is located on the east slope of a north-south ridge. Several east-trending drainage ditches (gullies) occur on the slope. The ground surface of the area of study slopes down from approximate El. 150 in the southwest corner to El. 115 in the northwest corner and El. 95 on the east side of the site. The eastern quarter of the site, below El. 100 on the north side and El. 105 on the south, is shown as a swampy area.

The approximate site location and area of study are shown superimposed on a reproduction of the USGS Quadrangle Map presented as **Figure 2-1**.

2.1.2 Soil Survey Maps

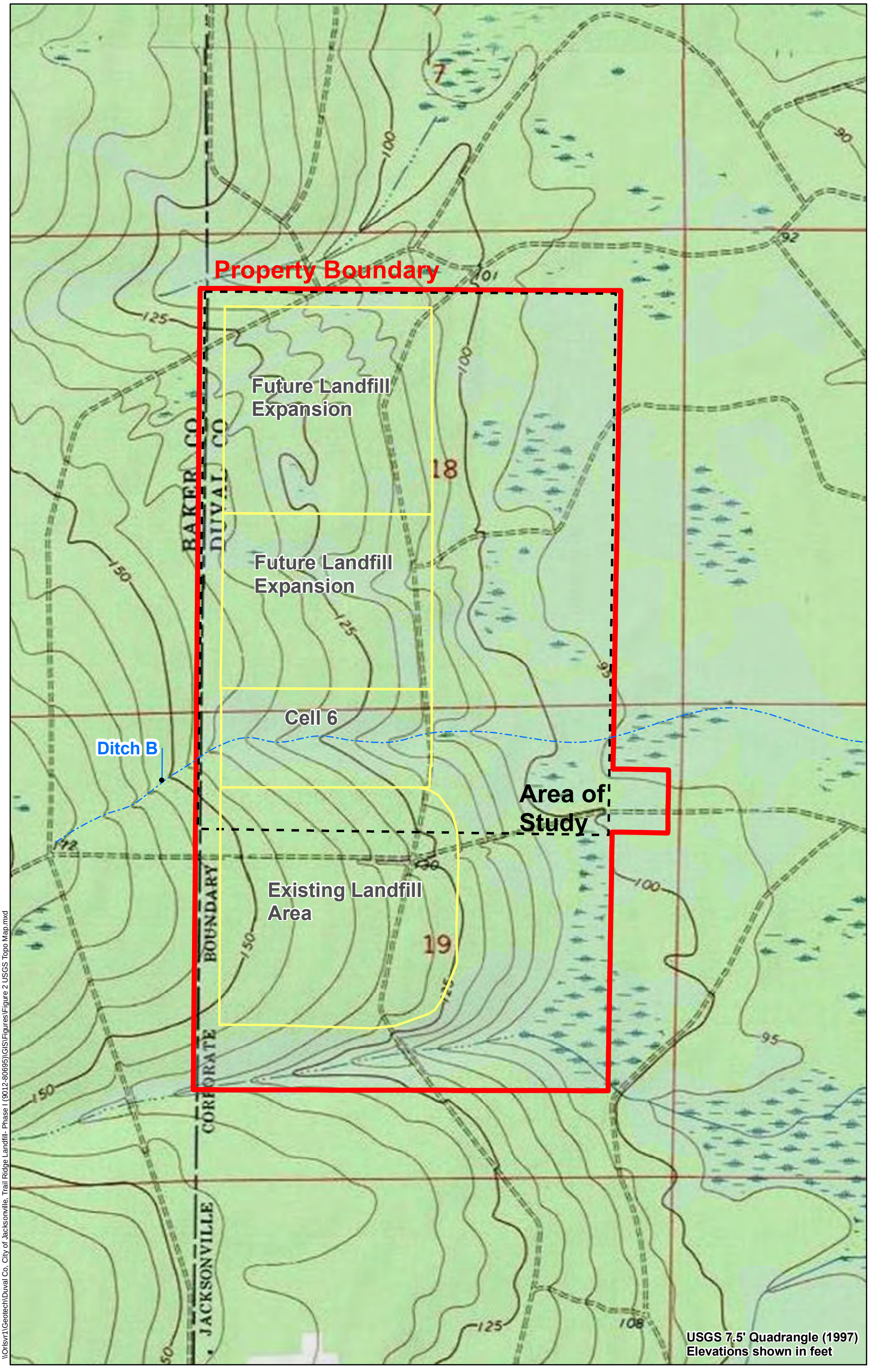
A review of the Soil Survey Maps for Duval County, Florida, and Baker County, Florida, prepared by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), indicates that eight soil units are mapped within the area of study. In general, the soils on the slopes (Map Units 14, 32 and 56) are poorly drained sands with varying amounts of silt, associated with upland pine flatwoods. The soils in the drainage ditches (Map Units 22, 35 and 62) typically are very poorly drained sands with higher silt contents; up to 1 foot of peat or organic soil may overlie the sands. The soil units occurring in the eastern swampy area (Map Units 51 and 66) have about two feet of silty sands underlain by clayey and clayey-silty sands to depths of 6.5 feet (the maximum depth included in the NRCS data).

The groundwater levels below the natural ground surface during years of normal (average) rainfall are estimated by the NRCS for the various soil units. The groundwater depths for the soils on the slope are typically 6 to 18 inches from January to October. The groundwater levels of the soils along the drainage ditches and in the swampy areas range from a depth of about 6 inches to ponded up to 24 inches most of the year.

A summary of the various soil units occurring on and around the Trail Ridge Landfill site is presented in **Table 2-1.** The Trail Ridge Landfill site and area of study are shown superimposed on a reproduction of the Soil Survey Map presented as **Figure 2-2**.

2.1.3 Review of Previous Geotechnical Explorations

Reports from three previous geotechnical explorations at the Trail Ridge Landfill site were reviewed and the reports are included on a CDRom in **Appendix A**. The areas covered in the reports include the existing landfill located to the south of the proposed landfill expansion area and the proposed borrow pit located further to the south. Eleven borings are within or on the perimeter of the proposed landfill expansion area. The approximate locations of these borings are shown on **Figure 2-3**.



\\Orlsvr1\Geotech\Duval Co, City of Jacksonville, Trail Ridge Landfill- Phase I (9012-80695)\GIS\Figures\Figure 2 USGS Topo Map.mxd

CDM Smith

N W E S

0 500 1,000 Feet

Figure 2-1
USGS Quadrangle Map
Trail Ridge Landfill Expansion
Duval County, Florida

Table 2-1
Soil Survey Data
Trail Ridge Landfill Expansion
Duval County, Florida

Component Name	Map Unit Symbol	Map Unit Name	Drainage Class	Average Wet Season Water Table*	Typical Soil Profile	
					Depth (ft)	Soils (USCS)
Boulogne	11	Boulogne Sand	Poorly Drained	6 to 18 inches from January to October.	0 - 6.5	SP, SP-SM, SM
Boulogne	14	Boulogne Fine Sand, 0 To 2 Percent Slopes	Poorly Drained	6 to 18 inches from January to October.	0 - 6.5	SP, SP-SM, SM
Surrency	18	Surrency-Mulat Complex, Frequently Flooded	Very Poorly Drained	0 to 6 inches from January to November. Long flooding occurs from January to March.	0 - 6.5	SC-SM, SM, SC, SP-SM
Hurricane	21	Hurricane And Ridgewood Soils, 0 To 5 Percent Slopes	Somewhat Poorly Drained	24 to 42 inches from March to August.	0 - 6 6 - 6.5	SP, SP-SM SM, SP-SM
Evergreen	22	Evergreen-Wesconnett Complex, Depressional, 0 To 2 Percent Slopes	Very Poorly Drained	Ponded up to 24 inches, most of the year.	0 - 1 1 - 6.5	PT (Muck) SP, SP-SM
Leon	23	Leon Sand	Poorly Drained	6 to 18 inches from January to October.	0 - 6.5	SP, SP-SM, SM
Leon	24	Leon-Evergreen Complex, Depressional	Very Poorly Drained	Ponded up to 24 inches, most of the year.	0 - 1 1 - 6.5	PT (Muck) SP, SP-SM
Mandarin	28	Mandarin Sand	Somewhat Poorly Drained	18 to 42 inches from March to August.	0 - 6.5	SP, SP-SM
Murville	30	Murville Fine Sand	Very Poorly Drained	0 to 6 inches from February to September.	0 - 6.5	SM, SP-SM
Leon	32	Leon Fine Sand, 0 To 2 Percent Slopes	Poorly Drained	6 to 18 inches from January to October.	0 - 6.5	SP, SP-SM
Lynn Haven	35	Lynn Haven Fine Sand, 0 To 2 Percent Slopes	Poorly Drained	0 to 6 inches from January to October.	0 - 6.5	SP, SP-SM, SM
Pantego	36	Pantego-Pamlico, Loamy Substratum, Complex, Depressional	Very Poorly Drained	Ponding up to 24 inches, most of the year.	0 - 0.5 0.5 - 2 2 - 6.5	PT (Muck) SM, ML, SC-SM, CL, CL-ML CL, SC
Pelham	37	Pelham Fine Sand	Poorly Drained	6 to 12 inches form March to September.	0 - 2.2 2.2 - 6.5	SM, SP-SM SC-SM, SC, SM, CL, ML
Mascotte	38	Mascotte Fine Sand, 0 To 2 Percent Slopes	Poorly Drained	6 to 18 inches from March to September.	0 - 3 3 - 4.5 4.5 - 6.5	SP-SM, SM SM, SC, SC-SM SP-SM, SM
Plummer	39	Plummer Fine Sand	Poorly Drained	6 to 24 inches from March to September.	0 - 3.8 3.8 - 6.5	SM, SP-SM SM, SC, SC-SM
Pottsburg	42	Pottsburg Sand, High	Somewhat Poorly Drained	12 to 24 inches from January to October.	0 - 6.5	SP, SP-SM
Pottsburg	43	Pottsburg Sand	Poorly Drained	6 to 24 inches from March to September.	0 - 6.5	SP, SP-SM
Mascotte	44	Mascotte-Pelham Complex, 0 To 2 Percent Slopes	Poorly Drained	6 to 18 inches from January to October.	0 - 2 2 - 5 5 - 6.5	SP-SM, SM SC, SC-SM SP-SM, SM
Osier	46	Osier Fine Sand, Frequently Flooded	Poorly Drained	0 to 6 inches from March to September.	0 - 6.5	SM, SP-SM
Pelham	51	Pelham Fine Sand, 0 To 2 Percent Slopes	Poorly Drained	6 to 12 inches form March to September.	0 -1.8 1.8 - 6.5	SP-SM, SM SC, SC-SM

Table 2-1 (Continued)
Soil Survey Data
Trail Ridge Landfill Expansion
Duval County, Florida

Component Name	Map Unit Symbol	Map Unit Name	Drainage Class	Average Wet Season Water Table*	Typical Soil Profile	
Albany	54	Albany Fine Sand, 0 To 5 Percent Slopes	Somewhat Poorly Drained	12 to 30 inches from January to October.	0 - 5 5 - 6.5	SP-SM, SM SM, SC, SC-SM
Pottsburg	56	Pottsburg Fine Sand, 0 To 2 Percent Slopes	Poorly Drained	6 to 12 inches from January to October.	0 - 6.5	SP, SP-SM, SM
Rutlege	62	Rutlege Mucky Fine Sand, 0 To 2 Percent Slopes, Frequently Flooded	Very Poorly Drained	0 to 6 inches all year long, Brief flooding occurs from December to May.	0 - 6.5	SP-SM, SM
Sapelo	63	Sapelo Fine Sand, 0 To 2 Percent Slopes	Poorly Drained	6 to 12 inches from January to October.	0 - 4 4 - 6.5	SP, SP-SM, SM SC, SC-SM, SM
Surrency	66	Surrency Loamy Fine Sand, Depressional, 0 To 2 Percent Slopes	Very Poorly Drained	Ponded up to 24 inches, most of the year.	0 - 2 2 - 6.5	SM, SP-SM SC-SM, SC
Pelham	82	Pelham Fine Sand, Depressional, 0 To 2 Percent Slopes	Poorly Drained	0 to 6 inches from March to September.	0 -1.8 1.8 - 6.5	SP-SM, SM SC, SC-SM
Water	99	Water				

*Note: Wet season water table is in undeveloped state.
USCS - Unified Soil Classification System

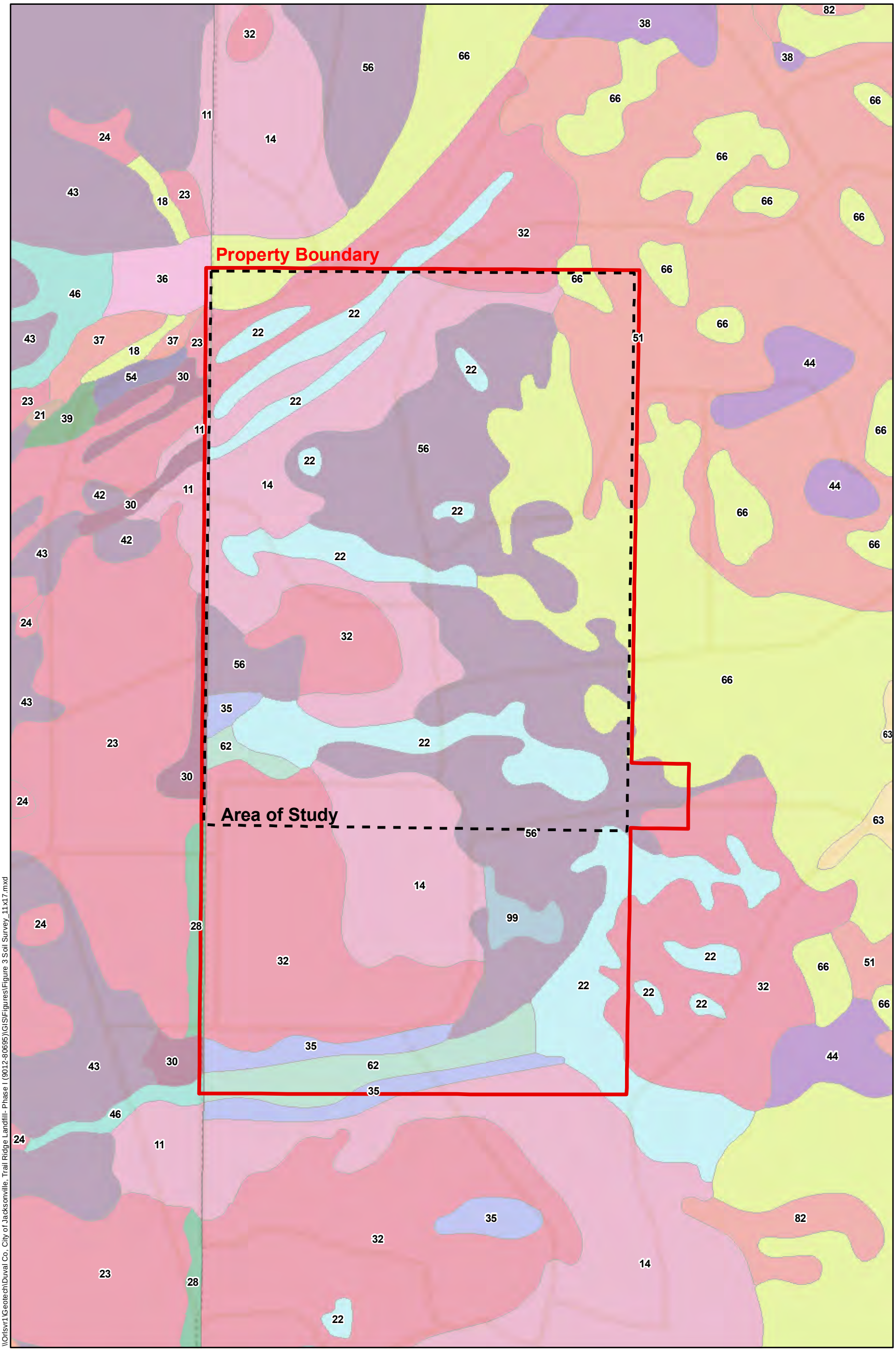
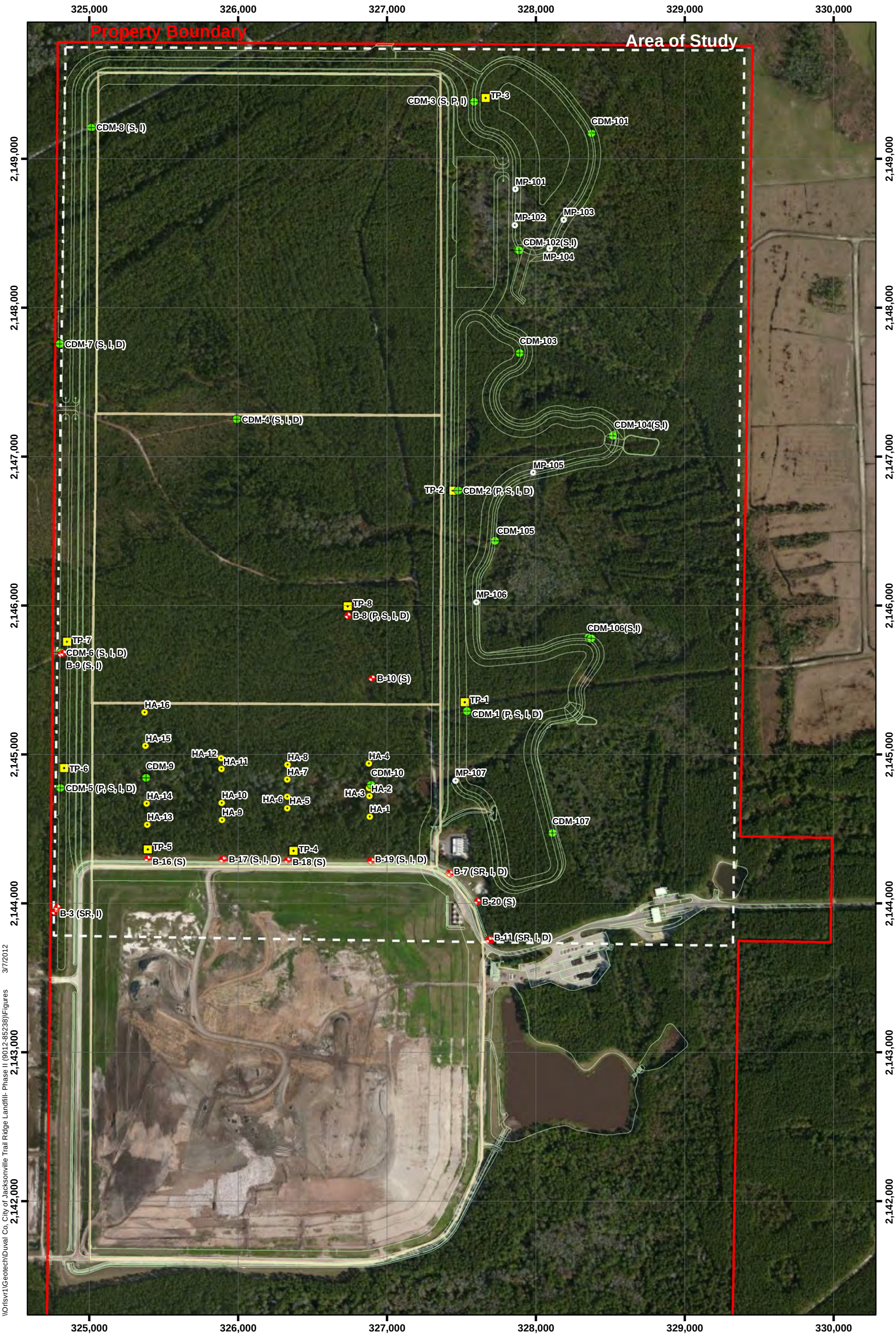


Figure 2-2
Soil Survey Map
Trail Ridge Landfill Expansion
Duval County, Florida



\\Orlsvr1\Geotech\Duval Co. City of Jacksonville Trail Ridge Landfill- Phase II (9012-85238)\Figures 3/7/2012

- New Boring/Monitor Well or Piezometer Cluster (by CDM Smith)
- Previous Boring/Monitor Well Cluster (by others)
- Hand Auger Boring / Shallow Piezometer
- Manual Probe
- Test Pit

Cluster Data: Shallow (S), Intermediate (I), Deep (D), Piezometer (P)

N W E S

0 300 600 Feet

Figure 2-3
Geotechnical Field Programs
Trail Ridge Landfill Expansion
Duval County, Florida

CDM Smith

The companies that prepared the reports, the submittal dates, and the areas investigated are listed below:

Table 2-2: Previous Geotechnical Explorations

October 1989	Ellis & Associates, Inc.	Location plan not available
April 1990	Golder Associates	Existing landfill and within proposed landfill expansion area
January 1992	Golder Associates	Existing landfill perimeter

During the initial investigation in 1989 by Ellis & Associates, Inc., five (5) Standard Penetration Test (SPT) borings were drilled to depths of 50, 55, 65 and 150 feet below the existing grade and five (5) shallow piezometers were installed. However, the location plan which consisted of an aerial photograph was not included with the boring information.

A subsequent investigation conducted by Golder Associates in 1990 included SPT borings and installation of monitoring wells. Fourteen borings, B1 through B14, were drilled. However, the logs for borings B1 and B4 were not included with the documents. Of the remaining logs, boring depths ranged from 60 to 150 feet. In June 1990, Ellis & Associates prepared a foundation analysis report for the existing landfill that included settlement and slope stability analyses.

In 1992, Golder Associates drilled additional borings and installed monitoring wells. A specific purpose survey by Sunshine State Surveyors, Inc. dated April 1992, shows Borings B16 through B31. However, only logs for Borings B16, B17, B18, and B19 are available. These borings were drilled to depths of 16.5 to 140 feet.

In 1996, Law Engineering and Environmental Services, Inc. submitted revised settlement and slope stability computations for an increased landfill height (to El. 350 feet).

Pertinent information obtained from review of previous geotechnical investigations has been incorporated into this report.

2.2 Field Exploration Programs

CDM Smith conducted two geotechnical exploration programs at the Trail Ridge Landfill site. The Phase 1 exploration was conducted in March and April, 2011. The Phase 2 exploration was conducted in November, 2011.

The Phase 1 exploration program consisted of the following:

- Drill eight (8) SPT borings (Borings CDM-1 through CDM-8) to depths ranging from 120 to 150 feet;
- Drill sixteen (16) hand auger (HA) borings (Borings HA-1 through HA-16);
- Excavate eight (8) test pits (TP) at selected locations;
- Install 22, 2-inch diameter monitoring wells (MW);
- Install four (4) 1-inch diameter piezometers and one 2-inch diameter piezometer (P) at selected locations;
- Conduct 23 slug tests in selected piezometers; and

- Take initial groundwater level readings in the completed monitoring wells and piezometers after development.

The Phase 2 exploration program consisted of the following:

- Drill nine (9) SPT borings (Borings CDM-9, CDM-10 and CDM-101 through CDM-107) to depths ranging from 30 to 149 feet;
- Perform seven (7) manual probes (MP);
- Install six (6) 2-inch diameter piezometers (P) at selected locations;
- Conduct six (6) slug tests in selected piezometers; and
- Install six (6) data loggers to monitor groundwater levels in selected piezometers.

The locations and ground surface elevations of the borings, test pits, manual probes, piezometers and monitoring wells were surveyed by representatives of Ghiotto and Associates, Inc. following completion of the field exploration programs. The coordinates and ground surface elevations are presented in **Table 2-3**, and the locations are depicted on Figure 2-3.

Descriptions of the field exploration programs are presented below.

2.2.1 Standard Penetration Test Borings

The Standard Penetration Test (SPT) borings CDM-1 through CDM-10 were drilled around and within the future landfill expansion; CDM-9 and CDM-10 were located in the central area of the proposed Cell 6. SPT borings CDM-101 through CDM-107 were located along the east berm of the proposed by-pass and stormwater ponds on the east side of the future land fill expansion.

The SPT borings were drilled by Amdrill, Inc. of Orlando, Florida with track-mounted Dietrich D-50 and CME 45 drill rigs. Mud-rotary drilling techniques were used to advance the borings to the termination depths. In general, soil samples were collected continuously in the upper 20 feet of each boring and at five-foot depth intervals thereafter to termination depth. Split-spoon soil sampling was conducted in general accordance with ASTM D 1586 "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils" using a 2-inch diameter sampler driven by blows from a 140-pound hammer falling freely for a 30-inch drop. The sampler was driven 18 inches per sample in the upper 12 feet and 24 inches thereafter to the termination depth. The number of blows required to drive the sampler each 6-inch increment was recorded and the Standard Penetration Resistance (N-value) was determined as the sum of the blows over the second and third increments. Upon completion, each SPT borehole was grouted with a Portland cement/bentonite mixture from the bottom of the borehole to the ground surface.

Representative soil samples obtained from each split-spoon sample were stored in sealed glass jars for later review and geotechnical laboratory testing. A CDM Smith geotechnical engineer observed the test borings in the field on a full-time basis and collected and visually classified the soil samples in accordance with the Unified Soil Classification System (ASTM D 2488).

Logs of the SPT borings were prepared by CDM Smith and are included in **Appendix B.** The surveyed coordinates and ground surface elevations of the SPT borings are presented on the logs.

Table 2-3
Survey Data for Phase I and Phase II Geotechnical Field Programs
Trail Ridge Landfill Expansion
Duval County, Florida

No.	Name	State Plane East HARN 83 Coordinates		Ground Elevation (ft-NGVD)
		Northing (feet)	Easting (feet)	
Recently Completed SPT Borings (2011)				
1	CDM-1	2,145,284	327,540	112.3
2	CDM-2	2,146,766	327,480	106.7
3	CDM-3	2,149,378	327,587	104.6
4	CDM-4	2,147,246	325,993	126.3
5	CDM-5	2,144,765	324,811	145.6
6	CDM-6	2,145,674	324,813	145.7
7	CDM-7	2,147,746	324,805	138.0
8	CDM-8	2,149,211	325,034	127.1
9	CDM-9	2,144,841	325,385	134.9
10	CDM-10	2,144,796	326,894	117.2
11	CDM-101	2,149,171	328,374	97.2
12	CDM-102	2,148,386	327,876	98.2
13	CDM-103	2,147,694	327,893	98.9
14	CDM-104	2,147,147	328,521	96.6
15	CDM-105	2,146,435	327,727	102.6
16	CDM-106	2,145,784	328,354	99.5
17	CDM-107	2,144,471	328,112	105.2
Recently Completed Monitoring Wells (2011)				
1	CDM-1S	2,145,290	327,543	112.0
2	CDM-1I	2,145,286	327,545	112.1
3	CDM-1D	2,145,280	327,546	112.1
4	CDM-2S	2,146,773	327,482	106.6
5	CDM-2I	2,146,769	327,485	106.6
6	CDM-2D	2,146,765	327,488	106.4
7	CDM-3S	2,149,371	327,584	104.9
8	CDM-3I	2,149,375	327,594	104.7
9	CDM-4S	2,147,252	325,997	126.4
10	CDM-4I	2,147,247	325,998	126.5
11	CDM-4D	2,147,242	325,998	126.4
12	CDM-5S	2,144,770	324,815	145.5
13	CDM-5I	2,144,765	324,816	145.4
14	CDM-5D	2,144,760	324,816	145.3
15	CDM-6S	2,145,669	324,818	145.9
16	CDM-6I	2,145,674	324,817	146.0
17	CDM-6D	2,145,679	324,816	145.9
18	CDM-7S	2,147,741	324,800	138.0
19	CDM-7I	2,147,747	324,800	138.0
20	CDM-7D	2,147,752	324,801	138.0
21	CDM-8S	2,149,206	325,024	127.1
22	CDM-8I	2,149,208	325,028	127.2
Recently Completed Piezometers (2011)				
1	CDM-1P	2,145,293	327,543	112.0
2	CDM-2P	2,146,776	327,479	106.6
3	CDM-3P	2,149,373	327,590	104.9
4	CDM-5P	2,144,775	324,814	145.5
5	B-8P	2,145,923	326,753	123.1
6	CDM-102S	2,148,383	327,883	98.6
7	CDM-102I	2,148,383	327,888	98.8
8	CDM-104S	2,147,135	328,520	97.1
9	CDM-104I	2,147,140	328,519	97.0
10	CDM-106S	2,145,777	328,368	100.0
11	CDM-106I	2,145,779	328,373	100.1

Table 2-3 (Continued)
Survey Data for Phase I and Phase II Geotechnical Field Programs
Trail Ridge Landfill Expansion
Duval County, Florida

No.	Name	State Plane East HARN 83 Coordinates		Ground Elevation (ft-NGVD)
		Northing (feet)	Easting (feet)	
Previously Completed Monitoring Wells (1990)				
1	B-3 (SR)	2,143,945	324,772	151.4
2	B-3 (I)	2,143,973	324,788	150.5
3	B-7 (SR)	2,144,201	327,418	120.4
4	B-7 (I)	2,144,196	327,425	120.3
5	B-7 (D)	2,144,201	327,424	120.7
6	B-8 (S)	2,145,917	326,752	123.1
7	B-8 (I)	2,145,913	326,751	123.2
8	B-8 (D)	2,145,920	326,753	122.9
9	B-9 (S)	2,145,687	324,786	146.2
10	B-9 (I)	2,145,692	324,784	146.2
11	B-10 (S)	2,145,502	326,929	126.1
12	B-16 (S)	2,144,299	325,395	141.8
13	B-17 (S)	2,144,295	325,906	136.3
14	B-17 (I)	2,144,295	325,893	136.2
15	B-17 (D)	2,144,295	325,899	136.0
16	B-18 (S)	2,144,289	326,333	131.8
17	B-19 (S)	2,144,284	326,888	125.8
18	B-19 (I)	2,144,284	326,893	125.9
19	B-19 (D)	2,144,283	326,898	125.8
Recently Completed Hand Auger Borings (2011)				
1	HA-1	2,144,583	326,886	120.9
2	HA-2	2,144,721	326,883	117.9
3	HA-3	2,144,775	326,883	118.0
4	HA-4	2,144,939	326,879	120.4
5	HA-5	2,144,639	326,334	127.4
6	HA-6	2,144,717	326,334	125.2
7	HA-7	2,144,833	326,333	124.6
8	HA-8	2,144,931	326,334	126.3
9	HA-9	2,144,560	325,895	132.9
10	HA-10	2,144,674	325,893	131.4
11	HA-11	2,144,903	325,891	130.3
12	HA-12	2,144,974	325,889	131.5
13	HA-13	2,144,527	325,393	139.3
14	HA-14	2,144,670	325,387	137.1
15	HA-15	2,145,056	325,379	137.8
16	HA-16	2,145,282	325,375	139.1
Recently Completed Test Pits (2011)				
1	TP-1 (@ CDM-1)	2,145,278	327,513	112.3
2	TP-2 (@ CDM-2)	2,146,753	327,462	106.9
3	TP-3 (@ CDM-3)	2,149,414	327,634	104.0
4	TP-4 (@ B-18)	2,144,393	326,359	131.4
5	TP-5 (@ B-16)	2,144,348	325,378	141.8
6	TP-6 (@ CDM-5)	2,144,742	324,785	145.2
7	TP-7 (@ CDM-6)	2,145,654	324,861	145.0
8	TP-8 (@ B-8)	2,145,972	326,728	123.2

2.2.2 Hand Auger Borings and Manual Probes

Hand auger (HA) borings were drilled by a CDM Smith geotechnical engineer along four transects perpendicular to Ditch B within proposed Cell 6. The borings were drilled to depths of 5 feet below the existing ground surface in general accordance with ASTM D 1452 "Standard Practice for Soil Exploration and Sampling by Auger Borings" using a stainless-steel, 3-inch-diameter bucket auger. A 1-inch diameter slotted PVC pipe was installed in the borehole to allow for future groundwater measurements. The annular space between the pipe and sidewalls of the borehole was backfilled with accumulated soil cuttings.

Representative soil samples obtained from the auger borings were visually classified (ASTM D 2488) and stored in sealed glass jars for later review and geotechnical laboratory testing. Logs of the hand auger borings were prepared by CDM Smith and are included in **Appendix C.** The surveyed coordinates and ground surface elevations of the borings are presented on the logs.

The manual probes were conducted at seven selected locations along the proposed alignments of the stormwater pond berms where the alignment crosses wetland areas. Probes were conducted by manually pushing a 1/2-inch diameter rod into the ground until refusal to penetration. At each location, the depth of water, if any, and the depth to which the rod was pushed were recorded. GPS coordinates were recorded at the test locations. A summary of the locations and findings is presented **Table C-1** in Appendix C.

2.2.3 Test Pit Excavations

Test pits (TP) were excavated at eight locations to further explore the nature of the near-surface soils and to explore for the presence of cemented, hardpan-type soils. The test pits were excavated by a representative of AMDRILL, Inc. of Orlando, Florida using a John Deere 310G backhoe. A CDM Smith geotechnical engineer observed the excavations on a full-time basis. The depths of the excavations ranged from 7 to 10 feet. The test pits were terminated upon collapse of the sidewalls or excessive water seepage at the bottom of excavation. Representative soil samples obtained from the test pits were stored in sealed ¼-gallon plastic sample bags for review and laboratory classification testing.

In addition, five 6-inch-long thin-walled tube samples were collected in Test Pits TP-1, TP-2 and TP-3 between depths of 3½ and 6 feet. The tubes were pushed manually into the soil in both vertical and horizontal directions. Upon collection, the tube samples were sealed. These samples were obtained for laboratory hydraulic conductivity testing.

Logs of the test pit excavations are included in **Appendix D.** The surveyed coordinates and ground surface elevations of the test pit locations are presented on the logs.

2.2.4 Monitoring Wells and Piezometers

Monitoring wells and piezometers were installed on the site by AMDRILL, Inc. of Orlando, Florida to obtain groundwater samples for analytical testing and to monitor the depths to groundwater, respectively. The locations of the monitoring wells and piezometers are shown in Figure 2-3.

The monitoring wells and piezometers were installed using a 6-inch-diameter rotary drill bit. Bio-degradable drilling mud was used to maintain borehole stability during well and piezometer installation. Drilling equipment was decontaminated prior to and during installation of the monitoring wells. The construction of the monitoring wells and piezometers consisted of 2-inch-diameter Schedule 40 PVC pipe

with 0.010-inch-wide slotted PVC screens. Two stainless steel well/piezometer centralizers were used to center each piezometer in the borehole. The annular space between the well/piezometer screens and the boreholes was backfilled with silica sand using standard sizes (6-20, 20-30 or 30-45) depending on the gradation of natural soils. The filter pack extended from 6 inches below the bottom to 2 feet above the top of the screened section. A 3-foot-thick bentonite seal was placed on top of the sand filter pack. The remaining annular space above the bentonite seal was grouted to the ground surface with Type I Portland cement/bentonite grout mixture.

A CDM Smith engineer observed the installation and construction of the monitoring wells and piezometers on a full-time basis and recorded the well/piezometer construction details. After construction, the monitoring wells were surged, purged and developed using the air-lift method for a minimum of 30 minutes until at least five piezometer volumes of groundwater were removed or until the groundwater was visually observed to exhibit relatively low turbidity. Development of the piezometers consisted of surging. The air-lift method was also supplemented by surging and pumping methods as pre-development and post-development, respectively.

Several initial groundwater level readings were recorded by CDM Smith. Typical construction details, a well construction summary table and initial groundwater level readings are presented in **Appendix E.**

2.2.5 Slug Tests

Slug tests were conducted by a CDM Smith engineer within the fully-saturated screen intervals in the recently installed monitoring wells and piezometers to obtain data to calculate the in situ horizontal hydraulic conductivity (Kh) of the surficial aquifer. A total of 28 slug tests were conducted. An attempt to conduct a slug test within Piezometer CDM-102(I) was unsuccessful due to poor groundwater recovery. Summary information for the tests is presented in **Appendix F**.

The slug tests were conducted in general accordance with ASTM D 4044-96 "Standard Test Method (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers" by inserting a weighted PVC plug into the monitoring well or piezometer and then recording the change in water level over time (the slug-in test). Subsequently the slug was removed and the resultant rate of water level recovery was recorded (slug-out test). The plug consisted of a 1-inch-diameter PVC pipe that was 8 feet in length with a displacement of approximately 3 feet of water in a 2-inch diameter well/piezometer. Water level data were recorded using a pressure transducer and a laptop computer. The calculated hydraulic conductivities are provided in **Table F-1** in Appendix F.

Section 3
Laboratory Testing Program

3.1 Introduction

Geotechnical laboratory classification testing was performed in accordance with American Society of Testing and Materials (ASTM) test methods. The purposes of the testing were to assist with soil classification and evaluation of engineering properties of the soils. Additional details and results of the geotechnical laboratory testing are included in Appendix G.

3.2 Sample Transport and Storage

Soil samples collected in the field were transported in general accordance with ASTM D 4220 "Standard Practice for Preserving and Transporting Soil Samples" to CDM Smith's laboratory/storage facility in Orlando, Florida for storage and visual classification. Following initial classification, representative soil samples were then transported in accordance with ASTM D 4220 to CES Consultants' laboratory for classification testing.

Samples not consumed during testing will be stored in the CDM Smith Orlando office for 12 months.

3.3 Laboratory Testing Program

The soil samples from the borings and test pits were visually classified in the CDM Smith laboratory by a CDM Smith geotechnical engineer in accordance with the Unified Soil Classification System (ASTM D 2488). Soil samples were selected for geotechnical classification tests to confirm the visual classification. The resulting soil descriptions and, where applicable, the results of the laboratory classification tests are shown on the SPT and HA boring logs and the TP logs presented in Appendices B through D**.** The results are also tabulated and presented in **Appendix G**. **Table G-1** presents the results by boring and **Table G-2** presents the results by soil layers. In addition to the laboratory classification tests, four constant-head hydraulic conductivity tests were conducted on the thin-walled tube samples obtained from the test pit excavations. The results of the tests are presented in Tables G-1 and G-2.

The types and quantities of tests are summarized in **Table 3-1**.

Table 3-1 Summary of Laboratory Tests

Test	ASTM Test Method	Quantity
Visual Classification	D 2488	-
Grain Size Analysis	D 422	36
Organic Content	D 2974	9
Fines Content (% passing No. 200 sieve)	D 1140	78
Atterberg Limits	D 4318	12
Moisture Content	D 2216	29
Unit Weight (Dry Density)	D 2937	4
Hydraulic Conductivity	D 2434	4

Section 4
Subsurface Conditions

4.1 Regional and Site Geology

The geology of Duval County consists of the six geologic units listed below (Miller, 1986; Krause and Randolph, 1989; Phelps, 1993; Leve, 1966; Fairchild, 1972) in descending order:

- Undifferentiated clastic deposits of Holocene, Pleistocene, and Pliocene age;
- Hawthorn Group of Miocene age;
- Ocala Limestone of late Eocene age;
- Avon Park Formation of middle Eocene age;
- Oldsmar Formation of middle to early Eocene age; and
- Cedar Keys Formation of early Eocene and late Paleocene age.

An east-to-west geologic section through Duval County is presented on **Figure 4-1**. Each of these geologic units is briefly described in the following subsections.

4.1.1 Undifferentiated Clastic Deposits

The undifferentiated clastic deposits of Holocene, Pleistocene, and Pliocene age are composed of unconsolidated soils, predominantly sand, clayey sands, and sandy clay, which were deposited during former periods with high sea levels. These sediments, which comprise the surficial aquifer system, are located across the county and range in thickness from 10 to 100 feet (Phelps, 1993).

4.1.2 Hawthorn Group

The Hawthorn Group underlies the surficial deposits and is composed of different formations and members (Scott, 1988). The Hawthorn Group which occurs across Duval and Baker Counties comprises the regional upper confining unit overlying the Floridan Aquifer. The Hawthorn Group consists of a complex, highly variable package of interbedded and intermixed siliciclastic, carbonate, and phosphatic sediments of the Miocene age, mostly clay, silt, and sand beds containing phosphate. It is considered a low-permeability unit due to the fines content of the soils that comprise the group. However, within this unit, there are permeable lenses of sands, limestone, and dolomite that are part of the intermediate aquifer system, where present. The thickness of the Hawthorn Group ranges from 350 to 500 feet in Duval County (Phelps, 1993; Scott, 1988). **Figure 4-2** shows the extent and thickness of the upper (Miocene) confining deposits in Duval County.

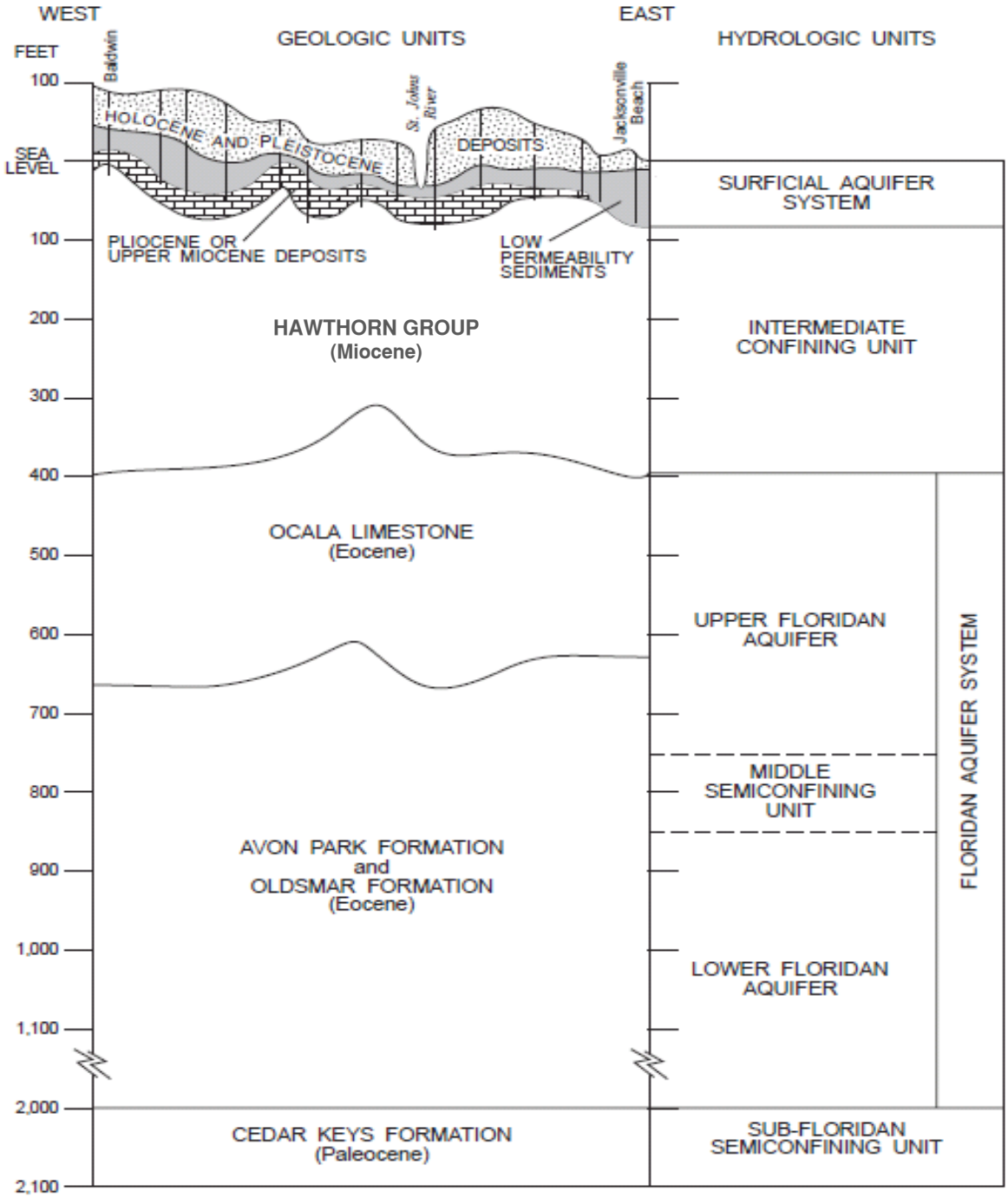


Figure 4-1. East-West Hydrogeologic/Geologic Cross Section through Duval County, FL (Adapted from Phelps, 1993)

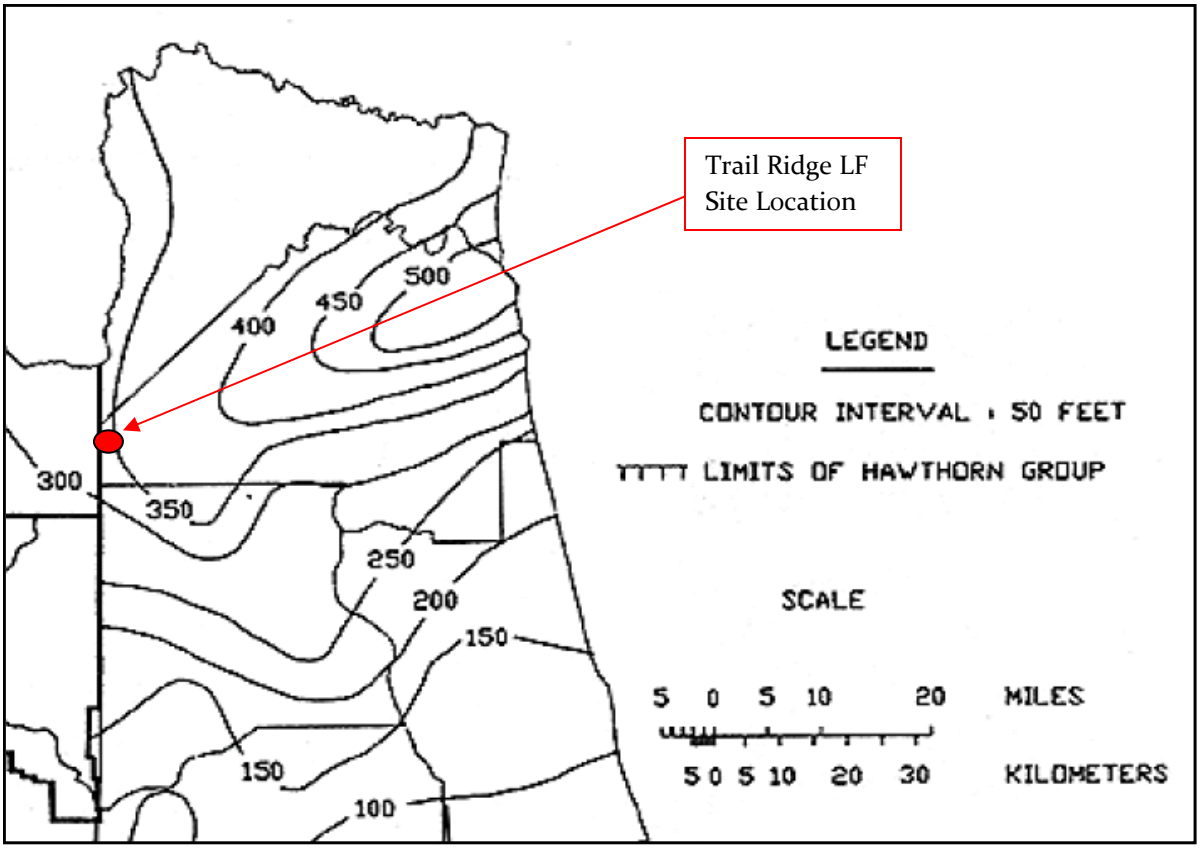


Figure 4-2. Thickness of the Hawthorn Group in Northeast Florida (Adapted from Scott and Lloyd, 1991; Scott, 1988)

4.1.3 Ocala Limestone

The Ocala Limestone of Late Eocene age overlies the Avon Park Formation. The Ocala Limestone is a white, generally soft, friable, porous limestone. The Ocala Limestone is one of the most permeable rock units in the Floridan Aquifer System (Miller, 1986). The approximate thickness of the Ocala Limestone ranges from 100 feet to 350 feet in Duval County (Leve; 1966; Miller, 1986).

4.1.4 Avon Park Formation

The Avon Park Formation of Eocene age consists of a thick sequence of fossiliferous limestone, dolomitic limestone, and dolostone. The lower portion of this unit has lower permeable carbonates that comprise the middle semi-confining unit within the Floridan Aquifer System. The Ocala Limestone and the upper part of the Avon Park Formation comprise the Upper Floridan Aquifer (Miller, 1986). The approximate thickness of the Avon Park Formation ranges from 700 feet to 1,100 feet in Duval County (Leve; 1966; Miller, 1986).

4.1.5 Oldsmar Formation

The Oldsmar Formation of Eocene age consists of off-white to light gray micritic limestone and vuggy dolostone. Evaporites are common in the lower parts of this formation. The Oldsmar Formation underlies the entire Florida peninsula. The approximate thickness of the Oldsmar Formation ranges from 300 feet to 500 feet in Duval County (Leve; 1966; Miller, 1986).

4.1.6. Cedar Keys Formation

The Cedar Keys Formation and equivalents of Paleocene age consist of dolostone, dolomitic limestone, and anhydrite. The Oldsmar and Cedar Keys Formations comprise the lower Floridan Aquifer. The Cedar Keys Formation is approximately 500 feet thick in Duval County (Leve; 1966; Miller, 1986).

4.2 Subsurface Stratigraphy

Subsurface soil conditions described in this section are based upon the results of visual classification and laboratory testing of the soils and rock encountered during the field exploration programs. The stratigraphy presented herein is generalized and highlights the four major layers and the predominant soil types that comprise each layer. Layers 1, 2 and 3 comprise the surficial aquifer system, and Layer 4 corresponds to the Hawthorne Group previously described in the Regional and Site Geology Section of this report.

Subsurface conditions encountered at the site consist of the following layers in order of their occurrence below land surface:

- **Leaves, topsoil, root mat, and peat:** Approximately six inches of leaves, topsoil and root mat typically were encountered at the ground surface of the boring and test pit locations. An exception was Boring CDM-9 where approximately 5½ feet of peat were encountered.

  SPT borings CDM -9 and CDM-10 were drilled along the drainage ditch (Ditch B) that transverses Cell 6. Borings HA-1 through HA-16 were drilled in low areas along transects perpendicular to Ditch B. No peat or excessive depths of organic material were observed at any location other than CDM-9.

  The manual probes that were conducted adjacent to the wetland areas along the proposed pond berm alignments encountered approximately six inches of leaves, topsoil and root mat. Below this depth, approximately 10 to 42 inches of loose sand were encountered. The probes typically terminated at depths of 12 to 48 inches where refusal to penetration was encountered.

- **Layer 1**: Layer 1 soils are comprised of sandy soils classified in accordance with the Unified Soil Classification System as clean sand (SP), well graded sand (SW), and poorly- or well-graded sand with silt or clay (SP-SM, SP-SC or SW-SM). Based on the results of laboratory grain size analyses, the percent fines for Layer 1 soils ranged from 1 to 12. The Layer 1 soils were encountered below the leaves, topsoil and root mat at each of the boring locations and extended to depths ranging from 59 to 133 feet (El. 49.1 to El. 10.9).

  Several sub-layers comprised of lower permeability soils were encountered throughout Layer 1. The nature, occurrence, and variations of these layers are discussed below.

  Sub-layers 1A and **1B** were observed in the borings on the west side of the proposed landfill expansion and in the case of Sub-layer 1A extended partially into the western portion of the proposed Cell 6. These sub-layers are comprised of lower-permeability soils classified as silty sand (SM), clayey sand (SC), lean clay (CL), and low elasticity silt (ML). Based on the results of laboratory grain size analyses, the percent fines for Sub-layer 1A and 1B soils varied from 13 to 47.

  Sub-layer 1A occurred between El. 115 and E. 140. The thickness varied from less than 5 feet to more than 20 feet. Sub-layer 1B was encountered between El. 40 and El. 70 in three deep borings along the west side of the landfill expansion. The thickness varied from less than 5 feet at B-3 to almost 30 feet at CDM-7.

SPT N-values for the Layer 1 and the Sub-layer 1A and 1B soils ranged from 1 to over 100 blows per foot.

The slug tests were generally performed in Layer 1 and Sub-layers 1A and 1B (25 of the 28 tests). The hydraulic conductivities calculated from the slug test results ranged from 4.4 to 123.1 feet per day with an average value of 30.2 feet per day. (The highest test result of 254.3 feet per day was considered an outlier and was not included in the calculation of the average.) The hydraulic conductivities did not correlate with the relative densities of the tested soils based on the SPT N-values in the adjacent boreholes.

Sub-layers 1C and 1D were observed in the borings that were located in or adjacent to the wetlands along the east side of the proposed landfill expansion. Sub-layer 1C is comprised of lower-permeability soils classified as silty sand (SM), clayey sand (SC), lean clay (CL), and highly elastic silt (MH); generally the soils are of SM and SC classification. Sub-layer 1C occurred between El. 80 and El. 95, sloping slightly down from south to north. The thickness ranged from 1 foot at CDM-107 to almost 8 feet at CDM-102. Occasionally, thin lenses of Layer 1 soils occurred within Sub-layer 1C.

Sub-layer 1D is comprised principally of high plasticity clay (CH) although layers of highly elastic silt (MH) and silty sand (SM) were also observed. Sub-layer 1D occurred as one or two layers with thicknesses of 2 to 7 feet between El. 60 and El. 85.

Based on the results of laboratory tests, the percent fines for Sub-layer 1C and 1D soils ranged from 13 to 77, the liquid limit from 36 to 76 percent, the plasticity index from 15 to 40 percent and the natural moisture content from 18 to 75 percent. The laboratory results for three samples indicated that the natural moisture content was equal to or exceeded the liquid limit. However, the N-values of these same samples were 2, 4 and 20 bpf which represents material ranging from soft to stiff consistency and of correspondingly higher shear strengths than can be estimated from the laboratory test results.

SPT N-values for Sub-layer 1C soils ranged from 2 to 82 blows per foot and for Sub-layer 1D soils from 2 to 28 blows per foot.

- **Layer 2:** Layer 2 soils are comprised of low permeability sediments and are classified as silty sand (SM), clayey sand (SC), low or highly elastic silt (ML or MH) and clay (CL or CH). Based on the results of laboratory grain size analyses, the percent fines ranged from 16 to 65. Generally the soils are more silty than clayey. The soils were calcareous in some borings. Layer 2 soils were encountered in all of the deep borings except CDM-9 beginning at depths of 59 to 133 feet (El. 49.1 to El. 10.9). The thickness of Layer 2 varied from as little as 1 foot in CDM-7 to 23 feet in B-7.

  SPT N-values ranged from 2 to greater than 100 blows per foot. In Boring CDM-5, the sampler advanced under the static weight of the hammer in the upper two feet of this layer.

- **Layer 3:** Layer 3 is comprised of limestone with varying degrees of weathering. Samples were gravelly, sandy and silty. Based on the results of laboratory grain size analyses, the percent fines ranged from 1 to 42.

  This layer was encountered in all of the deep borings except CDM-5 and B-3 located in the southwest corner of the landfill expansion. CDM-5 was terminated at El. 5.6 and B-3 at El. 2.5 without encountering Layer 3. **Figure 4-3** shows the approximate contours of the top of the limestone layer. The upper surface of Layer 3 slopes down from between El. 30 and El. 39 in the northeast and northwest corners of the expansion area, respectively, to El. 14 in the southeast corner and below El.

2.5 in the southwest corner. The thickness of the limestone varies from 4 feet at CDM-3 to 22 feet at CDM-1.

SPT N-values ranged from 36 to greater than 100 blows per foot. Three slug tests were performed in the limestone layer. The calculated hydraulic conductivities of 16.5, 24.9 and 95.7 feet per day are comparable to the results in the Layer 1 and Sub-layer 1A and 1B soils.

- **Layer 4:** Layer 4 soils consist of silty sand (SM) and clayey sand (SC) with sand-size phosphate particles as well as low elasticity silt (ML) and lean clay (CL). Based on the results of laboratory grain size analyses, the percent fines ranged from 17 to 25.

  Soils in this layer were encountered at eight of the deep boring locations. The upper surface of Layer 4 slopes down from above El. 25 at the north end of the landfill expansion to below El. 0 on the south end as shown in **Figure 4-4**.

  SPT N-values ranged from 41 to greater than 100 blows per foot.

Table 4-1 presents a summary of the depths and elevations at which each of the major layers and sub-layers were encountered at the locations of the SPT borings. **Appendix H** presents soil profiles along eight transects using the seventeen CDM Smith borings and nine borings from previous explorations by Golder Associates, Inc. in 1990 and 1992.

4.3 Groundwater Levels

Groundwater was encountered at depths of 1 to 5-1/4 feet at the SPT and HA boring locations. For the SPT borings, the measurements were made in 3-inch-diameter hand-augered boreholes drilled adjacent to each SPT boring and measured after 24 hours. Groundwater depths at the test boring locations are shown on the SPT Boring Logs presented in Appendix B and the HA Boring Logs in Appendix C.

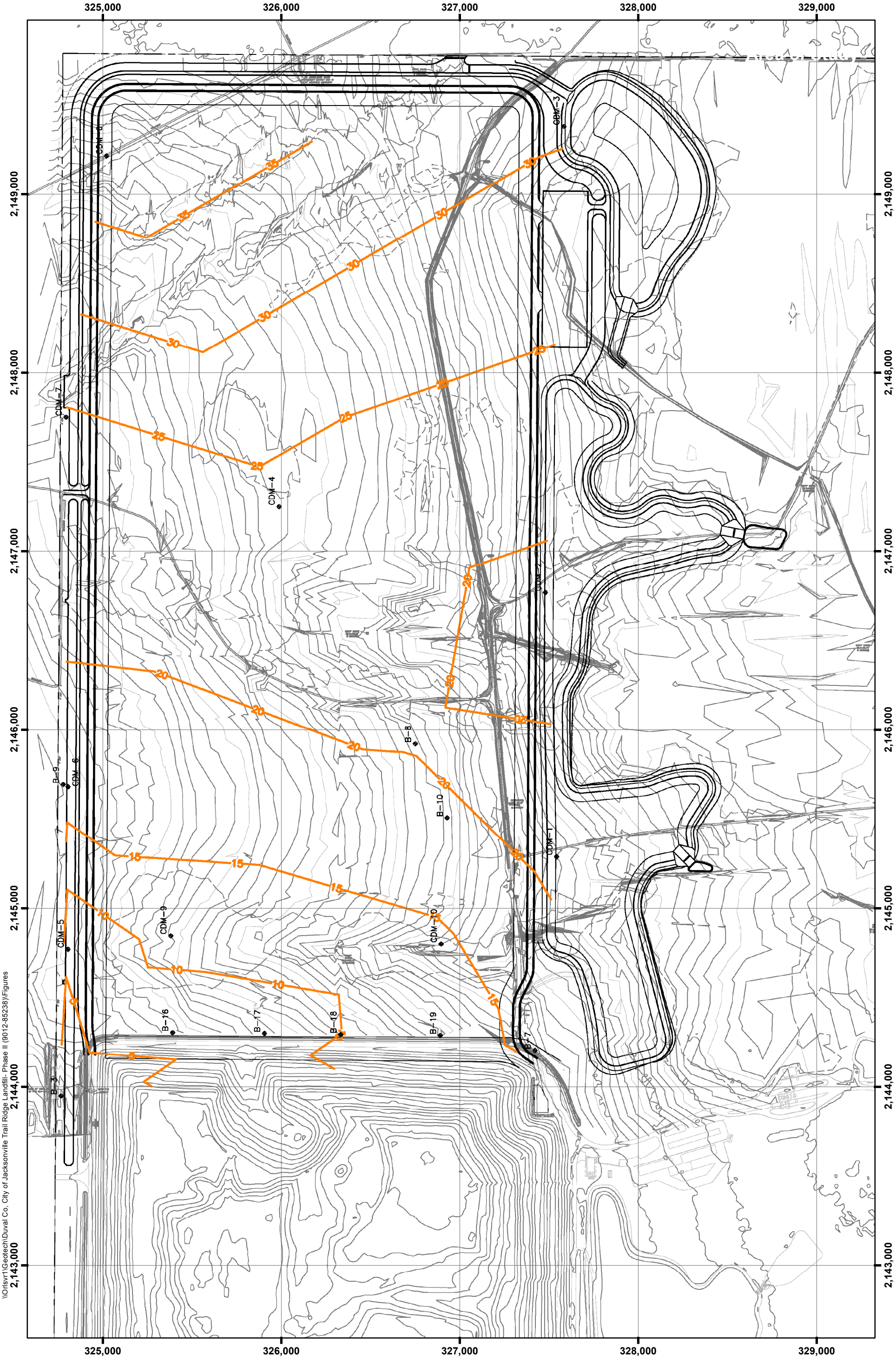
Groundwater levels were also measured in the monitoring wells and piezometers discussed in Section 2 of this report. Detailed analyses of these data will be presented in the Hydrogeologic Report. Preliminary findings include:

- Groundwater flows from west to east.
- Artesian conditions were measured in the deep and intermediate monitor wells at boring locations CDM-1, CDM-2, CDM-104 and CDM-106. The water level in the intermediate depth monitor well at CDM-102 was approximately 3 feet higher than in the shallow monitoring well.
- Sub-layers 1C and 1D act as semi-confining units.

4.4 Expected Variations in Subsurface Conditions

Interpretations of general subsurface conditions presented herein are based on soil and groundwater conditions observed at the boring locations. However, subsurface conditions may vary between exploration locations. If conditions are found to be different than those described herein, then the data and interpretations contained in this report should be reevaluated by CDM Smith and confirmed in writing.

Water levels measured in the explorations should not be considered to represent stabilized groundwater levels. Actual groundwater levels encountered during construction may be different from those observed at the time of the exploration.



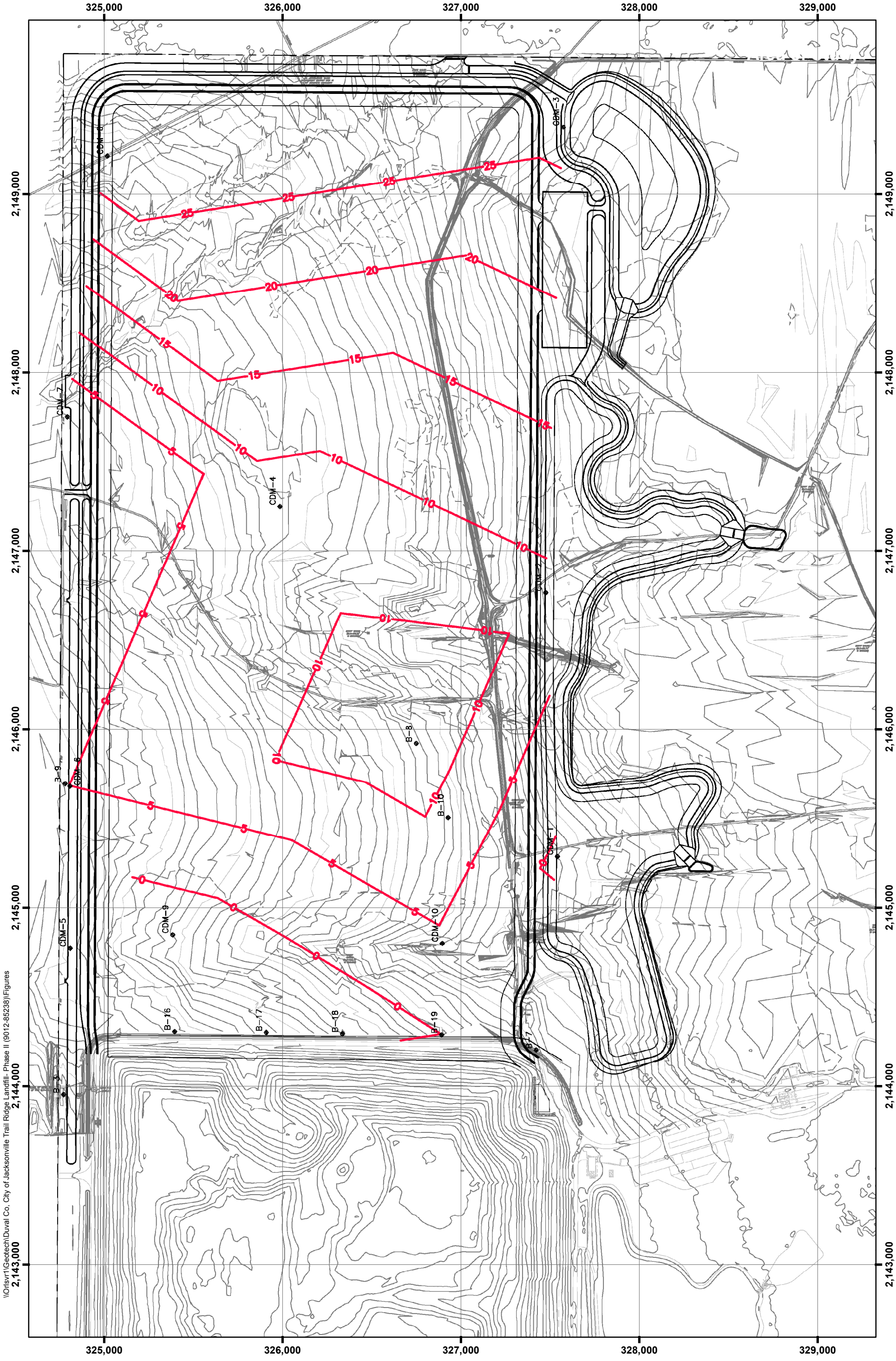
\\Orlsvr1\Geotech\Duval Co. City of Jacksonville Trail Ridge Landfill- Phase II (9012-85238)\Figures

Top of Layer 3 Contour Elevation

N
W
E
S

0 500 1,000 Feet

Figure 4-3
Top of Layer 3 Contour Elevations
Trail Ridge Landfill Expansion
Duval County, Florida



\\Orlsvr1\Geotech\Duval Co, City of Jacksonville Trail Ridge Landfill- Phase II (9012-85238)\Figures

Top of Layer 4 Contour Elevation

N W E S

0 500 1,000 Feet

Figure 4-4
Top of Layer 4 Contour Elevations
Trail Ridge Landfill Expansion
Duval County, Florida

Table 4-1
Summary of Subsurface Explorations Showing Layer Depths and Elevations
Trail Ridge Landfill
Duval County, Florida

Location	Elevation of Ground Surface [1]	**Depth of Exploration Below Ground Surface/** Bottom Elevation (feet)	**Depth (feet) to /** Elevation of Groundwater [2] (feet)	**Depth to Top of Layer (feet)** Elevation of Top of Layer												
				Leaves / Topsoil / Root mat / Peat	Layer 1	Layer 1A		Layer 1B		Layer 1C		Layer 1D		Layer 2	Layer 3	Layer 4
						Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom			
Standard Penetration Test (SPT) Borings by CDM Smith 2011																
CDM-1	112.3	**149.1**	**2.5**	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**73.0**	**91.0**	**113.0**
		-36.8	109.8	112.3	111.8	---	---	---	---	---	---	---	---	39.3	21.3	-0.7
CDM-2	106.7	**119.1**	**2.0**	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**14.0**	**15.5**	**49.0**	**50.0**	**83.0**	**88.0**	**98.0**
		-12.4	104.7	106.7	106.2	---	---	---	---	92.7	91.2	57.7	56.7	23.7	18.7	8.7
CDM-3	104.6	**150.0**	**2.5**	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**9.0**	**18.5**	**38.0**	**41.0**	**59.0**	**74.0**	**78.0**
		-45.4	102.1	104.6	104.1	---	---	---	---	95.6	86.1	66.6	63.6	45.6	30.6	26.6
CDM-4	126.3	**119.1**	**3.0**	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**99.0**	**103.0**	**---**
		7.2	123.3	126.3	125.8	---	---	---	---	---	---	---	---	27.3	23.3	---
CDM-5	145.6	**140.0**	**3.0**	**0.0**	**0.5**	**15.0**	**29.5**	**---**	**---**	**---**	**---**	**---**	**---**	**133.0**	**---**	**---**
		5.6	142.6	145.6	145.1	130.6	116.1	---	---	---	---	---	---	12.6	---	---
CDM-6	145.7	**139.5**	**4.7**	**0.0**	**0.5**	**6.0**	**33.0**	**---**	**---**	**---**	**---**	**---**	**---**	**124.0**	**128.0**	**---**
		6.2	141.0	145.7	145.2	139.7	112.7	---	---	---	---	---	---	21.7	17.7	---
CDM-7	138.0	**138.6**	**4.6**	**0.0**	**0.5**	**6.0**	**23.0**	**68.0**	**98.0**	**---**	**---**	**---**	**---**	**112.5**	**113.5**	**137.0**
		-0.6	133.4	138.0	137.5	132.0	115.0	70.0	40.0	---	---	---	---	25.5	24.5	1.0
CDM-8	127.1	**119.3**	**4.3**	**0.0**	**0.5**	**5.0**	**6.0**	**63.0**	**73.0**	**---**	**---**	**---**	**---**	**78.0**	**88.5**	**98.0**
		7.8	122.8	127.1	126.6	122.1	121.1	64.1	54.1	---	---	---	---	49.1	38.6	29.1
CDM-9	134.9	**148.9**	**2.3**	**0.0**	**5.8**	**15.0**	**18.0**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**123.0**	**138.0**
		-14.0	132.6	134.9	129.1	119.9	116.9	---	---	---	---	---	---	---	11.9	-3.1
CDM-10	117.2	**148.3**	**5.2**	**0.0**	**0.3**	**---**	**---**	**---**	**---**	**23.5**	**32.0**	**---**	**---**	**93.0**	**103.0**	**113.0**
		-31.1	112.0	117.2	117.0	---	---	---	---	93.7	85.2	---	---	24.2	14.2	4.2
CDM-101	97.2	**30.0**	**2.8**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**11.5**	**18.0**	**22.0**	**---**	**---**	**---**	**---**
		67.2	94.4	97.2	97.2	---	---	---	---	85.7	79.2	75.2	---	---	---	---
CDM-102	98.2	**50.0**	**2.5**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**7.8**	**18.0**	**18.0**	**34.0**	**---**	**---**	**---**
		48.2	95.7	98.2	98.2	---	---	---	---	90.4	80.2	80.2	64.2	---	---	---
CDM-103	98.9	**32.0**	**4.5**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**6.5**	**10.0**	**15.0**	**32.0**	**---**	**---**	**---**
		66.9	94.4	98.9	98.9	---	---	---	---	92.4	88.9	83.9	66.9	---	---	---
CDM-104	96.6	**50.0**	**3.4**	**0.0**	**0.3**	**---**	**---**	**---**	**---**	**3.0**	**7.0**	**22.0**	**24.5**	**---**	**---**	**---**
		46.6	93.2	96.6	96.4	---	---	---	---	93.6	89.6	74.6	72.1	---	---	---
CDM-105	102.6	**30.0**	**3.0**	**0.0**	**0.3**	**---**	**---**	**---**	**---**	**4.5**	**12.5**	**---**	**---**	**---**	**---**	**---**
		72.6	99.6	102.6	102.3	---	---	---	---	98.1	90.1	---	---	---	---	---
CDM-106	99.5	**50.0**	**4.5**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**10.0**	**15.0**	**16.5**	**37.0**	**---**	**---**	**---**
		49.5	95.0	99.5	99.5	---	---	---	---	89.5	84.5	83.0	62.5	---	---	---
CDM-107	105.2	**30.0**	**3.3**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**5.5**	**6.5**	**---**	**---**	**---**	**---**	**---**
		75.2	101.9	105.2	105.2	---	---	---	---	99.7	98.7	---	---	---	---	---

Table 4-1 (Continued)
Summary of Subsurface Explorations Showing Layer Depths and Elevations
Trail Ridge Landfill
Duval County, Florida

Location	Elevation of Ground Surface [1]	**Depth of Exploration Below Ground Surface/** Bottom Elevation (feet)	**Depth (feet) to /** Elevation of Groundwater [2] (feet)	**Depth to Top of Layer (feet)** Elevation of Top of Layer [3]												
				Leaves / Topsoil / Root mat / Peat	Layer 1	Layer 1A		Layer 1B		Layer 1C		Layer 1D		Layer 2	Layer 3	Layer 4
						Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom			
Test Pits (TP) by CDM Smith 2011																
TP-1	112.3	**9.5**	*	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		102.8	--	112.3	111.8	---	---	---	---	---	---	---	---	---	---	---
TP-2	106.9	**9.0**	*	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		97.9	--	106.9	106.4	---	---	---	---	---	---	---	---	---	---	---
TP-3	104.0	**8.5**	*	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		95.5	--	104.0	103.5	---	---	---	---	---	---	---	---	---	---	---
TP-4	131.4	**8.5**	*	**0.0**	**0.8**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		122.9	--	131.4	130.6	---	---	---	---	---	---	---	---	---	---	---
TP-5	141.8	**10.0**	*	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		131.8	--	141.8	141.3	---	---	---	---	---	---	---	---	---	---	---
TP-6	145.2	**9.5**	*	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		135.7	--	145.2	144.7	---	---	---	---	---	---	---	---	---	---	---
TP-7	145.0	**9.5**	*	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		135.5	--	145.0	144.5	---	---	---	---	---	---	---	---	---	---	---
TP-8	123.2	**7.5**	*	**0.0**	**0.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		115.7	--	123.2	122.7	---	---	---	---	---	---	---	---	---	---	---
Standard Penetration Test (SPT) Borings by Golder Associates, Inc. 1990 and 1992																
B-3	152.5	**150.0**	**5.3**	**0.0**	**0.0**	**16.5**	**30.0**	**81.5**	**85.5**	**---**	**---**	**---**	**---**	**132.5**	**---**	**---**
		2.5	147.2	152.5	152.5	136.0	122.5	71.0	67.0	---	---	---	---	20.0	---	---
B-7	121.5	**115.0**	**4.2**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**28.5**	**33.0**	**---**	**---**	**83.5**	**106.0**	**---**
		6.5	117.2	121.5	121.5	---	---	---	---	93.0	88.5	---	---	38.0	15.5	---
B-8	125.4	**150.0**	**5.6**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**96.5**	**105.0**	**112.0**
		-24.6	119.8	125.4	125.4	---	---	---	---	---	---	---	---	28.9	20.4	13.4
B-9	148.0	**82.0**	**7.3**	**0.0**	**0.0**	**16.0**	**20.0**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		66.0	140.7	148.0	148.0	132.0	128.0	---	---	---	---	---	---	---	---	---
B-10	128.2	**51.0**	**4.8**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**22.5**	**30.0**	**---**	**---**	**---**	**---**	**---**
		77.2	123.4	128.2	128.2	---	---	---	---	105.7	98.2	---	---	---	---	---
B-16	144.0	**18.0**	**7.2**	**0.0**	**0.0**	**9.5**	**17.0**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		126.0	136.8	144.0	144.0	134.5	127.0	---	---	---	---	---	---	---	---	---
B-17	138.4	**140.0**	**7.2**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**127.5**	**131.5**	**---**
		-1.6	131.2	138.4	138.4	---	---	---	---	---	---	---	---	10.9	6.9	---
B-18	134.1	**16.5**	**7.6**	**0.0**	**0.0**	**11.5**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
		117.6	126.5	134.1	134.1	122.6	---	---	---	---	---	---	---	---	---	---
B-19	127.9	**124.5**	**7.9**	**0.0**	**0.0**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**88.5**	**114.0**	**---**
		3.4	120.0	127.9	127.9	---	---	---	---	---	---	---	---	39.4	13.9	---

Notes:

1. Elevations are based on the 1929 NGVD.
2. See log for further information and dates. The depth to groundwater is expected to fluctuate with time.
3. Soil descriptions from the Golder Associates borings are not included in the layer descriptions in Section 4.2 of this report. The closest similar layer descriptions were used to delineate the breaks between layers.

* Groundwater was observed seeping from excavation walls or excavation bottom and did not represent stabilized conditions.

Abbreviations:

SPT Standard Penetration Test Boring

--- Layer not encountered

CDM Smith

Appendices

Soil Classification Chart
(ASTM D 2487 - 06)

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

A Based on the material passing the 3-in (75-mm) sieve.

B If the field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name

C Cu = D60/D10 $Cc = (D30)^2 / D10 \times D60$

D If soil contains ≥15 % sand, add “with sand” to group name.

E [E] Gravels with 5 to 12 % fines require dual symbols:

GW-GM well-graded gravel with silt

GW-GC well-graded gravel with clay

GP-GM poorly graded gravel with silt

GP-GC poorly graded gravel with clay

F If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

G If fines are organic, add “with organic fines” to group name.

H H If soil contains ≥15 % gravel, add “with gravel” to group name.

I Sands with 5 to 12% fines require dual symbols:

SW-SM well-graded sand with silt

SW-SC well-graded sand with clay

SP-SM poorly graded sand with silt

SP-SC poorly graded sand with clay

J If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

K If soil contains 15 to 29 % plus No. 200, add “with sand” or “with gravel,” whichever is predominant.

L If soil contains ≥30 % plus No. 200, predominantly sand, add “sandy ” to group name.

M If soil contains ≥ 30 % plus No. 200, predominantly gravel, add “gravelly” to group name.

N PI ≥ 4 and plots on or above “A” line.

O PI < 4 or plots below“ A” line.

P PI plots on or above “A” line.

Q PI plots below “A” line

The percentages of other components such as shell content, may be stated in terms indicating a range of percentages, as seen in the "Modifiers" table.

MODIFIERS	
Trace	<5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

To indicate that the soil may fall into one of two possible basic groups, a borderline symbol may be used with the two symbols separated by a slash. For example: SC/CL or CL/CH.

CDM Smith

Key to Soil Classification

Description of Compactness or Consistency in Relation to Standard Penetration Resistance

COARSE GRAINED SOILS (Sands and Gravels)	
N-Value	Compactness
0 – 3	Very Loose
4 – 10	Loose
11 – 30	Medium Dense
31 – 50	Dense
51 and Greater	Very Dense

FINE GRAINED SOILS (Silts and Clays)	
N-Value	Consistency
0 – 1	Very Soft
2 – 4	Soft
5 – 8	Medium Stiff
9 – 15	Stiff
16 – 30	Very Stiff
31 and Greater	Hard

PARTICLE SIZES		
Subdivision	Passes Sieve Size (in metric)	Retained on Sieve No (in metric)
Sand		
Coarse	No. 4 (4.75-mm)	No.10 (2.00-mm)
Medium	No. 10 (2.00-mm)	No. 40 (425-µm)
Fine	No. 40 (425-um)	No. 200 (75-um)
Gravel		
Coarse	3-in (75-mm)	3/4-in (19-mm)
Fine	3/4-in (19-mm)	No.4 (4.75-mm)
Cobbles and Boulders		
Cobbles	12-in (300-mm)	3-in (75-mm)
Boulders	---	12-in (300-mm)

Abbreviations:

RS	Rotosonic Boring
SPT	Standard Penetration Test Boring
CPT	Piezocone Penetration Test
TP	Test Pit
AB	Auger Boring

SHELL GRAPHIC				
Descriptive (per ASTM D2488)	% Shell Content	Graphic Symbol	Example	
Trace	<5%	No shell symbol	SP-SM No Shell	
Few	5 to 10%			
Little	15 to 25%	Shell mixed with a Soil Graphic Symbol	SP-SM Little Shell	
Some	30 to 45%			
Mostly	50 to 100%	Shell Only	SP-SM Mostly Shell	

Appendix A

Previous Geotechnical Reports

(CD)

Appendix B

Standard Penetration Test (SPT) Boring Logs

SPT BORING LOG
CDM-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 112.3
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 149.1
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 2.5 (03/03/11)
Drilling Date: Start: 03-02-11 **End:** 03-03-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2145283.8 E 327539.9
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
112.3														
0									**Organic Topsoil.**					
	SS	S-1	18/3	2 3 4	7			SP	**Poorly Graded SAND**, fine, medium dense, moist, gray.					
	SS	S-2	18/8	6 7 9	16									
	SS	S-3	18/18	6 8 12	20			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, brown.			9.2		
107.3 5	SS	S-4	18/18	9 12 13	25									
	SS	S-5	18/18	3 3 4	7				Grades to loose.					
	SS	S-6	18/14	9 9 11	20			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, very dark gray to black; with organics.					
102.3 10	SS	S-7	18/18	8 11 16	27					12.5		10.7		6.3
	SS	S-8A S-8B	18/18	16 22 22	44			SP	**Poorly Graded SAND**, fine, dense, wet, gray.		0.1/98.4	1.5		

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Temporary 4-inch Steel Casing installed to 50 feet bls.

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

SPT BORING LOG
CDM-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9	24/12	7 10 13 15	23			SP	Grades to medium dense.					
97.3 15	SS	S-10	24/16	11 11 13 18	24									
	SS	S-11	24/22	4 7 7 5	14			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark brown.					
	SS	S-12	24/24	2 3 3 7	6				Grades to loose and very dark gray to black.			6.7		
92.3 20														
	SS	S-13	24/22	8 12 24 31	36			SP-SM	**Poorly Graded SAND with Silt**, fine, dense, wet, light grayish brown to grayish brown.					
87.3 25														
	SS	S-14	24/12	8 14 26 29	40									
82.3 30														
	SS	S-15	24/12	13 25 36 50	61				Grades to very dense and brown.					
77.3 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP-SM						
	SS	S-16	16/16	14 43 50/4	93									
72.3 40	SS	S-17	9/9	27 50/3	50/3							5.7		
	SS	S-18	9/9	31 50/3	50/3				Grades to light brown					
	SS	S-19	9/9	55 50/3	50/3									
67.3 45														
	SS	S-20A S-20B	17/17	11 32 50/5	82/11									
62.3 50									Grades to gray.					
	SS	S-21A S-21B	16/16	14 31 50/4	81/10			SW	**Well Graded SAND**, fine, very dense, wet, light brown to light gray.					
57.3 55														
	SS	S-22	10/10	40 50/4	50/4						0.3/99.2	0.5		
52.3														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
52.3														
60								SW						
	SS	S-23	24/24	11 13 10 11	23			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, gray to dark gray.					
47.3														
65														
	SS	S-24	24/20	6 8 8 10	16							7.0		
42.3														
70														
	SS	S-25	24/24	4 4 8 12	12			SM	**Silty SAND**, very loose to loose, fine, wet, greenish gray			18.0		
37.3														
75														
	SS	S-26	24/24	1 2 1 3	3									
32.3														
80														
				3 3										

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
27.3 / 85	SS	S-27	24/24	6 11	9			SM	With trace phosphate.					
								SC	**Clayey SAND**, fine, very dense, wet, dark greenish gray.					
22.3 / 90	SS	S-28A S-28B	24/24	10 40 52 32	92	4.25 4.5				52.3		47.5		
	RC		36/0						**LIMESTONE** sampled as Poorly Graded SAND with Gravel, very dense, wet, light brown; calcareous.					
17.3 / 95	SS	S-29	24/24	3 15 47 50	62						26.3/73.5	0.2		
12.3 / 100	SS	S-30	4/4	50/4	50/4									
7.3 / 105	SS	S-31	16/16	20 47 50/4	97/10				**LIMESTONE** sampled as Silty SAND with Gravel, fine to medium, very dense, wet, light brown; with phosphate.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
2.3 / 110	SS	S-32	10/10	30 66/4	66/4									
-2.7 / 115	SS	S-33	8/8	27 50/2	50/2			SC	**Clayey SAND**, fine, very dense, moist, greenish gray; with trace phosphate (medium sand size).					
-7.7 / 120	SS	S-34	14/14	34 68 50/2	118/8									
-12.7 / 125	SS	S-35	15/15	26 40 50/3	90/9									
-17.7 / 130	SS	S-36	20/20	18 34 47 50/2	81					28.6			85/24	

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SC						
	SS	S-37	17/17	22 28 50/5	77/11							25.4		
-22.7 135														
	SS	S-38	14/14	27 42 50/2	92/8									
-27.7 140														
	SS	S-39	13/13	20 48 50/1	98/7									
-32.7 145														
	SS	S-40	14/14	32 42 50/2	92/8									
-37.7 150									**Boring terminated at 149.1 feet BGS.**					
-42.7 155														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 106.7
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 119.1
Drillers: Marvin Strickland
Depth to Groundwater Level (ft.BGS): 2.0 (03/04/11)
Drilling Date: Start: 03-04-11 **End:** 03-07-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2146765.6 E 327479.8
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
106.7														
0	SS	S-1	18/12	3 5 9	14			SP	**Organic Topsoil.** **Poorly Graded SAND**, fine, medium dense, moist, gray; with trace small roots.					
	SS	S-2	18/12	6 15 20	35									
	SS	S-3	18/18	9 14 19	33									
101.7 5	SS	S-4	18/18	13 25 30	55				Grades to dense and wet.					
	SS	S-5	18/18	9 12 8	20			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark brown.			9.6		
	SS	S-6	18/16	11 13 17	30							7.2		
96.7 10	SS	S-7	18/14	8 13 10	23			SP	**Poorly Graded SAND**, fine, medium dense, wet, dark brown.					
	SS	S-8	18/18	6 8 13	21						0.0/96.0	4.0		

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Temporary 4-inch Steel Casing installed to 30 feet bls.

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9	24/20	8 14 13 13	27			SP						
91.7 15	SS	S-10A S-10B	24/17	3 1 4 8	5			SM	**Silty SAND**, fine, loose, wet, brown.			17.5		
	SS	S-11	24/18	9 12 24 31	36			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, brown; hardpan-type.					
86.7 20	SS	S-12	24/12	15 22 18 10	40			SP	**Poorly Graded SAND**, fine, dense, wet, brown.					
81.7 25	SS	S-13	24/12	13 20 27 25	47									
76.7 30	SS	S-14	24/14	5 9 22 28	31			SP	**Poorly Graded SAND**, fine, medium dense, wet, light gray.					
71.7 35	SS	S-15	24/24	17 34 60 65	94			SP-SM	**Poorly Graded SAND with Silt**, fine, very dense, wet, light gray.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP-SM						
	SS	S-16	15/12	21 44 50/3	94/9									
66.7 40														
	SS	S-17	21/16	11 32 56 50/3	88									
61.7 45														
	SS	S-18B S-18A S-18C	24/20	5 6 9 14	15			SC	**Clayey SAND**, fine, medium dense, wet, brown.			12.7		
56.7 50								SP	**Poorly Graded SAND**, fine, medium dense, wet, grayish brown.					
	SS	S-19	24/22	9 11 8 13	19						0.0/98.2	1.8		
51.7 55								SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, light brown.					
	SS	S-20	24/24	4 6 5 4	11							11.0		
46.7														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
46.7														
60								SP-SM						
	SS	S-21	24/24	4 6 7 8	13									
41.7														
65								SP	**Poorly Graded SAND**, fine, medium dense, wet, greenish gray.					
	SS	S-22	24/24	9 11 7 3	18									
36.7														
70														
	SS	S-23	24/18	5 6 6 7	12									
31.7														
75														
	SS	S-24	24/24	4 6 10 15	16									
26.7														
80														
				1 1				SC	**Clayey SAND**, fine, very loose, wet, dark greenish gray.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
21.7 / 85	SS	S-25	24/24	1 2	2	0.75		SC		44.9		24.9	49/21	
16.7 / 90	SS	S-26A S-26B	24/24	30 16 63 31	79				**LIMESTONE** sampled as Silty SAND, fine to medium, very dense, wet, brown; with some gravel/limestone (coarse sand to coarse gravel size). Calcareous. Highly reactive to HCL.					
11.7 / 95	SS	S-27	21/21	30 18 80 50/3	98						11.8/73.5	14.7		
6.7 / 100	SS	S-28	6/6	97 50/0	50/0			SM	**Silty SAND**, fine, very dense, wet, brown; with some gravel/limestone (coarse gravel size).					
1.7 / 105	SS	S-29	12/12	22 80 50/0	130/6				Grades to light greenish gray with trace phosphate (fine to medium sand size).					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
-3.3 / 110	SS	S-30	14/14	29 53 50/2	103/8			SC	**Clayey SAND**, fine, very dense, moist, greenish gray; with trace phosphate (medium sand size).			16.7		
-8.3 / 115	SS	S-31	10/10	28 50/4	50/4									
	SS	S-32	14/14	19 43 50/2	93/8							22.4		
-13.3 / 120									**Boring Terminated at 119.1 feet BGS.**					
-18.3 / 125														
-23.3 / 130														

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 104.6
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 150
Drillers: Marvin Strickland
Depth to Groundwater Level (ft.BGS): 2.5 (03/08/11)
Drilling Date: Start: 03-07-11 **End:** 03-08-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2149377.7 E 327587.3
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
104.6														
0				3					**Organic Topsoil.**					
	SS	S-1	18/6	3 3 6	9			SP	**Poorly Graded SAND**, fine, loose, moist, gray.					
	SS	S-2	18/15	4 6 10	16				Grades to medium dense.					
	SS	S-3	18/13	6 10 12	22			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, light brown.					
99.6 5	SS	S-4	18/14	7 9 11	20									
	SS	S-5	18/18	13 18 22	40				Grades to dense.					
	SS	S-6	18/18	21 39 33	72				Grades to very dense and dark brown.			11.1		
94.6 10	SS	S-7A S-7B	18/18	9 17 33	50			SM	**Silty SAND**, fine, very dense, wet, dark brown.					
	SS	S-8A S-8B	18/18	30 41 39	80			SP-SM	**Poorly Graded SAND with Silt**, fine to medium, very dense, wet, brown.					
								SP	**Poorly Graded SAND**, fine, very dense, wet light					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Temporary 4-inch Steel Casing installed to 70 feet bls.

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9	24/24	9 16 28 30	44			SP	brown. Grades to medium dense.		0.0/95.2	4.8		
89.6 15	SS	S-10	24/24	18 11 12 8	23									
	SS	S-11B S-11A S-11C	24/24	4 7 8 9	15			CL	**Sandy CLAY**, very stiff, wet, grayish brown.	17.9		77.3		
								SC	**Clayey SAND**, fine, loose, wet, dark grayish brown.					
	SS	S-12	24/24	5 3 2 2	5			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, brown.					
84.6 20														
	SS	S-13	24/24	5 6 6 8	12				Grades to medium dense.					
79.6 25														
	SS	S-14	24/12	17 19 24 21	43			SP	**Poorly Graded SAND**, fine, dense, wet, brown.		0.0/97.4	2.6		
74.6 30														
	SS	S-15	24/24	21 38 60 65	98									
69.6 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP						
	SS	S-16	24/12	4 4 5 3	9			SC	**Clayey SAND**, fine, loose, wet, dark bluish gray.					
64.6 40								SP	**Poorly Graded SAND**, fine, loose, wet, greenish gray.					
	SS	S-17	24/24	3 2 3 3	5									
59.6 45														
	SS	S-18	24/24	2 2 2 3	4									
54.6 50									Loss of drilling fluid circulation at 51 feet bls.					
	SS	S-19	24/6	WOR/15 1 3	1						0.0/96.6	3.4		
49.6 55														
	SS	S-20A S-20B S-20C	24/24	2 4 11 13	15			SM	**Silty SAND**, fine, medium dense, wet, brown.					
44.6									**LIMESTONE** sampled as Silty SAND, fine to					

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
44.6														
60									coarse, medium dense, wet, brown; with some gravel/limestone (coarse sand to coarse gravel size). Calcareous. Highly reactive to HCL.					
	SS	S-21A S-21B	24/24	6 10 9 13	19			SC	**Clayey SAND**, fine to medium, medium dense, wet, greenish gray; with some limetone gravel (medium sand to coarse gravel size).	23.5		16.4	28/6	
39.6														
65														
	SS	S-22A S-22B	16/16	4 10 50/4	60/10			SM	**Silty SAND**, fine to coarse, very dense, wet, light gray; trace limestone.					
34.6														
70														
	SS	S-23A S-23B S-23C	15/15	42 43 50/3	93/9				**LIMESTONE** sampled as Silty SAND, fine to coarse, very dense, wet, brown; with some gravel/limestone (coarse sand to coarse gravel size). Calcareous. Trace phosphates (fine sand size).					
29.6														
75														
	SS	S-24	10/10	24 75/4	75/4			SC	**Clayey SAND**, fine, very dense, moist, greenish gray; with trace phosphate (medium sand size).					
24.6														
80														
				20 56										

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
19.6 / 85	SS	S-25	15/15	50/3	106/9			SC						
14.6 / 90	SS	S-26	14/14	24 38 50/2	88/8									
9.6 / 95	SS	S-27	16/16	21 33 67/4	100/10									
4.6 / 100	SS	S-28	15/15	17 46 50/3	96/9									
-0.4 / 105	SS	S-29	16/16	18 34 50/4	84/10									

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
110 / -5.4	SS	S-30	14/14	17 52 50/2	102/8			SC						
115 / -10.4	SS	S-31A S-31B	21/21	15 37 35 50/3	72				Trace desiccated clay particles (coarse sand size).					
120 / -15.4	SS	S-32	15/15	17 33 50/3	83/9									
125 / -20.4	SS	S-33	17/17	18 45 50/5	95/11									
130 / -25.4	SS	S-34	15/15	16 50 50/3	100/9									

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SC						
-30.4 / 135	SS	S-35	14/14	27 70 50/2	120/8									
-35.4 / 140	SS	S-36A S-36B	24/24	22 26 42 50	68									
-40.4 / 145	SS	S-37	15/15	21 42 50/3	92/9									
-45.4 / 150	SS	S-38	24/24	19 18 37 42	55									
									Boring terminated at 150 feet BGS.					
-50.4 / 155														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 126.3
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 119.1
Drillers: Marvin Strickland
Depth to Groundwater Level (ft.BGS): 3.0 (03/09/11)
Drilling Date: Start: 03-09-11 **End:** 03-09-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2147245.7 E 325992.7
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
126.3														
0	SS	S-1	18/6	2 3 4	7			SP	**Organic Topsoil.** **Poorly Graded SAND**, fine, loose, moist, dark gray; trace roots.					
	SS	S-2	18/8	3 4 6	10				Grades to wet.					
	SS	S-3	18/12	4 6 7	13				Grades to brown.					
121.3 5	SS	S-4	18/18	2 2 3	5			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, dark brown; some organics (roots).	1.0		5.7		3.6
	SS	S-5	18/18	6 11 10	21									
	SS	S-6	18/18	8 16 18	34			SP	**Poorly Graded SAND**, fine, dense, wet, mixed brown with light brown.					
116.3 10	SS	S-7	18/18	8 8 9	17			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark brown.					
	SS	S-8	18/18	11 10 14	24			SP	**Poorly Graded SAND**, fine, medium dense, wet, brown.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9	24/20	6 8 10 11	18			SP			0.0/98.2	1.8		
111.3 15	SS	S-10	24/24	12 16 18 20	34									
	SS	S-11	24/14	6 12 13 16	25									
	SS	S-12	24/22	20 14 15 14	29				Grades fine to medium.					
106.3 20														
	SS	S-13	24/20	4 6 13 20	19									
101.3 25														
	SS	S-14	24/18	11 15 25 21	40				Grades to grayish brown.					
96.3 30														
	SS	S-15	24/24	13 15 19 18	34			SP-SM	**Poorly Graded SAND with Silt**, fine, dense, wet, dark brown.	0.1		7.5		1.8
91.3 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP-SM						
	SS	S-16	24/14	12 16 23 33	39			SP	**Poorly Graded SAND**, fine to medium, dense, wet, brown.					
86.3 40														
	SS	S-17	24/12	13 18 28 39	46									
81.3 45														
	SS	S-18	24/18	13 19 35 50/4	54			SW	**Well Graded SAND**, fine to coarse, dense, wet, brown.		1.1/96.8	2.1		
76.3 50														
	SS	S-19	24/18	12 19 27 40	46									
71.3 55								SP	**Poorly Graded SAND**, fine, dense, wet, light brown.					
	SS	S-20	24/12	11 14 19 23	33									
66.3														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
66.3														
60								SP						
	SS	S-21	24/24	8 7 8 8	15									
61.3														
65														
	SS	S-22	24/24	7 9 12 14	21									
56.3														
70														
	SS	S-23	24/18	10 14 22 20	36									
51.3														
75														
	SS	S-24	24/24	3 2 3 3	5			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, light brown.			11.2		
46.3														
80														
				3 3										

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
41.3 / 85	SS	S-25	24/24	5 6	8			SP-SM						
36.3 / 90	SS	S-26	24/24	6 6 7 13	13									
31.3 / 95	SS	S-27	24/24	2 3 5 18	8			SP-SC	**Poorly graded SAND with Clay**, fine, loose, wet, dark greenish gray.			8.4		
26.3 / 100	SS	S-28A S-28B	24/24	7 5 8 9	13			MH	Grades to medium dense and dark green. Sandy SILT, stiff, wet, dark green.	32.9		55.3	51/7	
21.3 / 105	SS	S-29	21/21	17 32 38 50/3	70				**LIMESTONE** sampled as Silty SAND with Gravel, fine to coarse, very dense, wet, light gray; Calcareous.		15.3/69.3	15.4		

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-30	24/24	32 23 28 25	51									
16.3 110														
	SS	S-31	8/8	52 50/2	50/2				Grades with trace phosphates (fine to medium sand size).					
11.3 115														
	SS	S-32	14/14	22 85 50/2	135/8									
6.3 120									**Boring terminated at 119.1 feet BGS.**					
1.3 125														
-3.7 130														

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 145.6
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 140
Drillers: Marvin Strickland
Depth to Groundwater Level (ft.BGS): 3.0 (03/10/11)
Drilling Date: Start: 03-10-11 **End:** 03-11-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2144764.9 E 324811.1
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
145.6														
0	SS	S-1	18/6	3 3 4	7			SP	**Organic Topsoil.** **Poorly Graded SAND**, fine, loose, dry, gray.					
	SS	S-2	18/6	3 3 6	9									
	SS	S-3	18/12	4 6 9	15			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, brown; with trace organics.					
140.6 5	SS	S-4	18/14	5 6 6	12									
	SS	S-5	18/14	3 4 6	10				Grades to dark brown and with small roots.	0.1		7.7		0.3
	SS	S-6	18/12	7 9 10	19									
135.6 10	SS	S-7	18/14	3 3 5	8			SP	**Poorly Graded SAND**, fine, loose to medium dense, wet, grayish brown.					
	SS	S-8	18/24	4 7 5	12						0.0/97.7	2.3		

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Temporary 4-inch Steel Casing installed to 60 feet bls.

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9	24/20	2 5 11 15	16			SP						
130.6 15	SS	S-10A S-10B	24/24	15 18 24 16	42			SM	**Silty SAND**, fine, dense, wet, very dark gray to black; hardpan-type.					
	SS	S-11	24/24	13 23 16 16	39					0.2		12.7		0.9
	SS	S-12	24/18	12 14 15 18	29				Grades to very dark brown.					
125.6 20	SS	S-13	24/24	8 12 14 18	26			SW	**Well Graded SAND**, fine to coarse, medium dense, wet, brown.					
								SC	**Clayey SAND**, fine, medium dense, wet, brown.					
120.6 25	SS	S-14	24/24	5 8 8 4	16					19.2		22.0	20/4	
	SS	S-15	24/24	3 5 8 13	13			SM	**Sitly SAND**, fine, medium dense, wet, light brown.					
115.6 30								SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, light brown.					
	SS	S-16	24/24	7 5 8 10	13							8.3		
110.6 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP-SM						
	SS	S-17	24/24	8 10 14 14	24									
105.6 40														
	SS	S-18	24/12	9 13 20 24	33				Grades to dense.					
100.6 45														
								SW	**Well Graded SAND**, fine to medium, very dense, wet, dark grayish brown.					
	SS	S-19	22/14	14 28 40 50/4	68									
95.6 50														
	SS	S-20	24/16	15 27 44 53	71			SP	**Poorly Graded SAND**, fine, very dense, wet, light brown.		0.8/95.9	3.3		
90.6 55														
	SS	S-21	24/14	9 17 20 27	37									
85.6														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
85.6														
60								SP						
	SS	S-22	24/16	11 16 24 24	40									
80.6														
65														
	SS	S-23	24/14	13 16 26 25	42				Grades to dense.					
75.6														
70														
	SS	S-24	24/16	11 19 25 25	44			SP	**Poorly Graded SAND**, fine to medium, dense, grayish brown; with little gravel (fine gravel size).					
70.6														
75														
	SS	S-25	24/16	18 27 30 24	57							4.3		
65.6														
80														
				7 21										

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-26	24/20	26 28	47			SP						
60.6 85														
	SS	S-27	24/24	9 14 16 17	30									
55.6 90									Partial loss of drilling fluid circulation at 92 feet.					
	SS	S-28	24/18	10 12 16 12	28									
50.6 95														
	SS	S-29	24/8	10 12 17 13	29						0.7/98.2	1.3		
45.6 100														
	SS	S-30	24/14	12 14 15 20	29									
40.6 105														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
35.6 / 110	SS	S-31	24/24	11, 13, 14, 18	27			SP						
30.6 / 115	SS	S-32	24/0	8, 11, 16, 11	27									
25.6 / 120	SS	S-33	24/14	5, 6, 3, 4	9									
20.6 / 125	SS	S-34	24/14	4, 3, 3, 4	6									
15.6 / 130	SS	S-35	24/12	5, 6, 5, 8	11									

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP						
10.6 / 135	SS	S-36A S-36B	36/12	WOR/30 10	WOR			SM	**Silty SAND**, fine, very loose, wet, greenish gray; calcareous.					
									Total loss of drilling fluid circulation.					
5.6 / 140	SS	S-37A S-37B	24/24	9 26 19 46	45			SC	**Clayey SAND**, fine, very dense, wet, dark greenish gray.`	43.5 41.3		26.8		
									Boring terminated at 140 feet BGS.					
0.6 / 145														
-4.4 / 150														
-9.4 / 155														

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 145.7
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 139.5
Drillers: Marvin Strickland
Depth to Groundwater Level (ft.BGS): 4.7 (04/26/11)
Drilling Date: Start: 03-11-11 **End:** 03-12-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2145673.7 E 324812.7
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
145.7														
0	SS	S-1	18/14	3 3 10	13			SP	**Organic Topsoil.** **Poorly Graded SAND**, fine, medium dense, dry, gray; with trace small roots.					
	SS	S-2	18/12	9 7 8	15									
	SS	S-3	18/14	4 3 2	5			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, moist, brown.					
140.7 5	SS	S-4	18/12	3 4 4	8									
	SS	S-5	18/18	3 2 2	4			SM	**Silty SAND**, fine, loose, wet, very dark gray to black.					
	SS	S-6	18/18	5 5 6	11					0.1		13.5		0.5
135.7 10	SS	S-7	18/18	3 5 20	25									
	SS	S-8	18/18	15 12 17	29									

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Temporary 4-inch Steel Casing installed to 20 feet bls.

*California Sampler and 300-lb hammer.

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9	24/24	5 11 18 20	29			SM				14.5		
130.7 15	SS	S-10A S-10B S-10C	24/24	29 23 44 62	67			SC	**Clayey SAND**, fine, very dense, wet, brown.	25.5				
	SS	S-11A S-11B	24/24	9 18 22 27	40			SM	**Silty SAND**, fine, dense, wet, light brown			47.0		
								SP	**Poorly Graded SAND**, fine to medium, very dense, wet, light gray to white.					
	SS	S-12	24/20	19 41 32 32	73						1.4/96.1	2.5		
125.7 20														
	SS	S-13	24/24	5 10 6 5	16			SP	**Poorly Graded SAND**, fine medium dense, wet, light greenish gray.					
120.7 25														
								SM	**Silty SAND**, fine, loose, wet, light brown.					
	SS	S-14A S-14B	24/24	3 3 6 5	9									
115.7 30														
	SS	S-15	24/16	7 9 11 13	20			SW	**Well Graded SAND**, fine to medium, medium dense, wet, light gray to white.					
110.7 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SW						
	SS	S-16	24/24	6 8 9 9	17			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, light gray.					
105.7 40														
	SS	S-17	24/18	10 7 7 11	14				Grades to very light brown.			10.5		
100.7 45														
	SS	S-18	24/24	6 5 7 11	12									
95.7 50														
	SS	S-19	24/22	7 9 12 15	21				Grades to light gray.					
90.7 55														
	SS	S-20	24/20	10 17 26 25	43			SP	**Poorly Graded SAND**, fine, dense, wet, greenish gray.		0.0/98.2	1.8		
85.7														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
85.7														
60								SP						
	SS	S-21	24/14	13 18 20 19	38									
80.7														
65														
	SS	S-22	24/18	6 9 22 28	31									
75.7														
70														
	SS	S-23	24/12	10 16 17 21	33									
70.7														
75														
	SS	S-24	24/14	8 13 15 19	28				Grades to medium dense.					
65.7														
80														
				9 17										

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
60.7 / 85	SS	S-25	24/12	26 27	43			SP						
								SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, greenish gray.					
55.7 / 90	SS	S-26	24/12	15 14 15 17	29							7.1		
50.7 / 95	SS	S-27	24/14	8 12 11 9	23									
45.7 / 100	SS	S-28	24/14	7 11 16 15	27									
								SP	**Poorly Graded SAND**, fine, medium dense, wet, greeenish gray and brown.					
40.7 / 105	SS	S-29	24/14	9 12 19 19	31						0.0/98.6	1.4		

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
35.7 / 110	SS	S-30	24/14	10, 6, 6, 4	12			SP						
30.7 / 115	SS	S-31	24/24	3, 2, 4, 6	6									
25.7 / 120	SS	S-32	24/24	3, 4, 6, 8	10									
20.7 / 125	SS	S-33A, S-33B, S-33C	24/24	6, 7, 3, 7	10			CL	**Clay**, stiff, wet, greenish gray.			64.6		
								SC	**Clayey SAND**, fine, medium dense, wet, greenish gray.			34.2		
15.7 / 130	SS	S-34	24/24	13, 27, 47, 53	74				**LIMESTONE** sampled as Silty SAND, fine to coarse, very dense, wet, light greenish gray; with trace gravel (coarse sand to fine gravel size).					

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-35	16/16	21 26 50/4	76/10									
10.7 135														
	CS	CA-1	18/18	86 112 133	245	*						41.4		
5.7 140									**Boring Terminated at 139.5 feet BGS.**					
0.7 145														
-4.3 150														
-9.3 155														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 138.0
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 138.6
Drillers: Marvin Strickland
Depth to Groundwater Level (ft.BGS): 4.6 (04/25/11)
Drilling Date: Start: 03-13-11 **End:** 03-14-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2147746.3 E 324805.1
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
138.0														
0	SS	S-1	18/7	2 5 5	10				**Organic Topsoil** consisting of Poorly Graded SAND with Silt, fine, medium dense, moist, dark brown; with trace small roots.					
	SS	S-2	18/12	5 7 9	16			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark reddish brown.					
	SS	S-3	18/12	3 1 1	2			SP-SM	**Poorly Graded SAND with Silt**, fine, very loose to loose,wet, light gray.					
133.0 5	SS	S-4	18/14	3 3 4	7							9.1		
	SS	S-5	18/18	8 11 15	26			SM	**Silty SAND**, fine, medium dense, wet, light gray.	21.6				
	SS	S-6	18/18	9 10 9	19							27.8		
128.0 10	SS	S-7	18/18	2 3 3	6				Grades to loose.					
	SS	S-8A S-8B S-8C	18/18	3 3 4	7			SM	**Silty SAND**, fine, loose, wet, light brown.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

SPT BORING LOG
CDM-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9A S-9B S-9C	24/24	6 5 10 17	15			SC	**Clayey SAND**, medium dense, moist, gray; with seams of gray fine sand.			46.6		
123.0 15	SS	S-10	24/18	11 9 14 16	23			SP	**Poorly Graded SAND**, fine to medium, medium dense, wet, very light brown to white.					
	SS	S-11A S-11B	24/24	6 4 5 7	9			SP			1.7/97.3	1.0 22.3		
	SS	S-12A S-12B	24/24	3 3 4 6	7			SM	**Silty SAND**, fine, loose, wet, light gray.					
118.0 20	SS	S-13A S-13B	24/24	2 3 4 6	7			SP	**Poorly Graded SAND**, medium to coarse, loose, wet, light gray.			16.3		
								SC	**Clayey SAND**, fine, loose, moist, light brown.					
113.0 25	SS	S-14	24/24	3 2 1 1	3			SP-SM	**Poorly Graded SAND with Silt**, fine, very loose to loose, wet, light brown.					
108.0 30	SS	S-15	24/24	3 2 2 4	4									
103.0 35	SS	S-16	24/24	3 4 4 6	8							11.8		

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP-SM						
	SS	S-17	24/24	3 3 3 5	6									
98.0 40														
								SP-SM	**Poorly Graded SAND with Silt**, fine, wet, medium dense, light brown.					
	SS	S-18	24/16	6 10 11 12	21									
93.0 45														
	SS	S-19	24/18	8 10 16 17	26							8.8		
88.0 50														
								SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, greenish gray.					
	SS	S-20	24/24	7 10 10 9	20									
83.0 55														
								SP	**Poorly Graded SAND**, fine, medium dense, wet, greenish gray.					
	SS	S-21	24/18	6 7 8 10	15									
78.0														

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
78.0														
60								SP			0.0/98.0	2.0		
	SS	S-22	24/18	4 4 7 15	8									
73.0														
65														
	SS	S-23	24/12	10 13 35 36	53			SM	**Silty SAND**, fine, very dense, wet, gray.			12.3		
68.0														
70														
	SS	S-24	24/12	16 20 42 50/4	62									
63.0														
75														
	SS	S-25	24/12	20 48 53 54	103									
58.0														
80														
				12 15										

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
53.0	SS	S-26	24/12	19 25	34			SM						
85														
	SS	S-27	24/24	4 4 6 8	10			SM	**Silty SAND**, fine, medium dense, wet, greenish gray.					
48.0														
90														
	SS	S-28	24/20	3 3 4 7	7							12.3		
43.0														
95														
	SS	S-29	24/24	4 6 9 16	15			SP	**Poorly Graded SAND**, fine, medium dense to dense, wet, greenish gray.					
38.0														
100														
	SS	S-30	24/24	4 5 7 10	12						0.0/97.4	2.6		
33.0														
105														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-31	24/24	9 12 13 16	25			SP						
28.0 110								ML	**Sandy SILT**, hard, wet, greenish gray.					
	SS	S-32	24/22	19 45 33 50/4	78				**LIMESTONE** sampled as Clayey SAND, fine to medium, very dense, greenish gray.			42.2		
23.0 115														
	SS	S-33	24/22	24 21 15 39	36				Grades to medium dense.					
18.0 120														
	SS	S-34	14/14	24 70 50/2	120/8			SC	**Clayey SAND**, fine, very dense, moist, brown; with trace gravel (LIMESTONE) up to 1/4-inch size).					
13.0 125														
	SS	S-35	6/6	110/6	110/6							44.4		
8.0 130														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SC						
	SS	S-36	9/9	64 70/3	70/3					28.2				
3.0 135														
								CH	**Sandy CLAY**, hard, moist, greenish gray.					
	SS	S-37	7/7	42 54/1	54/1									
									Boring Terminated at 138.6 feet BGS.					
-2.0 140														
-7.0 145														
-12.0 150														
-17.0 155														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 127.1
Drilling Method/Rig: Mud Rotary/Dietrich D-50
Total Depth (ft.): 119.3
Drillers: Marvin Strickland
Depth to Groundwater Level (ft.BGS): 4.3 (03/21/11)
Drilling Date: Start: 03-15-11 **End:** 03-21-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2149210.7 E 325033.7
Logged By: Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
127.1														
0	SS	S-1	18/12	3 4 4	8			SP	**Organic Topsoil.** **Poorly Graded SAND**, fine, loose, dry, light gray.					
	SS	S-2	18/14	4 5 5	10			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, moist, dark brown. Grades to brown.					
	SS	S-3	18/18	1 1 2	3				Grades to wet and with trace small roots. Tree root encountered.					
122.1 5	SS	S-4	18/18	11 23 12	35			SM	**Silty SAND**, fine, dense, wet, gray.			12.7		
	SS	S-5	18/18	5 9 11	20			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, gray.			7.9	21/NP	
	SS	S-6	18/16	11 3 4	7			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, very dark gray to black.					
117.1 10	SS	S-7	18/14	4 5 7	12			SP-SM	**Poorly Graded SAND with Silt**, fine medium dense, wet, brown.			5.8		
	SS	S-8	18/16	8 9 9	18			SP	**Poorly Graded SAND**, fine, loose to medium dense, wet, brown.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Temporary 4-inch Steel Casing installed to 80 feet bls.

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 07-27-11

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-9	24/18	5 4 4 7	8			SP			0.0/98.9	1.1		
112.1 15	SS	S-10	24/20	4 5 7 9	12									
	SS	S-11	24/20	6 5 6 10	11			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark brown to dark reddish brown.					
	SS	S-12	24/24	10 11 11 10	22							6.7		
107.1 20														
								SP	**Poorly Graded SAND**, fine, dense, wet, very light gray to white.					
	SS	S-13	24/18	9 13 18 17	31									
102.1 25														
	SS	S-14	24/18	13 19 22 45	41			SP	**Poorly Graded SAND**, fine to medium, dense, wet, brown; with trace gravel (coarse sand to fine gravel size).					
97.1 30														
	SS	S-15	24/18	15 19 11 6	30			GW	**Well Graded Gravel with Sand**, dense, wet, grayish brown.					
92.1 35								SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, grayish brown; with trace gravel (coarse sand size).					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP-SM						
	SS	S-16	24/24	5 6 5 5	11				Grades to very light gray to white.					
87.1 40														
	SS	S-17	24/24	4 5 5 5	10							9.3		
82.1 45														
								SP-SC	**Poorly Graded SAND with Clay**, fine, loose, wet, light brown.					
	SS	S-18	24/24	3 3 6 7	9									
77.1 50														
	SS	S-19	24/18	5 5 7 8	12			SP	**Poorly Graded SAND**, fine, medium dense, wet, light brown.		0.0/97.6	2.4		
72.1 55														
	SS	S-20	24/20	3 2 3 4	5									
67.1														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
67.1														
60								SP	Grades to loose and greenish gray.					
	SS	S-21	24/24	3 2 3 6	5			SM	**Silty SAND**, fine, loose, wet, greenish gray.					
62.1														
65														
	SS	S-22	24/24	4 3 3 4	6									
57.1														
70								SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, greenish gray.					
	SS	S-23	24/24	2 3 6 6	9							8.6	17/NP	
52.1														
75														
	SS	S-24	24/24	3 4 6 9	10			SM	**Silty SAND**, fine, loose, wet, greenish gray.					
47.1														
80									Grades to light gray.					
				6 59				SM	**Silty SAND**, fine to medium, very dense, wet, light greenish gray; with trace gravel/limestone (medium sand size).					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
42.1	SS	S-25	13/13	50/1	109/7			SM						
85														
	SS	S-26A S-26B	20/20	9 10 29 50/2	39				**LIMESTONE** sampled as Silty SAND, fine to medium, dense, wet, very light gray; with trace gravel/limestone up to 1/8-inch size; calcareous.					
37.1												37.4		
90														
	SS	S-27	24/24	25 34 36 60	70			SP-SM	**Poorly Graded SAND with Silt**, fine, very dense, moist, light brown; with trace limestone fragments 1/2- to 1-inch size; highly reactive to HCL.					
32.1														
95									Hard Drilling.					
	SS	S-28	23/23	47 44 50 50/5	94			SC	**Clayey SAND**, fine, very dense, wet, greenish gray; with trace gravel/limestone up to 1/2-inch size.					
27.1														
100														
	SS	S-29	16/16	16 23 50/4	73/10									
22.1														
105									Grades with phosphate (fine to medium sand size).					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-30	19/19	12 19 50 50/1	69			SC	Grades without gravel/limestone and phosphate.					
17.1 110														
	SS	S-31	16/16	17 33 50/4	83/10									
12.1 115														
	SS	S-32	16/16	19 33 50/4	83/10									
7.1 120									**Boring terminated at 119.3 feet BGS.**					
2.1 125														
-2.9 130														

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 134.9
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 148.9
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 2.3 (11/9/11)
Drilling Date: Start: 11-08-11 **End:** 11-09-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2144860 E 325395
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
134.9														
0	SS	S-1	24/4	WOR WOR WOH WOH	WOH			PT	**PEAT**, very soft, wet, very dark brown; with roots and decayed wood.					
	SS	S-2	24/12	WOR WOR WOH WOH	WOH			SP-SM PT	**Poorly Graded SAND with Silt**, fine, very loose, wet, dark brown; with few organics. **PEAT**, very soft, wet, very dark brown; with roots and decayed wood.	73.2		5.8		8.8
129.9 5	SS	S-3	24/14	1 1 1 1	2					213.3				12.4
	SS	S-4	24/24	3 6 7 8	13			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, very dark gray to black; trace organic staining.					
	SS	S-5	24/24	4 8 10 12	18				Grades with more organic staining.					
124.9 10	SS	S-6	24/24	10 18 22 23	40				Same as above.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-7	24/18	18 20 22 25	42			SP-SM	Same as above.					
									Grades to very dense.					
119.9 15	SS	S-8A S-8B	24/24	17 25 27 28	52			SM	**Silty SAND**, fine, medium dense, wet, reddish brown.					
	SS	S-9	24/24	5 5 7 7	12									
	SS	S-10	24/24	5 5 6 5	11			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, light brown.					
114.9 20														
	SS	S-11	24/20	3 5 6 7	11				Same as above.			9.6		
109.9 25														
	SS	S-12	24/20	5 7 9 11	16				Grades to brown.					
104.9 30								SW	**Well Graded SAND**, fine to medium, dense, wet, gray.					
	SS	S-13A S-13B	24/24	8 13 23 37	36			SP	**Poorly Graded SAND**, fine, dense, wet, light brown.					
99.9 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP						
	SS	S-14	24/12	9 15 20 23	35				Same as above.					
94.9 40														
	SS	S-15	24/14	14 18 27 47	45				Same as above.					
89.9 45														
	SS	S-16	24/18	10 13 15 17	28				Grades to medium dense.					
84.9 50														
	SS	S-17	24/14	21 32 42 48	74			SP-SM	**Poorly Graded SAND with Silt**, fine, very dense, wet, light brown.			11.8		
79.9 55														
	SS	S-18	24/14	7 6 15 20	21				Grades to medium dense.					
74.9														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
74.9 60								SP-SM						
	SS	S-19	24/16	13 15 20 24	35			SP	**Poorly Graded SAND**, fine, dense, wet, grayish brown.					
69.9 65														
	SS	S-20	24/16	12 20 18 21	38				Same as above.					
64.9 70														
	SS	S-21	24/14	11 18 15 22	33			SP-SM	**Poorly Graded SAND with Silt**, fine, dense, wet, greenish gray.					
59.9 75														
	SS	S-22	24/16	22 25 32 38	57				Grades to very dense.					
54.9 80														
				18 24					Same as above.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
49.9 / 85	SS	S-23	24/14	28 36	52			SP-SM						
44.9 / 90	SS	S-24	24/16	26 28 36 40	64				Same as above.			6.4		
39.9 / 95	SS	S-25	17/12	28 48 50/5	98/11				Same as above.					
34.9 / 100	SS	S-26	15/15	40 43 50/3	93/9				Same as above.					
29.9 / 105	SS	S-27	24/20	11 15 21 28	36									

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
24.9 / 110	SS	S-28	24/24	6, 9, 18, 26	27			SP-SM						
								SP	**Poorly Graded SAND**, fine, medium dense, wet, greenish gray.					
19.9 / 115	SS	S-29	24/24	6, 8, 17, 20	25							4.2		
								SP	**Poorly Graded SAND**, fine, very dense, wet, brown, trace clay and gravel/limestone (fine sand size).					
14.9 / 120	SS	S-30	24/24	33, 42, 48, 50	90									
9.9 / 125	SS	S-31	5/5	50/5	50/5				**-LIMESTONE-** Sampled as Well Graded Gravel with Sand and Silt, very hard, moist, light gray (Calcareous).					
4.9 / 130	SS	S-32	5/5	50/5	50/5									

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
-0.1 / 135	SS	S-33	21/21	24 31 31 50/5	62									
-5.1 / 140	SS	S-34	9/9	50 50/3	50/3			ML	**-HAWTHORNE FORMATION-** **Silt**, hard, wet, light brown trace, gravel/limestone (fine gravel size).					
-10.1 / 145	SS	S-35	11/11	32 50/5	50/5				Grades without gravel/limestone.					
	SS	S-36	11/11	33 50/5	50/5									
-15.1 / 150									**Boring terminated at 148.9 feet BGS.**					
-20.1 / 155														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 117.2
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 148.3
Drillers: Josh Miller
Depth to Groundwater Level (ft.BGS): 5.2 (11/15/11)
Drilling Date: Start: 11-15-11 **End:** 11-15-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2144724 E 326888
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
117.2														
0	SS	S-1	24/12	2 2 2 2	4			SP-SM	**Organic Topsoil.** **Poorly Graded SAND with Silt and Organics**, fine, loose, dry, gray.					
	SS	S-2	24/24	3 3 5 8	8			SP	**Poorly Graded SAND**, fine, loose, moist, brown.			2.8		
112.2 5	SS	S-3	24/16	6 8 8 12	16				Grades to wet and gray.					
	SS	S-4	24/24	11 13 18 15	31			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark brown, trace organic staining.					
	SS	S-5	24/24	7 14 15 16	29				Same as above.					
107.2 10	SS	S-6	24/14	9 14 15 16	29			SP	**Poorly Graded SAND**, fine, medium dense, wet, dark grayish brown.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

SPT BORING LOG
CDM-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-7	24/24	22 26 27 26	53			SP-SM	**Poorly Graded SAND with Silt**, fine, very dense, wet, very dark brown; trace organic stained.					
102.2 15	SS	S-8	24/20	16 14 13 12	27									
	SS	S-9	24/24	15 21 33 19	54			SP	**Poorly Graded SAND**, fine, very dense, wet, dark brown.					
	SS	S-10	24/18	13 9 6 5	15				Grades to medium dense and grayish brown.					
97.2 20														
	SS	S-11	24/24	3 2 1 2	3			SM	**Silty SAND**, fine, very loose, wet, dark grayish brown.					
92.2 25														
	SS	S-12	24/24	3 2 2 2	4	0.75		MH	**SILT**, soft, wet, brown.	59.3		63.5	51/15	
87.2 30														
	SS	S-13	24/20	8 10 19 20	29			SP	**Poorly Graded SAND**, fine, medium dense, wet, gray.					
82.2 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP						
	SS	S-14	24/16	22 23 43 44	66				**Poorly Graded SAND**, fine, very dense, wet, light brown.					
77.2 40														
	SS	S-15	24/18	18 21 37 34	58				Grades to greenish gray.					
72.2 45														
	SS	S-16	24/16	33 34 37 33	71				Grades to grayish brown.					
67.2 50														
	SS	S-17	11/11	23 50/5	50/5				Same as above.					
62.2 55														
	SS	S-18	5/5	50/5	50/5				Same as above.			4.4		
57.2														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
57.2														
60								SP						
	SS	S-19	22/20	37 42 47 50/4	89				**Poorly Graded SAND**, fine, very dense, wet, grayish brown.					
52.2														
65														
	SS	S-20	24/22	9 12 11 12	23				Grades to medium dense.					
47.2														
70														
	SS	S-21	24/24	21 15 15 16	30			SP-SM	**Poorly Graded SAND with Silt**, fine, dense, wet, light greenish gray.					
42.2														
75														
	SS	S-22	24/24	10 8 8 9	16				Grades to medium dense.					
37.2														
80														
				13 18				SP-SM	Same as above.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
32.2 / 85	SS	S-23	24/24	24 30	42			SP-SM						
								SP-SM	Grades to dense.					
27.2 / 90	SS	S-24	24/24	11 13 15 15	28									
22.2 / 95	SS	S-25	24/24	11 9 13 25	22			SC	**Clayey SAND**, fine, medium dense, wet, greenish gray.					
17.2 / 100	SS	S-26A S-26B	24/24	9 8 11 13	19	2.5		CH	**CLAY**, very stiff, wet, greenish gray.					
12.2 / 105	SS	S-27	5/5	50/5	50/5				**-LIMESTONE-** Sampled as Well Graded Gravel with Sand and Silt, hard, wet, gray; (Calcareous).					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
7.2	SS	S-28	16/16	14 26 50/4	76/10			SM	**Silty SAND with Gravel/Limestone**, fine to medium, very dense, wet, gray; (Calcareous).					
110														
2.2	SS	S-29	11/11	29 50/5	50/5			SM-SC	**Silty/Clayey SAND**, fine, very dense, wet, light greenish gray, with some gravel/limestone fragments (fine sand to fine gravel size). (Calcareous).					
115														
								ML	**Sandy SILT**, hard, wet, light brown; trace gravel/limestone fragments, (fine sand to coarse gravel size).					
	SS	S-30	11/11	24 50/5	50/5									
-2.8														
120														
	SS	S-31	5/5	50/5	50/5				Same as above.					
-7.8														
125														
	SS	S-32	10/10	36 50/4	50/4			SM	**Silty SAND**, fine, very dense, moist, greenish gray.					
-12.8														
130														

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SM						
	SS	S-33	5/5	50/5	50/5			ML	**SILT**, hard, wet, greenish gray.					
-17.8 / 135														
	SS	S-34	5/5	50/5	50/5				Grades with trace gravel/limestone fragments (fine to coarse sand size).					
-22.8 / 140														
	SS	S-35	10/10	36 50/4	50/4				Same as above.					
-27.8 / 145														
	SS	S-36	3/3	50/3	50/3									
									Boring terminated at 148.3 feet BGS.					
-32.8 / 150														
-37.8 / 155														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-101

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 97.2
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 30
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 2.8 (11/4/11)
Drilling Date: Start: 11-04-11 **End:** 11-04-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2149076 E 328382
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
97.2														
0	SS	S-1	24/16	3 2 2 3	4			SP	**Poorly Graded SAND**, fine, loose, moist, mottled brown and gray.					
	SS	S-2	24/24	3 2 3 3	5			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, brown.			7.6		
92.2 5	SS	S-3	24/24	3 3 7 11	10			SP-SM	Same as above.					
	SS	S-4	24/18	3 7 7 9	14			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, brown.					
	SS	S-5	24/18	8 11 12 12	23			SP-SM	Grades to light brown.			7.3		
87.2 10	SS	S-6A S-6B	24/24	10 10 10 7	20			SM	**Silty SAND**, fine, medium dense, wet, dark gray.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-101

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-7	24/24	1 1 1 1	2			SM		19.7		36.9	83/37	0.9
82.2 15	SS	S-8	24/24	2 2 4 4	6			SM	**Silty SAND**, fine, loose, wet, gray.					
	SS	S-9A S-9B	24/24	4 6 7 7	13				Grades to dark gray.					
								SM	**Silty SAND**, fine, medium dense, wet, grayish brown.					
	SS	S-10	24/24	4 6 8 11	14			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, grayish brown.					
77.2 20														
								CH	**CLAY**, very stiff, wet, dark gray.					
	SS	S-11	24/24	12 14 12 12	26									
72.2 25														
	SS	S-12	24/24	5 6 7 8	13	3.75			Grades to stiff.					
67.2 30									**Boring terminated at 30 feet BGS.**					
62.2 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-102

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 98.2
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 50
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 2.5 (11/3/11)
Drilling Date: Start: 11-02-11 **End:** 11-03-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2148359 E 327934
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
98.2														
0	SS	S-1	24/24	1 2 3 3	5			SP-SM	**Poorly Graded SAND with Silt,** fine, loose, moist, dark brown.					
	SS	S-2	24/24	4 6 7 6	13			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, gray.					
93.2 5	SS	S-3	24/24	9 11 14 18	25				Same as above.					
	SS	S-4	24/18	9 11 10 11	21			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, light gray.		0.9/93.6	5.5		
	SS	S-5A S-5B	24/24	6 11 11 10	22			SM	**Silty SAND**, fine, medium dense, wet, gray.		0.0/82.5	17.5		
88.2 10	SS	S-6A S-6B	24/24	5 7 9 8	16			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, gray.					
								SM	**Silty SAND**, fine, medium dense, wet, light gray.					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

SPT BORING LOG
CDM-102

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-7	24/24	3 5 5 6	10			SM						
83.2 15	SS	S-8	24/18	6 8 9 8	17				**Silty SAND**, fine, medium dense, wet, light gray.					
	SS	S-9	24/24	4 11 10 12	21				Grades to gray.	19		37.4	37/16	
	SS	S-10	24/16	6 8 8 8	16			CH	**CLAY**, very stiff, wet, light gray.					
78.2 20														
	SS	S-11A S-11B	24/24	4 11 18 39	29			SP	**Poorly Graded SAND**, fine, medium dense, wet, mottled, light gray and brown.					
73.2 25														
	SS	S-12	10/10	27 50/4	50/4				Grades to light brown.					
68.2 30														
								CH	**CLAY**, stiff, wet, greenish gray.					
	SS	S-13A S-13B	24/14	5 8 8 13	16			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, grayish brown.					
63.2 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-102

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SP-SM						
	SS	S-14	24/22	10 12 19 27	31			SP	**Poorly Graded SAND**, fine, dense, wet, greenish gray.					
58.2 40														
	SS	S-15	24/24	10 17 27 46	44				Same as above.					
53.2 45														
	SS	S-16	24/24	9 17 31 43	48				Same as above.		1.5/96.0	1.5		
48.2 50									**Boring terminated at 50 feet BGS.**					
43.2 55														
38.2														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-103

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 98.9
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 32
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 4.5 (11/3/11)
Drilling Date: Start: 11-03-11 **End:** 11-03-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2147712 E 327934
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
98.9														
0	SS	S-1	24/18	3 3 3 5	6			SP	**Poorly Graded SAND**, fine, loose, dry, grayish brown.					
	SS	S-2	24/24	5 7 8 9	15				Grades to medium dense.					
93.9 5	SS	S-3A S-3B	24/20	7 13 14 18	27			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, grayish brown.					
								SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark brown; organic stained.					
	SS	S-4	24/18	13 15 35 50	50			SM	**Silty SAND**, fine, very dense, wet, dark brown; partially cemented, hardpan-type.					
	SS	S-5	24/24	36 47 35 32	82				Same as above.					
88.9 10	SS	S-6	24/20	13 28 21 22	49			SP-SM	**Poorly Graded SAND with Silt**, fine, dense, wet, reddish brown.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-103

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-7	24/24	6 12 15 17	27			SP-SM	Same as above.					
83.9 15	SS	S-8A S-8B	24/24	8 13 15 17	28	3.25		SP-SM CH	Same as above. **CLAY**, very stiff, wet, dark brown.					
	SS	S-9	24/16	1 3 2 1	5			SP SM	**Poorly Graded SAND**, fine, loose, wet, dark gray. **Silty SAND**, fine, medium dense, wet, dark gray.					
78.9 20	SS	S-10A S-10B	24/24	1 2 18 20	20			SP SM	**Poorly Graded SAND**, fine, medium dense, wet, gray to greenish gray. **Silty SAND**, fine, loose, wet, greenish gray.					
73.9 25	SS	S-11A S-11B	24/24	1 2 2 3	4	1.0		CH	**CLAY**, soft, wet, greenish gray.					
68.9 30	SS	S-12	24/24	2 2 2 6	4			CH						
	SS	S-13	24/24	3 3 8 24	11			CH SM	 **Silty SAND**, fine, medium dense, wet, greenish gray.					
63.9 35									**Boring terminated at 32 feet BGS.**					

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-104

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 96.6
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 50
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 3.4 (11/3/11)
Drilling Date: Start: 11-03-11 **End:** 11-03-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2147098 E 328533
Logged By: Eduardo Gutierrez, EIT

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
96.6														
0	SS	S-1	24/14	2 3 7 8	10			SP	**Organic Topsoil**. **Poorly Graded SAND with Silt**, fine, medium dense, dry gray.					
	SS	S-2A S-2B	17/15	8 14 50/5 5	64/11			SM	Same as above. **Silty SAND**, fine, very dense, moist, light gray; partially cemented, hardpan-type.					
91.6 5	SS	S-3	24/24	8 12 12 7	24			SM	**Silty SAND**, fine, medium dense, wet, very dark brown.			19.6		
	SS	S-4A S-4B	24/24	6 8 14 11	22			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, dark brown.					
	SS	S-5	24/24	6 4 5 5	9				Grades to loose.					
86.6 10	SS	S-6	24/24	4 4 4 6	8									

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-104

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
				3				SP-SM						
	SS	S-7	24/24	4 4 5	8			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, wet, gray.		0.0/91.0	9.0		
81.6 15	SS	S-8	24/24	3 4 4 8	8						0.0/92.4	7.6		
	SS	S-9	24/18	2 5 9 14	14			SP	**Poorly Graded SAND**, fine, medium dense, wet, gray.					
	SS	S-10	24/24	8 7 11 8	18				Grades to gray to greenish gray.					
76.6 20														
								CL	**Lean CLAY**, very stiff, wet, light gray.					
	SS	S-11	24/24	7 13 15 29	28	1.25				47.1		59.3	36/17	
71.6 25								SP	**Poorly Graded SAND**, fine, medium dense, wet, grayish brown.					
	SS	S-12	24/18	5 6 19 32	25				Same as above.					
66.6 30														
	SS	S-13A S-13B	24/14	6 4 4 4	8				Grades to loose and gray.					
61.6 35								SM	**Silty SAND**, fine, loose, wet, gray.					

BOREHOLE-TRLF-JANUARY 2012 - 2 TRLF-PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-104

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								SM						
								SP	**Poorly Graded SAND**, fine, medium dense, wet, gray to greenish gray.					
	SS	S-14	24/18	5 8 9 8	17									
56.6 40														
	SS	S-15A S-15B	24/20	5 6 10 14	16									
								SP	**Poorly Graded SAND**, fine, medium dense, wet, greenish gray; with trace gravel/limestone fragments.		4.1/93.9	2.0		
51.6 45														
	SS	S-16	24/20	7 11 14 17	25				Same as above.					
46.6 50									**Boring terminated at 50 feet BGS.**					
41.6 55														
36.6														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-105

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 102.6
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 30
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 3.0 (11/4/11)
Drilling Date: Start: 11-04-11 **End:** 11-04-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2146429 E 327702
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
102.6														
0	SS	S-1	24/12	3 3 4 4	7			SM	**Organic TOPSOIL.** **Silty SAND**, fine, loose, moist, dark brown; with organics.					
	SS	S-2A S-2B	24/24	4 4 16 18	20			SP-SM SP	**Poorly Graded SAND with Silt**, fine, medium dense, moist. **Poorly Graded SAND**, fine, medium dense, wet, brown; with trace organics.					
97.6 5	SS	S-3	24/24	7 11 20 30	31			SM	**Silty SAND**, fine, very dense, wet, very dark gray to black; partially cemented, hardpan-type.					
	SS	S-4	24/24	18 32 37 33	69							13.1		
	SS	S-5	24/24	6 12 14 13	26			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, reddish brown; trace cementation.					
92.6 10	SS	S-6A S-6B	24/24	11 18 15 13	33			SM	Grades to brown without cementation. **Silty SAND**, fine, dense, wet, reddish brown.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-105

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
				4				SM						
	SS	S-7	24/24	8 9 10	17			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, wet, brown.			8.2		
87.6 15	SS	S-8A S-8B	24/24	3 4 8 11	12				Grades to dark brown.					
	SS	S-9A S-9B	24/24	5 8 9 12	17				Grades to very dark brown to black; organic stained.					
								SP	**Poorly Graded SAND**, fine, medium dense, wet, light grayish brown.					
	SS	S-10	24/24	4 7 8 10	15				Grades to dark brown.					
82.6 20														
	SS	S-11	24/14	11 8 9 10	17				Grades to grayish brown.			4.6		
77.6 25														
	SS	S-12	24/14	12 17 19 18	36				Grades to dense.					
72.6 30									**Boring terminated at 30 feet BGS.**					
67.6 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-106

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 99.5
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 50
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 4.5 (11/2/11)
Drilling Date: Start: 11-02-11 **End:** 11-02-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2145738 E 328389
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
99.5														
0	SS	S-1	24/12	2 4 5 14	9			SP-SM	**Poorly Graded SAND with Silt**, fine, loose, dry, very dark gray to black; organic stained.					
	SS	S-2	24/18	7 7 10 11	17				Grades to medium dense.					
94.5 5	SS	S-3	24/24	8 14 20 20	34				Grades to dense.					
	SS	S-4	17/17	10 18 50/5	68/11			SP-SM	**Poorly Graded SAND with Silt**, fine, very dense, wet, dark brown; partially cemented, hardpan-type.		0.0/93.4	6.6		
	SS	S-5	24/24	22 23 19 17	42			SP-SM	**Poorly Graded SAND with Silt**, fine, dense, very dark brown.		0.0/91.5	8.5		
89.5 10	SS	S-6	24/24	5 6 4 4	10			SM	**Silty SAND**, fine, medium dense, wet, dark gray.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-106

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-7	24/24	4 7 7 11	14			SM						
	SS	S-8A S-8B	24/24	4 5 9 10	14				Same as above					
84.5 15								SP	**Poorly Graded SAND**, fine, medium dense, wet, grayish brown.					
	SS	S-9	24/24	6 5 7 6	12	3.0		CH	**CLAY**, stiff, wet, dark gray.					
	SS	S-10	24/24	2 3 4 6	7	1.5			Grades to medium stiff and gray.					
79.5 20														
	SS	S-11	24/14	5 3 8 15	11			SP	**Poorly Graded SAND**, fine, medium dense, wet, mottled light brown and light gray.					
74.5 25														
	SS	S-12	24/24	4 4 5 4	9			SP	**Poorly Graded SAND**, fine, loose, wet, greenish gray.					
69.5 30														
								MH/CH	**SILT / CLAY**, very soft, wet, greenish gray.					
	SS	S-13	24/24	WOR 1 1 1	2					74.6		51.1	76/40	
64.5 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

CDM Smith

SPT BORING LOG
CDM-106

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
								MH/CH						
								SP-SM	**Poorly Graded SAND with Silt**, fine, dense, wet, brown.					
	SS	S-14	24/24	21 22 13 18	35									
59.5 40														
	SS	S-15	5/5	50/5	50/5				Grades to very dense.		1.8/89.6	8.6		
54.5 45														
	SS	S-16	24/24	12 16 24 33	40				Grades to dense and light brown.					
49.5 50									**Boring terminated at 50 feet BGS.**					
44.5 55														
39.5														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-107

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 105.2
Drilling Method/Rig: Mud Rotary/CME-45
Total Depth (ft.): 30
Drillers: Leon Natividad
Depth to Groundwater Level (ft.BGS): 3.3 (11/7/11)
Drilling Date: Start: 11-07-11 **End:** 11-07-11
Abandonment Method: Grouted to ground surface
Borehole Coordinates:
Field Screening Instrument: None
N 2144518 E 328134
Logged By: Eduardo Gutierrez, EIT

Elev. Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
105.2														
0	SS	S-1	24/14	2 3 7 12	10			SP-SM	**Poorly Graded SAND with Silt**, fine, medium dense, dry, grayish brown.					
	SS	S-2	24/18	14 23 36 44	59			SP	**Poorly Graded SAND**, fine, very dense, moist, mottled gray and brown.					
100.2 5	SS	S-3A S-3B	24/20	15 35 37 40	72				Grades to wet.					
								SM	**Silty SAND**, fine, very dense, wet, very dark gray to black; organic stained.					
	SS	S-4A S-4B	24/24	23 25 23 15	48			SP	**Poorly Graded SAND**, fine, medium dense, wet, very dark gray; organic stained.					
								SP-SM	**Poorly Graded SAND with Silt**, fine, dense, wet, dark brown.					
	SS	S-5	24/22	5 5 10 13	15				Grades to medium dense.					
95.2 10	SS	S-6	24/24	11 11 14 10	25			SP	**Poorly Graded SAND**, fine, medium dense, wet, dark brown; trace organic staining.					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
SS - Split Spoon
ST - Shelby Tube
CS - California Sampler

OTHER:
WOH - Weight of Hammer
WOR - Weight of Rod
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Hammer Weight = 140 lb.
Hammer Drop Height = 30 in.
Spoon Size = 2 in. OD and 24 in. length.

REMARKS

Reviewed by: William L. Fox, P.E. **Date:**

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF - PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

SPT BORING LOG
CDM-107

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Elev. / Depth (ft.)	Sample Type	Sample Number	Penetration / Recovery (Inches)	Blows per 6-in	In-Situ Test (N value)	Pocket Penetrometer (tsf)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
	SS	S-7	24/14	5 10 11 11	21			SP	Same as above.					
90.2 15	SS	S-8	24/20	15 16 19 23	35				Grades to dense and dark grayish brown.					
	SS	S-9	24/12	15 12 13 12	25				**Poorly Graded SAND**, fine, medium dense, wet, gray.					
	SS	S-10	24/18	11 8 5 4	13				Same as above.					
85.2 20														
	SS	S-11	24/14	8 10 11 11	21				Grades to grayish brown.					
80.2 25														
	SS	S-12	24/24	11 21 35 38	56				Grades to very dense.					
75.2 30									**Boring terminated at 30 feet BGS.**					
70.2 35														

BOREHOLE–TRLF–JANUARY 2012 - 2 TRLF–PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/02/12

Appendix C

Hand Auger (HA) Boring Logs
And Summary of Manual Probes (MP)

CDM Smith

HAND AUGER LOG
HA-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 120.9
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 3.5 (4/7/2011)
Drilling Date: Start: 04-07-11 **End:** 04-07-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144583 E 326886
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
120.9											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, gray.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, brown.					
▽	HA	S-4	3 - 4								
	HA	S-5	4 - 5		SP	**Poorly Graded SAND**, fine, wet, dark brown.					
115.9											
5						**Auger boring terminated at 5 feet BGS.**					
110.9											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 117.9
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 3.5 (4/7/2011)
Drilling Date: Start: 04-07-11 **End:** 04-07-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144721 E 326883
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
117.9											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, gray.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
▽	HA	S-4	3 - 4								
	HA	S-5	4 - 5								
112.9											
5						**Auger boring terminated at 5 feet BGS.**					
107.9											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

CDM Smith

HAND AUGER LOG
HA-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 118.0
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 4.5 (4/7/2011)
Drilling Date: Start: 04-07-11 **End:** 04-07-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144775 E 326883
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
118.0											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, mottled gray and brown; with few roots present.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4.5								
113.0	HA	S-5	4.5 - 5		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
5						**Auger boring terminated at 5 feet BGS.**					
108.0											
10											

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 120.4
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 3.5 (4/7/2011)
Drilling Date: Start: 04-07-11 **End:** 04-07-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144939 E 326879
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
120.4											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, grayish brown.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, brown.					
	HA	S-5	4 - 5								
115.4 5						**Auger boring terminated at 5 feet BGS.**					
110.4 10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

CDM Smith

HAND AUGER LOG
HA-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 127.4
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 3.0 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144639 E 326334
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
127.4											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, gray.					
	HA	S-2	1 - 2.5								
	HA	S-3	2.5 - 3		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, brown.					
	HA	S-4	3 - 4								
	HA	S-5	4 - 5								
122.4 5						**Auger boring terminated at 5 feet BGS.**					
117.4 10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 125.2
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 2.0 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144717 E 326334
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
125.2											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, grayish brown.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4			Grades to brown.					
	HA	S-5	4 - 5								
120.2											
5						**Auger boring terminated at 5 feet BGS.**					
115.2											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

CDM Smith

HAND AUGER LOG
HA-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 124.6
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 2.0 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144833 E 326333
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
124.6											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, wet, mottled brown and gray.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4								
	HA	S-5	4 - 5			Grades to dark brown.					
119.6											
5						**Auger boring terminated at 5 feet BGS.**					
114.6											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 126.3
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 2.0 (4/7/2011)
Drilling Date: Start: 04-07-11 **End:** 04-07-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144931 E 326334
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
126.3											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, brown.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4								
	HA	S-5	4 - 5		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
121.3											
5						**Auger boring terminated at 5 feet BGS.**					
116.3											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

CDM Smith

HAND AUGER LOG
HA-9

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 132.9
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 3.5 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144560 E 325895
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
132.9											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, grayish brown.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4			Grades with few roots.					
	HA	S-5	4 - 5		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
127.9											
5						**Auger boring terminated at 5 feet BGS.**					
122.9											
10											

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-10

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 131.4
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 2.5 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144674 E 325893
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
131.4											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, gray.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3.5								
	HA	S-4	3.5 - 4		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
	HA	S-5	4 - 5								
126.4 5						**Auger boring terminated at 5 feet BGS.**					
121.4 10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-11

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 130.3
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 1.5 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144903 E 325891
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
130.3											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, grayish brown.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4			Grades to wet and brown.					
	HA	S-5	4 - 5								
125.3											
5						**Auger boring terminated at 5 feet BGS.**					
120.3											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

CDM Smith

HAND AUGER LOG
HA-12

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 131.5
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 1.5 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144974 E 325889
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
131.5											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, gray.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3.5								
	HA	S-4	3.5 - 4		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
	HA	S-5	4 - 5								
126.5 5						**Auger boring terminated at 5 feet BGS.**					
121.5 10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-13

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 139.3
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 3.0 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144527 E 325393
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
139.3											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, wet, brown.					
	HA	S-2	1 - 2.5								
	HA	S-3	2.5 - 3		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
	HA	S-4	3 - 4								
	HA	S-5	4 - 5								
134.3											
5						**Auger boring terminated at 5 feet BGS.**					
129.3											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

CDM Smith

HAND AUGER LOG
HA-14

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 137.1
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 1.5 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2144670 E 325387
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
137.1											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, wet, grayish brown; with few roots.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4.5								
132.1	HA	S-5	4.5 - 5		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
5						**Auger boring terminated at 5 feet BGS.**					
127.1											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

CDM Smith

HAND AUGER LOG
HA-15

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 137.8
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 1.0 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2145056 E 325379
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
137.8											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, grayish brown.					
	HA	S-2	1 - 2								
	HA	S-3	2 - 3								
	HA	S-4	3 - 4								
	HA	S-5	4 - 5								
132.8											
5						**Auger boring terminated at 5 feet BGS.**					
127.8											
10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

CDM Smith

HAND AUGER LOG
HA-16

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County
Project Number: 9012-85238

Drilling Contractor: CES
Surface Elevation (ft-NGVD 1929): 139.1
Drilling Method: Manual Auger
Total Depth (ft.): 5
Drillers: Ronnie Mitchell
Depth to Groundwater Level (ft. BGS): 2.5 (4/6/2011)
Drilling Date: Start: 04-06-11 **End:** 04-06-11
Abandonment Method: Temporary 1-inch Piezometer Installed
Borehole Coordinates:
Field Screening Instrument: None
N 2145282 E 325375
Logged By: Ronnie Mitchell/ Eduardo Gutierrez

Elev. Depth (ft.)	Sample Type	Sample Number	Sample Interval (feet)	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	%gravel size / %sand size	%Fines	Liquid Limit / Plasticity Index	Organic Content (%)
139.1											
0						**Organic Material.**					
	HA	S-1	0.25 - 1		SP	**Poorly Graded SAND**, fine, moist, gray.					
	HA	S-2	1 - 2								
▽	HA	S-3	2 - 3								
	HA	S-4	3 - 4		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, brown.					
	HA	S-5	4 - 5			Grades to dark brown.					
134.1 5						**Auger boring terminated at 5 feet BGS.**					
129.1 10											

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
HA - Hand Auger

OTHER:
BGS - Below Ground Surface
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

Samples obtained using a 3-inch diameter stainless steel bucket auger.

REMARKS

-Approximate 18-inch of soft/ loose soil probed with steel rod.

-Organic material typically consisted of leaves, small roots, and organic-laden soil.

Reviewed by: William L. Fox, P.E. **Date:** 12-20-11

HAND AUGERS-TRAIL RIDGE LF-12-20-2011 TRLF - HAND AUGERS DITCH B.GPJ CDM_CORP.GDT 12/22/11

Table C-1
Manual Probe (MP) at Stormwater Ponds Area
Summary Table
Trail Ridge Landfill Expansion

Name	Approximate Location		Depth of Standing Water (inches)	Thickness of Leaves, Topsoil, Root Mat (inches)	Thickness of Soft/Loose Soil (inches)
	Northing (feet)	Easting (feet)			
MP-101	2148793	327865	0	6	42
MP-102	2148555	327861	0	1	11
MP-103	2148590	328189	0	2	34
MP-104	2148396	328094	0	6	12
MP-105	2146892	327985	0	6	18
MP-106	2146021	327602	0	8	10
MP-107	2144824	327463	0	6	12

Appendix D

Test Pit (TP) Logs

CDM Smith

TEST PIT L O G
TP-1

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 112.3
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 9.5
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): 5.5 (Water Seeping)
Excavation Date: Start: 03-29-11 **End:** 03-29-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2145277.8 E 327512.7
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. / Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		112.3									
		0									
S-1 (0-2)	30		E		SP	**Poorly Graded SAND**, fine, moist, gray.					
S-2 (2.5-3.5) Tube#1 (3.5)	42		E		SP	**Poorly Graded SAND**, fine, moist, brown.		0.0/96.1	3.9		
						-Horizontal Permeability = 7.2E-4 cm/sec	16.7				109.4
		107.3 / 5									
Tube#2 (5.3-5.8) S-3 (5-6)			E			-Vertical Permeability = 2.5E-6 cm/sec	13.2	0.0/95.8	4.2		118.9
S-4 (8-9)	42		E to M		SP-SM	**Poorly Graded SAND with Silt**, fine wet, dark brown.					
S-5 (9.5)			E to M			-Partially/ weakly cemented sand observed at 9 feet-bls.					
		102.3 / 10				**Excavation terminated at 9.5 feet BLS due to water entering from bottom of excavation.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

CDM Smith

TEST PIT L O G
TP-2

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 106.9
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 9
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): 5 (Water Seeping)
Excavation Date: Start: 03-29-11 **End:** 03-29-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2146752.6 E 327462.2
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		106.9									
		0			SP	**Poorly Graded SAND**, fine, moist, gray.					
S-1 (0-2)			E								
S-2 (2-4)	84		E			-Tree stump at 3 feet bls.					
Tube#1 (5-5.5)		101.9 5				-Moderate water seepage observed.					
Tube#2 (5.8-6.3) S-3 (6-7)			E			-Vertical Permeability = 5.9E-6 cm/sec	16	0.0/95.3	4.7		116.0
S-4 (7-9)	24		E		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, brown; partially/ very weakly cemented.					
		96.9 10				**Excavation terminated at 9 feet BLS due to water entering from bottom of excavation.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

CDM Smith

TEST PIT L O G
TP-3

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 104.0
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 8.5
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): 8 (Water Seeping)
Excavation Date: Start: 03-29-11 **End:** 03-29-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2149414 E 327634.4
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. / Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		104.0									
S-1 (0-3.5)	42	0	E		SP	**Poorly Graded SAND**, fine, dry, gray.					
S-2 (3.5-6) Tube#1 (4.5)	60	99.0 / 5	E		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, light brown. -Horizontal permeability = 2.4E-4 cm/sec	12.8	0.0/94.7	5.3		117.7
S-3 (6-7)			E			Grades to wet and brown.					
S-4 (7-8)			M			Grades to very dark brown; partially/ weakly cemented.					
		94.0 / 10				**Excavation terminated at 8.5 feet BLS due to sidewall collapse above water seepage level.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

CDM Smith

TEST PIT L O G
TP-4

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 131.4
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 8.5
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): 6.5 (Water Seeping)
Excavation Date: Start: 03-29-11 **End:** 03-29-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2144393.2 E 326359
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. / Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		131.4 / 0									
	9					**Organic Matter.** (Leaves, roots, decayed wood, etc.)					
S-1 (0-2)	39		E		SP-SM	**Poorly Graded SAND with Silt**, fine, dry, gray. Grades to moist and brown.			5.6		
S-2 (2-4)			E						10.1		
S-3 (4-7)	36	126.4 / 5	E		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.			10.0		
S-4 (7-8)	18		E		SP	**Poorly Graded SAND**, fine, wet, gray.			2.8		
		121.4 / 10				**Excavation terminated at 8.5 feet BLS due to sidewall collapse and water seepage from bottom of excavation.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

CDM Smith

TEST PIT L O G
TP-5

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 141.8
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 10
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): 7 (Water Seeping)
Excavation Date: Start: 03-30-11 **End:** 03-30-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2144347.9 E 325377.6
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		141.8									
	6	0				**Organic Matter.** (Leaves, roots, decayed wood, etc.)					
S-1 (0-2.5)	24		E		SP	**Poorly Graded SAND**, fine, dry, gray.					
S-2 (2.5-3.5) S-3 (3.5-5)	30		E E		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, brown.					
		136.8 5									
S-4 (5-7) S-5 (7-10)	60		E E		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown. Grades to very dark brown. Grades to dark gray.					
		131.8 10				**Excavation terminated at 10 feet BLS due to sidewall collapse and water seepage from bottom of excavation.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

TEST PITS - TRAIL RIDGE LANDFILL TRAIL RIDGE LANDFILL TEST PITS.GPJ CDM_CORP.GDT 07/05/11

CDM Smith

TEST PIT L O G
TP-6

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 145.2
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 9.5
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): 7.5 (Water Seeping)
Excavation Date: Start: 03-30-11 **End:** 03-30-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2144742.2 E 324784.6
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. / Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		145.2 / 0									
	6					**Organic Matter.** (Leaves, roots, decayed wood, etc.)					
S-1 (0-2)	24		E		SP	**Poorly Graded SAND**, fine, dry, gray.					
S-2 (2-2.5)			E			Grades to light gray.					
S-3 (2.5-3.5)	33	140.2 / 5	M		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, dark brown. Grades to light gray and brown.					
S-4 (5-7)	51		E		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
S-5 (7-8.5)			E								
		135.2 / 10				**Excavation terminated at 9.5 feet BLS due to sidewall collapse and water seepage from bottom of excavation.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

TEST PITS - TRAIL RIDGE LANDFILL TRAIL RIDGE LANDFILL TEST PITS.GPJ CDM_CORP.GDT 07/05/11

CDM Smith

TEST PIT L O G
TP-7

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 145.0
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 9.5
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): GNE
Excavation Date: Start: 03-30-11 **End:** 03-30-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2145654.5 E 324861
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. / Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		145.0 / 0									
	6					**Organic Matter.** (Leaves, roots, decayed wood, etc.)					
S-1 (0-1)	9		E		SP	**Poorly Graded SAND**, fine, dry, gray.					
S-2 (1-2)	9		M		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, light reddish brown; partially/ weakly cemented.					
S-3 (2-5)	90	140.0 / 5	E		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, light brown. Grades to dark brown.					
S-4 (5-8)			E			Grades to wet.					
		135.0 / 10				**Excavation terminated at 9.5 feet BLS due to sidewall collapse.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

CDM Smith

TEST PIT L O G
TP-8

Client: City of Jacksonville
Project Name: Trail Ridge Landfill
Project Location: Duval County, Florida
Project Number: 9012-80695

Drilling Contractor: AMDRILL, Inc.
Surface Elevation (ft-NGVD 1929): 123.2
Excavation Method/Rig: Backhoe/John Deere 310G
Total Depth (ft.): 7.5
Drillers: Adam Benson
Depth to Groundwater Level (ft. BLS): 5 (Water Seeping)
Excavation Date: Start: 03-30-11 **End:** 03-30-11
Abandonment Method: Backfilled with backhoe
Test Pit Coordinates:
Field Screening Instrument: None
N 2145972 E 326727.5
Logged By: Eduardo Gutierrez

Sample No. (Sample Depth)	Layer Thickness (inches)	Elev. / Depth (ft.)	Excavation Effort	Graphic Log	USCS Group Symbol	Material Description	Moisture content (%)	% Gravel size / % Sand size	% Fines	Liquid Limit / Plasticity Index	Tube Dry Density (pcf)
		123.2 / 0									
	6					**Organic Matter.** (Leaves, roots, decayed wood, etc.)					
S-1 (0-3)	30		E		SP	**Poorly Graded SAND**, fine, dry, gray.					
S-2 (3-5)	24	118.2 / 5	E		SP-SM	**Poorly Graded SAND with Silt**, fine, moist, light brown.					
S-3 (5-7)	30		E		SP-SM	**Poorly Graded SAND with Silt**, fine, wet, dark brown.					
		113.2 / 10				**Excavation terminated at 7.5 feet BLS due to sidewall collapse and water seepage from bottom of excavation.**					

EXPLANATION OF ABBREVIATIONS

SAMPLING TYPES:
BS - Bulk Sample

OTHER:
BLS - Below Land Surface
GNE - Groundwater Not Encountered
NGVD - National Geodetic Vertical Datum
USCS - Unified Soil Classification System

NOTES

REMARKS

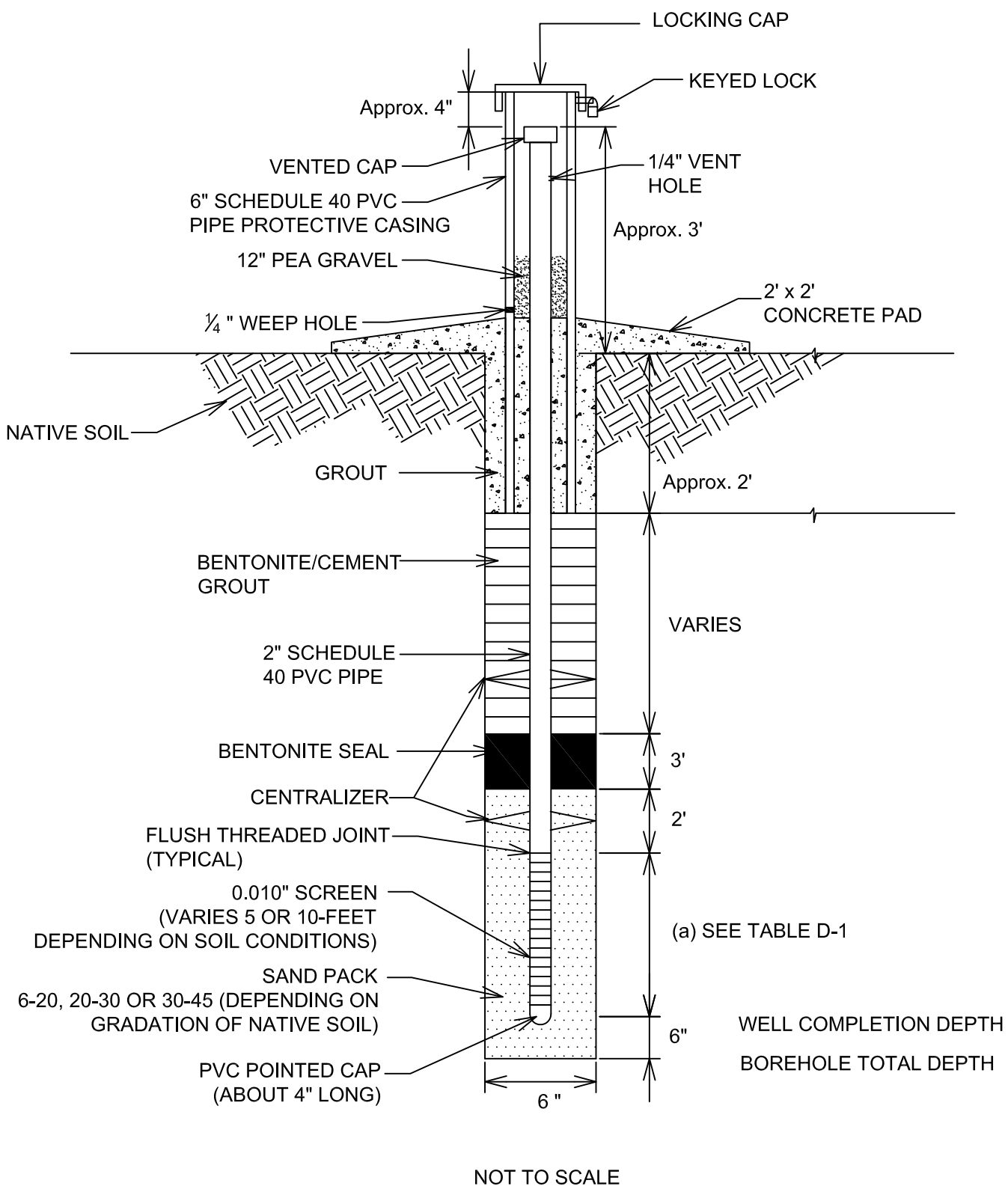
Excavation Effort:
E = Easy
M = Moderate
D = Difficult

Reviewed by: Rebecca G. Ascoli, P.E. **Date:** 06-29-11

TEST PITS - TRAIL RIDGE LANDFILL TRAIL RIDGE LANDFILL TEST PITS.GPJ CDM_CORP.GDT 07/05/11

Appendix E

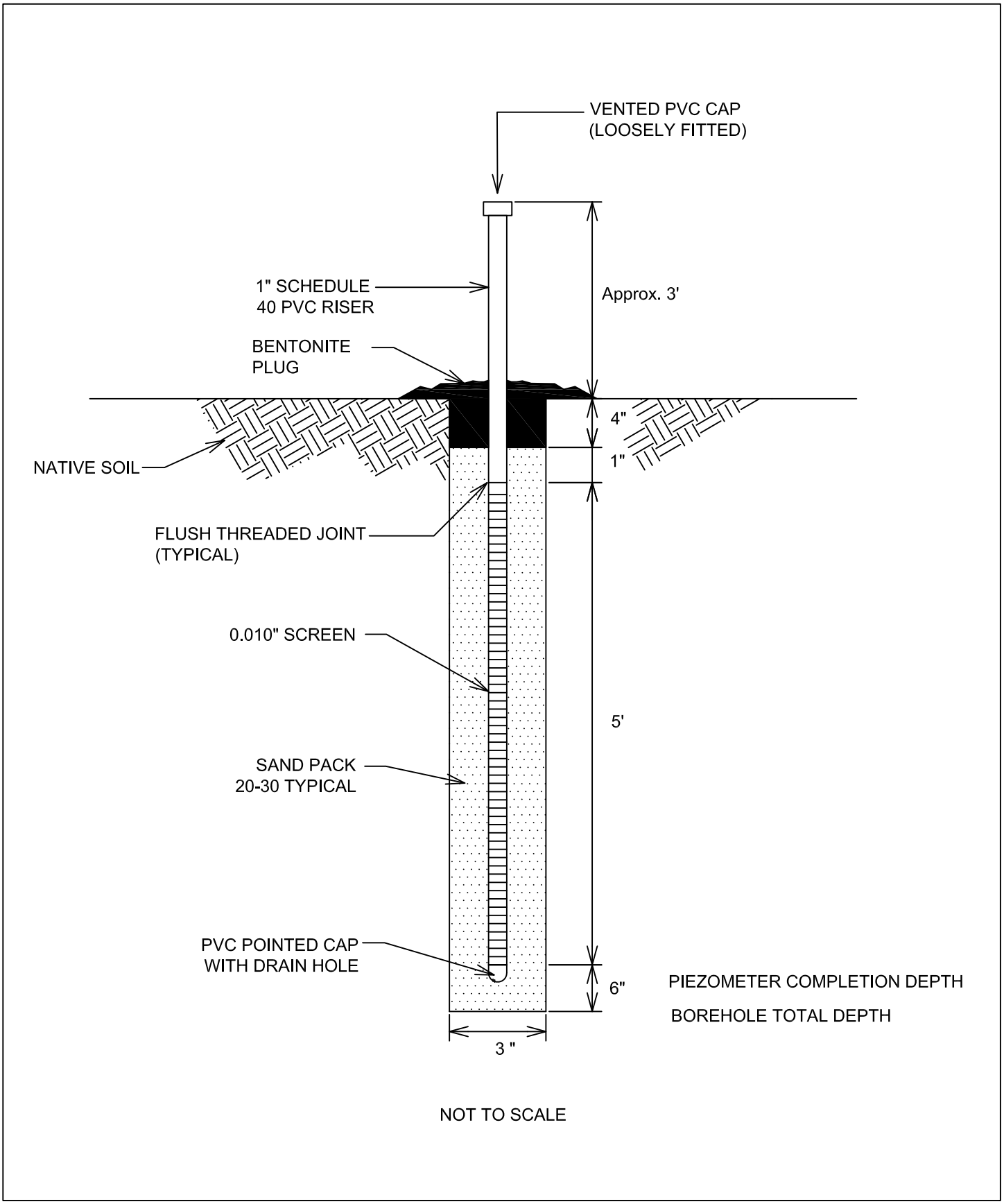
Monitoring Wells, Piezometers and Groundwater Information



Z:\Duval Co, City of Jacksonville Trail Ridge Landfill- Phase II (9012-85238)\Figures\Fig 1 Typical 2-in MW Construction Detail.dwg

CDM Smith

Figure E-1
Typical 2" Diameter Monitoring Well or Piezometer Construction Detail
Trail Ridge Landfill Expansion
Duval County, Florida



Z:\Duval Co, City of Jacksonville Trail Ridge Landfill- Phase II (9012-85238)\Figures\Fig 2 Typical 1-in Piezometer Construction Detail.dwg

CDM Smith

Figure E-2
Typical 1" Diameter Piezometer Construction Detail
Trail Ridge Landfill Expansion
Duval County, Florida

Table E-1
Well Construction Summary
Trail Ridge Landfill Expansion

Location	Date Completed	State Plane East HARN 83		Top of Well Pipe Elevation (ft NGVD 29)	Ground Elevation (ft NGVD 29)	Concrete Pad Elevation (ft NGVD 29)	Stick up (ft)	Well Diameter (in)	Screen Length (ft)	Sand Pack Material	Depth to Bottom of Well from Ground Surface	Depth to Top of Bentonite Seal (ft bls)	Depth to Top of Sand Filter Pack (ft bls)	Screen Interval (ft bls) (a)	Screen Interval Elevation (ft NGVD) (a)
		Northing (ft)	Easting (ft)												
CDM-1 P	4/11/2011	2,145,293.5	327,542.6	115.1	112.0	N/A	3.1	1	5	20/30	4.7	0.0	0.3	0 to 5	112.0 to 107.0
CDM-1 S	3/24/2011	2,145,290.3	327,543.3	115.0	112.0	112.3	3.0	2	5	6/20	16.4	6.0	9.0	11 to 16	101.0 to 96.0
CDM-1 I	3/24/2011	2,145,285.6	327,544.9	118.2	112.1	112.5	6.1	2	5	6/20	60.1	50.0	53.0	55 to 60	57.1 to 52.1
CDM-1 D	3/23/2011	2,145,280.3	327,546.0	120.2	112.1	112.4	8.1	2	5	6/20	100.2	90.0	93.0	95 to 100	17.1 to 12.1
CDM-2 P	4/11/2011	2,146,776.2	327,479.4	110.0	106.6	N/A	3.4	1	5	20/30	4.7	0.0	0.3	0 to 5	106.6 to 101.6
CDM-2 S	3/26/2011	2,146,773.0	327,481.9	110.6	106.6	106.8	4.0	2	5	20/30	14.3	4.0	7.0	9 to 14	97.6 to 92.6
CDM-2 I	3/26/2011	2,146,769.3	327,484.8	114.5	106.6	106.8	7.9	2	5	6/20	57.3	47.0	50.0	52 to 57	54.6 to 49.6
CDM-2 D	3/25/2011	2,146,764.9	327,488.3	115.8	106.4	106.6	9.4	2	5	20/30	100.1	90.0	93.0	95 to 100	11.4 to 6.4
CDM-3 S	3/27/2011	2,149,371.4	327,584.3	107.8	104.9	105.1	2.9	2	5	20/30	16.4	6.0	9.0	11 to 16	93.9 to 88.9
CDM-3 P	3/27/2011	2,149,373.3	327,589.6	107.9	104.9	105.1	3.0	2	5	20/30	33.2	23.0	26.0	28 to 33	76.9 to 71.9
CDM-3 I	3/27/2011	2,149,375.2	327,594.2	107.7	104.7	105.0	3.0	2	5	6/20	59.6	49.0	52.0	54 to 59	50.7 to 45.7
CDM-4 S	4/4/2011	2,147,252.4	325,996.8	129.5	126.4	126.7	3.1	2	5	20/30	16.3	6.0	9.0	11 to 16	115.4 to 110.4
CDM-4 I	4/4/2011	2,147,247.4	325,997.5	129.6	126.5	126.8	3.1	2	5	6/20	55.6	45.0	48.0	50 to 55	76.5 to 71.5
CDM-4 D	4/5/2011	2,147,241.9	325,998.5	129.3	126.4	126.7	2.9	2	5	20/30	110.7	100.0	103.0	105 to 110	21.4 to 16.4
CDM-5 P	4/11/2011	2,144,774.9	324,814.4	149.0	145.5	N/A	3.5	1	5	20/30	8.6	0.0	3.8	3 to 8	142.5 to 137.5
CDM-5 S	3/29/2011	2,144,770.3	324,815.3	148.6	145.5	145.7	3.1	2	5	20/30	15.0	5.0	8.0	10 to 15	135.5 to 130.5
CDM-5 I	3/29/2011	2,144,764.8	324,816.1	148.4	145.4	145.7	3.0	2	10	20/30	60.3	45.0	48.0	50 to 60	95.4 to 85.4
CDM-5 D	3/28/2011	2,144,759.8	324,816.5	148.2	145.3	145.6	2.9	2	10	6/20	111.0	96.0	99.0	101 to 111	44.3 to 34.3
CDM-6 S	4/6/2011	2,145,669.0	324,817.9	149.1	145.9	146.2	3.2	2	10	20/30	29.4	14.0	17.0	19 to 29	126.9 to 116.9
CDM-6 I	4/6/2011	2,145,673.8	324,817.2	149.2	146.0	146.2	3.2	2	10	30/45	66.0	51.0	54.0	56 to 66	90.0 to 80.0
CDM-6 D	4/7/2011	2,145,678.8	324,816.4	149.0	145.9	146.2	3.1	2	10	30/45	110.8	95.0	98.0	100 to 110	45.9 to 35.9
CDM-7 S	4/7/2011	2,147,741.4	324,799.6	141.0	138.0	138.2	3.0	2	5	20/30	19.5	9.0	12.0	14 to 19	124.0 to 119.0
CDM-7 I	4/6/2011	2,147,746.7	324,800.0	141.0	138.0	138.2	3.0	2	10	6/20	65.6	50.0	53.0	55 to 65	83.0 to 73.0
CDM-7 D	4/6/2011	2,147,752.3	324,800.7	141.1	138.0	138.3	3.1	2	10	30/45	110.0	95.0	98.0	100 to 110	38.0 to 28.0
CDM-8 S	4/9/2011	2,149,206.2	325,024.2	130.2	127.1	127.3	3.1	2	5	20/30	16.5	6.0	9.0	11 to 16	116.1 to 111.1
CDM-8 I	4/9/2011	2,149,208.4	325,028.5	130.1	127.2	127.3	2.9	2	10	20/30	60.6	45.0	48.0	50 to 60	77.2 to 67.2
B-8 P	4/11/2011	2,145,923.4	326,753.3	126.3	123.1	N/A	3.2	1	5	20/30	6.0	0.0	0.3	0 to 5	123.1 to 118.1
CDM-102 S	11/3/2011	2,148,383.0	327,883.1	102.6	98.6	N/A	3.9	2	5	30/45	10.4	1.0	3.0	5 to 10	93.6 to 88.6
CDM-102 I	11/3/2011	2,148,383.0	327,888.2	102.7	98.8	N/A	3.9	2	5	30/45	50.4	41.0	43.0	45 to 50	53.8 to 48.8
CDM-104 S	11/3/2011	2,147,135.4	328,519.7	100.8	97.1	N/A	3.6	2	5	30/45	15.2	6.0	8.0	10 to 15	87.1 to 82.1
CDM-104 I	11/3/2011	2,147,139.7	328,518.8	102.0	97.0	N/A	5.0	2	5	20/30	40.4	31.0	33.0	35 to 40	62.0 to 57.0
CDM-106 S	11/2/2011	2,145,776.5	328,368.4	104.0	100.0	N/A	4.0	2	5	20/30	10.4	1.0	3.0	5 to 10	95.0 to 90.0
CDM-106 I	11/2/2011	2,145,778.7	328,372.6	103.8	100.1	N/A	3.7	2	5	20/30	50.5	41.0	43.0	45 to 50	55.1 to 50.1

(P) - Piezometer
(S) - Shallow
(I) - Intermediate
(D) - Deep

N/A = Not Aplicable
(a) = See Figure E-1

CDM Smith

Table E-2
Groundwater Summary by Depth below Ground Surface
Trail Ridge Landfill Expansion
Duval Co, FL

Location	Screen Depth Below Ground Surface (ft)	Groundwater Depth Below Ground Surface (ft)			Comments
		12-Apr-11	20-Apr-11 21-Apr-11	25-Apr-11	
CDM-1 (P)	0 to 5	2.6	3.4	3.7	
CDM-1 (S)	11 to 16	2.7	3.4	3.6	
CDM-1 (I)	55 to 60	-3.1	-2.8	-2.6	Groundwater level is above ground surface (artesian condition)
CDM-1 (D)	95 to 100	-3.7	-4.2	-4.0	Groundwater level is above ground surface (artesian condition)
CDM-2 (P)	0 to 5	-	3.1	3.5	
CDM-2 (S)	9 to 14	-	3.4	3.6	
CDM-2 (I)	52 to 57	-	-3.5	-3.4	Groundwater level is above ground surface (artesian condition)
CDM-2 (D)	95 to 100	-	-5.8	-5.6	Groundwater level is above ground surface (artesian condition)
CDM-3 (S)	11 to 16	3.3	3.9	4.0	
CDM-3 (P)	28 to 33	3.4	4.0	4.2	
CDM-3 (I)	54 to 59	4.6	5.3	5.5	
CDM-4 (S)	11 to 16	2.0	2.6	2.8	
CDM-4 (I)	50 to 55	1.9	2.4	2.7	
CDM-4 (D)	105 to 110	5.5	5.7	5.8	
CDM-5 (P)	3 to 8	6.0	6.4	6.7	
CDM-5 (S)	10 to 15	6.0	6.4	6.7	
CDM-5 (I)	50 to 60	6.5	6.9	7.1	
CDM-5 (D)	101 to 111	6.6	6.9	7.1	
CDM-6 (S)	19 to 29	7.1	7.5	7.7	
CDM-6 (I)	56 to 66	7.3	7.7	7.9	
CDM-6 (D)	100 to 110	7.3	7.6	7.9	
CDM-7 (S)	14 to 19	4.1	4.4	4.6	
CDM-7 (I)	55 to 65	4.0	4.5	4.7	
CDM-7 (D)	100 to 110	3.7	4.6	4.9	
CDM-8 (S)	11 to 16	4.0	4.8	5.0	
CDM-8 (I)	50 to 60	4.8	5.4	5.6	

Location	Screen Depth Below Ground Surface (ft)	Groundwater Depth Below Ground Surface (ft)			Comments
		2-Nov-11 3-Nov-11 (Boring Location)	8-Dec-11		
CDM-102 (S)	5 to 10	2.5	3.6	-	
CDM-102 (I)	45 to 50	2.5	0.5	-	
CDM-104 (S)	10 to 15	3.4	3.2	-	
CDM-104 (I)	35 to 40	3.4	-0.5	-	Groundwater level is above ground surface (artesian condition)
CDM-106 (S)	5 to 10	3.0	2.4	-	
CDM-106 (I)	45 to 50	3.0	-1.4	-	Groundwater level is above ground surface (artesian condition)

Table E-3
Groundwater Summary by Elevation
Trail Ridge Landfill Expansion
Duval Co, FL

Location	Ground Surface Elevation (ft-NGVD)	Screen Interval Elevation (ft-NGVD)	Groundwater Elevation (ft-NGVD)			Comments
			12-Apr-11	20-Apr-11 21-Apr-11	25-Apr-11	
CDM-1 (P)	112.0	112.0 to 107.0	109.4	108.7	108.4	
CDM-1 (S)	112.0	101.0 to 96.0	109.3	108.6	108.4	
CDM-1 (I)	112.1	57.1 to 52.1	115.2	114.9	114.7	Groundwater level is above ground surface (artesian condition)
CDM-1 (D)	112.1	17.1 to 12.1	115.7	116.2	116.1	Groundwater level is above ground surface (artesian condition)
CDM-2 (P)	106.6	106.6 to 101.6	-	103.5	103.1	
CDM-2 (S)	106.6	97.6 to 92.6	-	103.3	103.0	
CDM-2 (I)	106.6	54.6 to 49.6	-	110.2	110.0	Groundwater level is above ground surface (artesian condition)
CDM-2 (D)	106.4	11.4 to 6.4	-	112.1	112.0	Groundwater level is above ground surface (artesian condition)
CDM-3 (S)	104.9	93.9 to 88.9	101.5	101.0	100.8	
CDM-3 (P)	104.9	76.9 to 71.9	101.5	100.9	100.7	
CDM-3 (I)	104.7	50.7 to 45.7	100.1	99.4	99.2	
CDM-4 (S)	126.4	115.4 to 110.4	124.4	123.9	123.6	
CDM-4 (I)	126.5	76.5 to 71.5	124.6	124.1	123.8	
CDM-4 (D)	126.4	21.4 to 16.4	120.9	120.7	120.6	
CDM-5 (P)	145.5	142.5 to 137.5	139.5	139.0	138.8	
CDM-5 (S)	145.5	135.5 to 130.5	139.5	139.0	138.8	
CDM-5 (I)	145.4	95.4 to 85.4	138.9	138.5	138.3	
CDM-5 (D)	145.3	44.3 to 34.3	138.8	138.4	138.2	
CDM-6 (S)	145.9	126.9 to 116.9	138.8	138.4	138.2	
CDM-6 (I)	146.0	90.0 to 80.0	138.7	138.3	138.1	
CDM-6 (D)	145.9	45.9 to 35.9	138.6	138.2	137.9	
CDM-7 (S)	138.0	124.0 to 119.0	133.9	133.6	133.4	
CDM-7 (I)	138.0	83.0 to 73.0	134.0	133.5	133.3	
CDM-7 (D)	138.0	38.0 to 28.0	134.3	133.4	133.2	
CDM-8 (S)	127.1	116.1 to 111.1	123.1	122.3	122.1	
CDM-8 (I)	127.2	77.2 to 67.2	122.4	121.7	121.5	

Location	Ground Surface Elevation (ft-NGVD)	Screen Interval Elevation (ft-NGVD)	Groundwater Elevation (ft-NGVD)			Comments
			2-Nov-11 3-Nov-11	8-Dec-11		
CDM-102 (S)	98.6	93.6 to 88.6	96.1	95.0	-	
CDM-102 (I)	98.8	53.8 to 48.8	96.3	98.3	-	
CDM-104 (S)	97.1	87.1 to 82.1	93.7	93.9	-	
CDM-104 (I)	97.0	62.0 to 57.0	93.6	97.5	-	Groundwater level is above ground surface (artesian condition)
CDM-106 (S)	100.0	95.0 to 90.0	97.0	97.6	-	
CDM-106 (I)	100.1	55.1 to 50.1	97.1	101.5	-	Groundwater level is above ground surface (artesian condition)

CDM Smith

Appendix F

Slug Test Results

Table F-1
Summary of Slug Test Results
Trail Ridge Landfill Expansion
Duval Co, FL

Location	Ground Surface Elevation (ft NGVD)	Screen Interval Below Ground Surface (ft)	Screen Interval Elevation (ft NGVD)	Soil Type[3] (USCS)	Test Date	Method[1]	Slug Test Results			
							kh		kh average	
							(cm/sec)	(ft/day)	(cm/sec)	(ft/day)
CDM-1 (S)	112.0	11 to 16	101.0 to 96.0	SP	4/20/2011	Falling Head Rising Head	6.8E-03 5.5E-03	19.4 15.6	6.2E-03	17.5
CDM-1 (I)	112.1	55 to 60	57.1 to 52.1	SW	4/20/2011	Falling Head Rising Head	1.2E-02 1.6E-02	34.4 45.4	1.4E-02	39.9
CDM-1 (D)	112.1	95 to 100	17.1 to 12.1	Limestone	4/20/2011	Falling Head Rising Head	6.9E-03 4.7E-03	19.7 13.2	5.8E-03	16.5
CDM-2 (S)	106.6	9 to 14	97.6 to 92.6	SP	4/20/2011	Falling Head Rising Head	2.0E-03 3.1E-03	5.8 8.7	2.6E-03	7.3
CDM-2 (I)	106.6	52 to 57	54.6 to 49.6	SP (4ft) SP-SM (1ft)	4/20/2011	Falling Head Rising Head	3.2E-03 4.0E-03	9.0 11.2	3.6E-03	10.1
CDM-2 (D)	106.4	95 to 100	11.4 to 6.4	Limestone (3ft) SM (2ft)	4/20/2011	Falling Head Rising Head	7.7E-03 9.8E-03	21.9 27.9	8.8E-03	24.9
CDM-3 (S)	104.9	11 to 16	93.9 to 88.9	SP	4/20/2011	Falling Head Rising Head	5.0E-03 6.3E-03	14.1 18.0	5.7E-03	16.1
CDM-3 (P)	104.9	28 to 33	76.9 to 71.9	SP	4/20/2011	Falling Head Rising Head	1.4E-02 1.5E-02	38.5 42.0	1.4E-02	40.3
CDM-3 (I)	104.7	54 to 59	50.7 to 45.7	SP	4/20/2011	Falling Head Rising Head	5.4E-03 5.9E-03	15.2 16.6	5.6E-03	15.9
CDM-4 (S)	126.4	11 to 16	115.4 to 110.4	SP	4/21/2011	Falling Head Rising Head	1.5E-02 2.1E-02	43.5 60.0	1.8E-02	51.8
CDM-4 (I)	126.5	50 to 55	76.5 to 71.5	SW	4/21/2011	Falling Head Rising Head	1.8E-02 1.9E-02	51.5 55.0	1.9E-02	53.3
CDM-4 (D)	126.4	105 to 110	21.4 to 16.4	Limestone	4/21/2011	Falling Head Rising Head	1.9E-02 4.9E-02	52.8 138.5	3.4E-02	95.7
CDM-5 (S)	145.5	10 to 15	135.5 to 130.5	SP	4/21/2011	Falling Head Rising Head	4.3E-02 2.4E-02	121.6 69.3	3.4E-02	95.5
CDM-5 (I)	145.4	50 to 60	95.4 to 85.4	SW-SP	4/21/2011	Falling Head Rising Head	2.3E-02 1.7E-02	66.1 48.2	2.0E-02	57.2
CDM-5 (D)	145.3	101 to 111	44.3 to 34.3	SP	4/21/2011	Falling Head Rising Head	1.0E-01 7.9E-02	284.5 224.1	9.0E-02	254.3
CDM-6 (S)	145.9	19 to 29	126.9 to 116.9	SP (8ft) SM (2ft)	4/21/2011	Falling Head Rising Head	1.3E-02 1.5E-02	36.1 41.9	1.4E-02	39.0
CDM-6 (I)	146.0	56 to 66	90.0 to 80.0	SP (8ft) SP-SM (2ft)	4/21/2011	Falling Head Rising Head	1.1E-02 1.1E-02	30.8 30.6	1.1E-02	30.7
CDM-6 (D)	145.9	100 to 110	45.9 to 35.9	SP	4/21/2011	Falling Head Rising Head	1.9E-03 2.1E-03	5.5 5.9	2.0E-03	5.7
CDM-7 (S)	138.0	14 to 19	124.0 to 119.0	SP (4ft) SM (1ft)	4/21/2011	Falling Head Rising Head	4.7E-02 4.0E-02	132.0 114.2	4.3E-02	123.1
CDM-7 (I)	138.0	55 to 65	83.0 to 73.0	SP (7ft) SP-SM (3ft)	4/21/2011	Falling Head Rising Head	3.2E-03 3.1E-03	9.0 8.8	3.1E-03	8.9
CDM-7 (D)	138.0	100 to 110	38.0 to 28.0	SP	4/21/2011	Falling Head Rising Head	1.4E-03 1.6E-03	4.1 4.6	1.5E-03	4.4
CDM-8 (S)	127.1	11 to 16	116.1 to 111.1	SP	4/21/2011	Falling Head Rising Head	8.0E-03 1.2E-02	22.8 32.9	9.8E-03	27.9
CDM-8 (I)	127.2	50 to 60	77.2 to 67.2	SP (7ft) SP-SC (3ft)	4/21/2011	Falling Head Rising Head	2.2E-03 1.5E-03	6.3 4.3	1.9E-03	5.3
CDM-102 (S)	98.6	5 to 10	93.6 to 88.6	SP-SM (4ft) SP (1ft)	12/8/2011	Falling Head Rising Head	4.6E-03 5.0E-03	13.0 14.2	4.8E-03	13.6
CDM-102 (I)	98.8	45 to 50	53.8 to 48.8	SP	12/8/2011	Falling Head Rising Head	[2]			
CDM-104 (S)	97.1	10 to 15	87.1 to 82.1	SP-SM	12/8/2011	Falling Head Rising Head	2.2E-03 1.2E-03	6.2 3.4	1.7E-03	4.8
CDM-104 (I)	97.0	35 to 40	62.0 to 57.0	SP (3ft) SM (2ft)	12/8/2011	Falling Head Rising Head	6.4E-03 5.3E-04	18.1 1.5	3.5E-03	9.8
CDM-106 (S)	100.0	5 to 10	95.0 to 90.0	SP-SM	12/8/2011	Falling Head Rising Head	3.6E-03 1.9E-03	10.1 5.3	2.7E-03	7.7
CDM-106 (I)	100.1	45 to 50	55.1 to 50.1	SP-SM	12/8/2011	Falling Head Rising Head	2.5E-03 2.9E-03	7.2 8.3	2.7E-03	7.8

Notes:

[1] Performed and analyzed in accordance with ASTM D 4044-96-"Test Method (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers".

[2] An attempt to conduct a slug test within Piezometer CDM-102(I) was unsuccessful due to poor groundwater recovery.

[3] Based on adjacent SPT boring.

kv - vertical permeability

kh - horizontal permeability

The anisotropic ratio kh/kv = 1 was used for all calculations.

Appendix G

Laboratory Testing Results

- CDM-1
- CDM-2
- CDM-3
- CDM-4
- CDM-5
- CDM-6
- CDM-7
- CDM-8
- CDM-9
- CDM-10
- CDM-101
- CDM-102
- CDM-104
- CDM-105
- CDM-106
- TP-1
- TP-2
- TP-3
- TP-4

Table G-1
Laboratory Test Results
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)			Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
							Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
CDM-1	S-3	3.0	to	4.5	112.3	108.6			9.2							SP-SM	
	S-7	9.0	to	10.5		102.6			10.7				12.5	6.3		SP-SM	
	S-8A & S-9 (Composite)	10.5	to	14.0		100.1	0.1	98.4	1.5							SP	
	S-12	18.0	to	20.0		93.3			6.7							SP-SM	
	S-17	40.0	to	42.0		71.3			5.7							SP-SM	
	S-22	58.0	to	60.0		53.3	0.3	99.2	0.5							SW	
	S-24	68.0	to	70.0		43.3			7.0							SP-SM	
	S-25	73.0	to	75.0		38.3			18.0							SM	
	S-28a	88.0	to	90.0		23.3			47.5				52.3			SC	
	S-29 & S-30 (Composite)	93.0	to	100.0		15.8	26.3	73.5	0.2							Limestone	
	S-36	128.0	to	130.0		-16.7				61	85	24	28.6			SC	
	S-37	133.0	to	135.0		-21.7			25.4							SC	
CDM-2	S-5	6.0	to	7.5	106.7	100.0			9.6							SP-SM	
	S-6	7.5	to	9.0		98.5			7.2							SP-SM	
	S-7, S-8, & S-9 (Composite)	9.0	to	14.0		95.2	0.0	96.0	4.0							SP	
	S-10A	14.0	to	16.0		91.7			17.5							SM	
	S-18B	49.0	to	49.5		57.5			12.7							SC	
	S-19	53.0	to	55.0		52.7	0.0	98.2	1.8							SP	
	S-20	58.0	to	60.0		47.7			11.0							SP-SM	
	S-25	83.0	to	85.0		22.7			24.9	28	49	21	44.9			SC	
	S-27B & S-28	93.0	to	100.0		10.2	11.8	73.5	14.7							Limestone	
	S-30	108.0	to	110.0		-2.3			16.7							SC	
	S-32	118.0	to	120.0		-12.3			22.4							SC	
CDM-3	S-6	7.5	to	9.0	104.6	96.4			11.1							SP-SM	
	S-8B, S-9, & S-10 (Composite)	11.5	to	16.0		90.9	0.0	95.2	4.8							SP	
	S-11B	16.0	to	18.0		87.6			77.3				17.9			CL	
	S-14A, S-14B, & S-15 (Composite)	28.0	to	35.0		73.1	0.0	97.4	2.6							SP	
	S-19, S-20A, & S-20B (Composite)	53.0	to	59.5		48.4	0.0	96.6	3.4							SP	
	S-21A	63.0	to	64.5		40.9			16.4	28	34	6	23.5			SC	
CDM-4	S-4	4.5	to	6.0	126.3	121.1			5.7				1	3.6		SP-SM	
	S-8, S-9, & S-10	10.5	to	16.0		113.1	0.0	98.2	1.8							SP	
	S-15	33.0	to	35.0		92.3			7.5				0.1	1.8		SP-SM	
	S-18 & S-19 (Composite)	48.0	to	55.0		74.8	1.1	96.8	2.1							SW	
	S-25	83.0	to	85.0		42.3			11.2							SP-SM	
	S-27	93.0	to	95.0		32.3			8.4							SP-SC	
	S-28B	99.0	to	100.0		26.8			55.3	51	58	7	32.9			MH	
	S-29 & S-30 (Composite)	103.0	to	110.0		19.8	15.3	69.3	15.4							Limestone	

Table G-1 (Continued)
Laboratory Test Results
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)			Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
							Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
CDM-5	S-5	6.0	to	7.5	145.6	138.9			7.7				0.1	0.3		SP-SM	
	S-8, S-9, & S-10A (Composite)	4.0	to	15.0		136.1	0.0	97.7	2.3							SP	
	S-11	16.0	to	18.0		128.6			12.7				0.2	0.9		SM	
	S-14	23.0	to	25.0		121.6			22.0	20	24	4	19.2			SC	
	S-16	33.0	to	35.0		111.6			8.3							SP-SM	
	S-20A, S-20B, & S21 (Composite)	53.0	to	60.0		89.1	0.8	95.9	3.3							SP	
	S-25	78.0	to	80.0		66.6			4.3							SP	
	S-29, S-30, & S-31	98.0	to	100.0		46.6	0.7	98.0	1.3							SP	
	S-37A	138.0	to	140.0		6.6			26.8				43.5			SC	
	S-37B	138.0	to	140.0		6.6							41.3			SC	
CDM-6	S-6	7.5	to	9.0	145.7	137.5			13.5				0.1	0.5		SM	
	S-9	12.0	to	14.0		132.7			14.5							SM	
	S-10C	15.5	to	16.0		130.0							25.5			SC	
	S-11A	16.0	to	17.0		129.2			47.0							SC	
	S-11B, S-12, & S-13 (Composite)	17.0	to	25.0		124.7	1.4	96.1	2.5							SP	
	S-17	43.0	to	45.0		101.7			10.5							SP-SM	
	S-20 & S-21 (Composite)	58.0	to	65.0		84.2	0.0	98.2	1.8							SP	
	S-26	88.0	to	90.0		56.7			7.1							SP-SM	
	S-29 & S-30 (Composite)	103.0	to	110.0		39.2	0.0	98.6	1.4							SP	
	S-33B	123.8	to	124.3		21.7			64.6							CL	
	S-33C	124.3	to	125.0		21.1			34.2							SC	
	CA-1	138.0	to	140.0		6.7			41.4							Limestone	
CDM-7	S-4	4.5	to	6.0	138.0	132.8			9.1							SP-SM	
	S-5	6.0	to	7.5		131.3							21.6			SM	
	S-6	7.5	to	9.0		129.8			27.8							SM	
	S-9A	12.0	to	13.0		125.5			46.6							SC	
	S-10, S-11A, S-12A (Composite)	14.0	to	19.0		121.5	1.7	97.3	1.0							SP	
	S-11B	17.0	to	18.0		120.5			22.3							SM	
	S-13A	20.0	to	21.5		117.3			16.3							SC	
	S-16	33.0	to	35.0		104.0			11.8							SP-SM	
	S-19	48.0	to	50.0		89.0			8.8							SP-SM	
	S-21, S-22 (Composite	58.0	to	65.0		76.5	0.0	98.0	2.0							SP	
	S-23	68.0	to	70.0		69.0			12.3							SM	
	S-28	93.0	to	95.0		44.0			12.3							SM	
	S-29, S-30, & S-31 (Composite)	98.0	to	110.0		34.0	0.0	97.4	2.6							SP	
	S-32	113.0	to	115.0		24.0			42.2							Limestone	
	S-35	128.0	to	130.0		9.0			44.4							SC	
	S-36	133.0	to	135.0		4.0							28.2			SC	

Table G-1 (Continued)
Laboratory Test Results
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)			Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
							Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
CDM-8	S-4B	5.5	to	6.0	127.1	121.4			12.7							SM	
	S-5	6.0	to	7.5		120.4			7.9	N/A	21	NA				SP-SM	
	S-7	9.0	to	10.5		117.4			5.8							SP-SM	
	S-8, S-9, S-10 (Composite)	10.5	to	16.0		113.9	0.0	98.9	1.1							SP	
	S-12	18.0	to	20.0		108.1			6.7							SP-SM	
	S-17	43.0	to	45.0		83.1			9.3							SP-SM	
	S-19, S-20 (Composite)	53.0	to	60.0		70.6	0.0	97.6	2.4							SP	
	S-23	73.0	to	75.0		53.1			8.6	N/A	17	NA				SP-SM	
	S-26B	89.0	to	90.0		37.6			37.4							Limestone	
CDM-9	S-2	2.0	to	4.0	134.9	131.9			5.8				73.2	8.8		SP-SM	
	S-3	4.0	to	6.0		129.9							213.3	12.4		PT	
	S-11	23.0	to	25.0		110.9			9.6							SP-SM	
	S-17	53.0	to	55.0		80.9			11.8							SP-SM	
	S-24	88.0	to	90.0		45.9			6.4							SP-SM	
	S-29	113.0	to	115.0		20.9			4.2							SP	
CDM-10	S-2	2.0	to	4.0	117.2	114.2			2.8							SP	
	S-12	28.0	to	30.0		88.2			63.5	36	51	15	59.3			MH	
	S-18	58.0	to	60.0		58.2			4.4							SP	
CDM-101	S-2	2.0	to	4.0	97.2	94.2			7.6							SP-SM	
	S-5	8.0	to	10.0		88.2			7.3							SP-SM	
	S-7	12.0	to	14.0		84.2			36.9	46	83	37	19.7	0.9		SM	
CDM-102	S-4	6.0	to	8.0	98.2	91.2	0.0	94.5	5.5							SP-SM	
	S-5A (1)	8.0	to	9.0		89.7	0.0	82.5	17.5							SM	
	S-5A (2)	8.0	to	9.0		89.7			18.9							SM	
	S-9(1), S-9(2) (Composite)	16.0	to	18.0		81.2			37.4	21	37	16	19.1			SM	
	S-16	48.0	to	50.0		49.2	0.0	98.5	1.5							SP	
CDM-104	S-3	4.0	to	6.0	96.6	91.6			19.6							SM	
	S-7	12.0	to	14.0		83.6	0.0	91.0	9.0							SP-SM	
	S-8	14.0	to	16.0		81.6	0.0	92.4	7.6							SP-SM	
	S-11(1), S-11(2) (Composite)	23.0	to	24.5		72.9			59.3	19	36	17	47.1			CL	
	S-15B	44.0	to	45.0		52.1	3.0	95.0	2.0							SP	
CDM-105	S-4	6.0	to	8.0	102.6	95.6			13.1							SM	
	S-7	12.0	to	14.0		89.6			8.2							SP-SM	
	S-11	23.0	to	25.0		78.6			4.6							SP	
CDM-106	S-4	6.0	to	8.0	99.5	92.5	0.0	93.4	6.6							SP-SM	
	S-5	8.0	to	10.0		90.5	0.0	91.5	8.5							SP-SM	
	S-13(1), S-13(2) (Composite)	33.0	to	35.0		65.5			51.1	36	76	40	74.6			MH/CH	
	S-15, S-16 (Composite)	43.0	to	50.0		53.0	0.6	90.8	8.6							SP-SM	

Table G-1 (Continued)
Laboratory Test Results
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)	Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
					Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
TP-1	S-2	2.5 to 3.5	112.3	109.3	0.0	96.1	3.9							SP	
	Tube #1 (H)	3.5		108.8							16.7		7.2E-04	SP	109.4
	Tube #2 (V)	5.3 to 5.8		106.8							13.2		2.5E-06	SP	118.9
	S-3	5.0 to 6.0		106.8	0.0	95.8	4.2							SP	
TP-2	Tube #2 (V)	5.8 to 6.3	106.9	100.9							16		5.9E-06	SP	116.0
	S-3	6.0 to 7.0		100.4	0.0	95.3	4.7							SP	
TP-3	S-2	3.5 to 6.0	104.0	99.3	0.0	94.7	5.3							SP-SM	
	Tube #1 (H)	4.5		99.5							12.8		2.4E-04	SP-SM	117.7
TP-4	S-1	0.0 to 2.0	131.4	130.4			5.6							SP-SM	
	S-2	2.0		129.4			10.1							SP-SM	
	S-3	4.0		127.4			10.0							SP-SM	
	S-4	8.0		123.4			2.8							SP	

* Gravel size particles consist of shell / shell fragments or limestone fragments.

(1) Grain Size Analysis tests were conducted in accordance with ASTM D-1140.
(2) Atterberg Limit tests were conducted in accordance with ASTM D-4318.
(3) Moisture Contents were conducted in accordance with ASTM D2216.
(4) Organic Content tests were conducted in accordance with ASTM D-2974-87.
(5) Unified Soil Classification System (USCS) used in table is based on ASTM D2487 and ASTM D2488.
(6) Shelby tube sample density tests, were conducted in accordance with ASTM D2434.
For Shelby Tube (ST) samples, the moisture contents and unit weights shown are averages of sub-samples (where applicable).

NGVD National Geodetic Vertical Datum
CA 6-inch tube sample obtained with California Sampler.
D_{10} Particle size corresponding to 10 % finer in the particle-size distribution curve.
PL Plasticity Limit
LL Liquid Limit
PI Plasticity Index
(H) Horizontal Orientation
(V) Vertical Orientation

SC Clayey Sand
SP Poorly Graded Sand
SP-SM Poorly Graded Sand with Silt
SP-SC Poorly Graded Sand with Clay
SM Silty Sand
SW Well Graded Sand
CL Lean Clay or Sandy Clay
CH Fat Clay
MH Silt or Sandy Silt

CDM Smith

Table G-2
Laboratory Test Results by Layer
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)			Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
							Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
Topsoil / Peat Layer																	
CDM-9	S-2	2.0	to	4.0	134.9	131.9			5.8				73.2	8.8		SP-SM	
	S-3	4.0	to	6.0		129.9							213.3	12.4		PT	
Layer 1																	
CDM-1	S-3	3.0	to	4.5	112.3	108.6			9.2							SP-SM	
	S-7	9.0	to	10.5		102.6			10.7				12.5	6.3		SP-SM	
	S-8A & S-9 (Composite)	10.5	to	14.0		100.1	0.1	98.4	1.5							SP	
	S-12	18.0	to	20.0		93.3			6.7							SP-SM	
	S-17	40.0	to	42.0		71.3			5.7							SP-SM	
	S-22	58.0	to	60.0		53.3	0.3	99.2	0.5							SW	
	S-24	68.0	to	70.0		43.3			7.0							SP-SM	
CDM-2	S-5	6.0	to	7.5	106.7	100.0			9.6							SP-SM	
	S-6	7.5	to	9.0		98.5			7.2							SP-SM	
	S-7, S-8, & S-9 (Composite)	9.0	to	14.0		95.2	0.0	96.0	4.0							SP	
	S-19	53.0	to	55.0		52.7	0.0	98.2	1.8							SP	
	S-20	58.0	to	60.0		47.7			11.0							SP-SM	
CDM-3	S-6	7.5	to	9.0	104.6	96.4			11.1							SP-SM	
	S-8B, S-9, & S-10 (Composite)	11.5	to	16.0		90.9	0.0	95.2	4.8							SP	
	S-14A, S-14B, & S-15 (Composite)	28.0	to	35.0		73.1	0.0	97.4	2.6							SP	
	S-19, S-20A, & S-20B (Composite)	53.0	to	59.5		48.4	0.0	96.6	3.4							SP	
CDM-4	S-4	4.5	to	6.0	126.3	121.1			5.7				1	3.6		SP-SM	
	S-8, S-9, & S-10	10.5	to	16.0		113.1	0.0	98.2	1.8							SP	
	S-15	33.0	to	35.0		92.3			7.5				0.1	1.8		SP-SM	
	S-18 & S-19 (Composite)	48.0	to	55.0		74.8	1.1	96.8	2.1							SW	
	S-25	83.0	to	85.0		42.3			11.2							SP-SM	
	S-27	93.0	to	95.0		32.3			8.4							SP-SC	
CDM-5	S-5	6.0	to	7.5	145.6	138.9			7.7				0.1	0.3		SP-SM	
	S-8, S-9, & S-10A (Composite)	4.0	to	15.0		136.1	0.0	97.7	2.3							SP	
	S-16	33.0	to	35.0		111.6			8.3							SP-SM	
	S-20A, S-20B, & S21 (Composite)	53.0	to	60.0		89.1	0.8	95.9	3.3							SP	
	S-25	78.0	to	80.0		66.6			4.3							SP	
	S-29, S-30, & S-31	98.0	to	100.0		46.6	0.7	98.0	1.3							SP	

Table G-2 (Continued)
Laboratory Test Results by Layer
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)			Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
							Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
Layer 1																	
CDM-6	S-11B, S-12, & S-13 (Composite)	17.0	to	25.0	145.7	124.7	1.4	96.1	2.5							SP	
	S-17	43.0	to	45.0		101.7			10.5							SP-SM	
	S-20 & S-21 (Composite)	58.0	to	65.0		84.2	0.0	98.2	1.8							SP	
	S-26	88.0	to	90.0		56.7			7.1							SP-SM	
	S-29 & S-30 (Composite)	103.0	to	110.0		39.2	0.0	98.6	1.4							SP	
CDM-7	S-4	4.5	to	6.0	138.0	132.8			9.1							SP-SM	
	S-10, S-11A, S-12A (Composite)	14.0	to	19.0		121.5	1.7	97.3	1.0							SP	
	S-16	33.0	to	35.0		104.0			11.8							SP-SM	
	S-19	48.0	to	50.0		89.0			8.8							SP-SM	
	S-21, S-22 (Composite	58.0	to	65.0		76.5	0.0	98.0	2.0							SP	
	S-29, S-30, & S-31 (Composite)	98.0	to	110.0		34.0	0.0	97.4	2.6							SP	
CDM-8	S-5	6.0	to	7.5	127.1	120.4			7.9	N/A	21	NA				SP-SM	
	S-7	9.0	to	10.5		117.4			5.8							SP-SM	
	S-8, S-9, S-10 (Composite)	10.5	to	16.0		113.9	0.0	98.9	1.1							SP	
	S-12	18.0	to	20.0		108.1			6.7							SP-SM	
	S-17	43.0	to	45.0		83.1			9.3							SP-SM	
	S-19, S-20 (Composite)	53.0	to	60.0		70.6	0.0	97.6	2.4							SP	
	S-23	73.0	to	75.0		53.1			8.6	N/A	17	NA				SP-SM	
CDM-9	S-11	23.0	to	25.0	134.9	110.9			9.6							SP-SM	
	S-17	53.0	to	55.0		80.9			11.8							SP-SM	
	S-24	88.0	to	90.0		45.9			6.4							SP-SM	
	S-29	113.0	to	115.0		20.9			4.2							SP	
CDM-10	S-2	2.0	to	4.0	117.2	114.2			2.8							SP	
	S-18	58.0	to	60.0		58.2			4.4							SP	
CDM-101	S-2	2.0	to	4.0	97.2	94.2			7.6							SP-SM	
	S-5	8.0	to	10.0		88.2			7.3							SP-SM	
CDM-102	S-4	6.0	to	8.0	98.2	91.2	0.0	94.5	5.5							SP-SM	
	S-16	48.0	to	50.0		49.2	0.0	98.5	1.5							SP	
CDM-104	S-7	12.0	to	14.0	96.6	83.6	0.0	91.0	9.0							SP-SM	
	S-8	14.0	to	16.0		81.6	0.0	92.4	7.6							SP-SM	
	S-15B	44.0	to	45.0		52.1	3.0	95.0	2.0							SP	
CDM-105	S-7	12.0	to	14.0	102.6	89.6			8.2							SP-SM	
	S-11	23.0	to	25.0		78.6			4.6							SP	
CDM-106	S-4	6.0	to	8.0	99.5	92.5	0.0	93.4	6.6							SP-SM	
	S-5	8.0	to	10.0		90.5	0.0	91.5	8.5							SP-SM	
	S-15, S-16 (Composite)	43.0	to	50.0		53.0	0.6	90.8	8.6							SP-SM	

Table G-2 (Continued)
Laboratory Test Results by Layer
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)			Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
							Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
Layer 1																	
TP-1	S-2	2.5	to	3.5	112.3	109.3	0.0	96.1	3.9							SP	
	Tube #1 (H)	3.5				110.6							16.7		7.2E-04	SP	109.4
	Tube #2 (V)	5.3	to	5.8		106.8							13.2		2.5E-06	SP	118.9
	S-3	5.0	to	6.0		106.8	0.0	95.8	4.2							SP	
TP-2	Tube #2 (V)	5.8	to	6.3	106.9	100.9							16		5.9E-06	SP	116.0
	S-3	6.0	to	7.0		100.4	0.0	95.3	4.7							SP	
TP-3	S-2	3.5	to	6.0	104.0	99.3	0.0	94.7	5.3							SP-SM	
	Tube #1 (H)	4.5				99.5							12.8		2.4E-04	SP-SM	117.7
TP-4	S-1	0.0	to	2.0	131.4	130.4			5.6							SP-SM	
	S-2	2.0				129.4			10.1							SP-SM	
	S-3	4.0				127.4			10.0							SP-SM	
	S-4	8.0				123.4			2.8							SP	
Layer 1A																	
CDM-5	S-11	16.0	to	18.0	145.6	128.6			12.7				0.2	0.9		SM	
	S-14	23.0	to	25.0		121.6			22.0	20	24	4	19.2			SC	
CDM-6	S-6	7.5	to	9.0	145.7	137.5			13.5				0.1	0.5		SM	
	S-9	12.0	to	14.0		132.7			14.5							SM	
	S-10C	15.5	to	16.0		130.0							25.5			SC	
	S-11A	16.0	to	17.0		129.2			47.0							SC	
CDM-7	S-5	6.0	to	7.5	138.0	131.3							21.6			SM	
	S-6	7.5	to	9.0		129.8			27.8							SM	
	S-9A	12.0	to	13.0		125.5			46.6							SC	
	S-11B	17.0	to	18.0		120.5			22.3							SM	
	S-13A	20.0	to	21.5		117.3			16.3							SC	
CDM-8	S-4B	5.5	to	6.0	127.1	121.4			12.7							SM	
Layer 1B																	
CDM-7	S-23	68.0	to	70.0	138.0	69.0			12.3							SM	
	S-28	93.0	to	95.0		44.0			12.3							SM	
Layer 1C																	
CDM-2	S-10A	14.0	to	16.0	106.7	91.7			17.5							SM	
CDM-3	S-11B	16.0	to	18.0	104.6	87.6			77.3				17.9			CL	
CDM-10	S-12	28.0	to	30.0	117.2	88.2			63.5	36	51	15	59.3			MH	
CDM-101	S-7	12.0	to	14.0	97.2	84.2			36.9	46	83	37	19.7	0.9		SM	
CDM-102	S-5A (1)	8.0	to	9.0	98.2	89.7	0.0	82.5	17.5							SM	
	S-5A (2)	8.0	to	9.0		89.7			18.9							SM	
	S-9(1), S-9(2) (Composite)	16.0	to	18.0		81.2			37.4	21	37	16	19.1			SM	
CDM-104	S-3	4.0	to	6.0	96.6	91.6			19.6							SM	
CDM-105	S-4	6.0	to	8.0	102.6	95.6			13.1							SM	
Layer 1D																	
CDM-2	S-18B	49.0	to	49.5	106.7	57.5			12.7							SC	
CDM-104	S-11(1), S-11(2) (Composite)	23.0	to	24.5	96.6	83.0			59.3	19	36	17	47.1			CL	
CDM-106	S-13(1), S-13(2) (Composite)	33.0	to	35.0	99.5	65.5			51.1	36	76	40	74.6			MH/CH	

Table G-2 (Continued)
Laboratory Test Results by Layer
Trail Ridge Landfill Expansion

Exploration ID	Sample No.	Sample Depth Interval (ft-bls)			Ground Surface Elevation (ft-NGVD)	Mid Sample Elevation (ft-NGVD)	Grain Size Analysis (1)			Atterberg Limits (2)			Moisture Content (%) (3)	Organic Content (%) (4)	Hydraulic Conductivity (cm/sec)	USCS Classification (5)	Dry Density (pcf) (6)
							Gravel Size * (%)	Sand Size (%)	Fines (%)	PL (%)	LL (%)	PI (%)					
Layer 2																	
CDM-1	S-25	73.0	to	75.0	112.3	38.3			18.0							SM	
	S-28a	88.0	to	90.0		23.3			47.5				52.3			SC	
CDM-2	S-25	83.0	to	85.0	106.7	22.7			24.9	28	49	21	44.9			SC	
CDM-3	S-21A	63.0	to	64.5	104.6	40.9			16.4	28	34	6	23.5			SC	
CDM-4	S-28B	99.0	to	100.0	126.3	26.8			55.3	51	58	7	32.9			MH	
CDM-5	S-37A	138.0	to	140.0	145.6	6.6			26.8				43.5			SC	
	S-37B	138.0	to	140.0		6.6							41.3			SC	
CDM-6	S-33B	123.8	to	124.3	145.7	21.7			64.6							CL	
	S-33C	124.3	to	125.0		21.1			34.2							SC	
Layer 3																	
CDM-1	S-29 & S-30 (Composite)	93.0	to	100.0	112.3	15.8	26.3	73.5	0.2							Limestone	
CDM-2	S-27B	93.0	to	100.0	106.7	10.2	11.8	73.5	14.7							Limestone	
CDM-4	S-29 & S-30 (Composite)	103.0	to	110.0	126.3	19.8	15.3	69.3	15.4							Limestone	
CDM-6	CA-1	138.0	to	140.0	145.7	6.7			41.4							Limestone	
CDM-7	S-32	113.0	to	115.0	138.0	24.0			42.2							Limestone	
	S-35	128.0	to	130.0		9.0			44.4							SC	
	S-36	133.0	to	135.0		4.0							28.2			SC	
CDM-8	S-26B	89.0	to	90.0	127.1	37.6			37.4							Limestone	
Layer 4																	
CDM-1	S-36	128.0	to	130.0	112.3	-16.7				61	85	24	28.6			SC	
	S-37	133.0	to	135.0		-21.7			25.4							SC	
CDM-2	S-30	108.0	to	110.0	106.7	-2.3			16.7							SC	
	S-32	118.0	to	120.0		-12.3			22.4							SC	

* Gravel size particles consist of shell / shell fragments or limestone fragments.

(1) Grain Size Analysis tests were conducted in accordance with ASTM D-1140.
(2) Atterberg Limit tests were conducted in accordance with ASTM D-4318.
(3) Moisture Contents were conducted in accordance with ASTM D2216.
(4) Organic Content tests were conducted in accordance with ASTM D-2974-87.
(5) Unified Soil Classification System (USCS) used in table is based on ASTM D2487 and ASTM D2488.
(6) Shelby tube sample density tests, were conducted in accordance with ASTM D2434.
For Shelby Tube (ST) samples, the moisture contents and unit weights shown are averages of sub-samples (where applicable).

NGVD National Geodetic Vertical Datum
CA 6-inch tube sample obtained with California Sampler.
D_{10} Particle size corresponding to 10 % finer in the particle-size distribution curve.
PL Plasticity Limit
LL Liquid Limit
PI Plasticity Index
(H) Horizontal Orientation
(V) Vertical Orientation

SC Clayey Sand
SP Poorly Graded Sand
SP-SM Poorly Graded Sand with Silt
SP-SC Poorly Graded Sand with Clay
SM Silty Sand
SW Well Graded Sand
CL Lean Clay or Sandy Clay
CH Fat Clay
MH Silt or Sandy Silt

CDM Smith

CDM-1

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-3
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	3-4.5 3/24/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	369

Dry Mass of the Sample after Washing (grams): 335

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **9.2**

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-7
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Black**	**Sample Depth (feet):** **Test Date:**	9-10.5 3/24/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	159

Dry Mass of the Sample after Washing (grams): 142

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **10.7**

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	3/15/2011	**Collected by:**	Client
Received Date:	3/15/2011	**Analysis by:**	A.U.
Report Date:	3/17/2011	**Sample No.:**	S-7; CDM-1 9-10.5 Feet Depth
Description of Material:	Poorly Graded Sand with Silt (SP-SM), Fine, Black		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	6.34	%	3/16/2011
Residue	N/A	93.66	%	3/16/2011
Moisture	N/A	73.2	%	3/16/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S8A &S9
Material Description:	**Poorly Graded Sand (SP), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	10.5-14 3/16/2011
Remarks:		**Sample Weight (grams):**	689

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	1.0	0.1%	1.0	0.1%	99.9%
No 10 (2.00 mm)	3.0	0.4%	4.0	0.6%	99.4%
No 20 (.850 mm)	9.0	1.3%	13.0	1.9%	98.1%
No 40 (.425 mm)	151.0	21.9%	164.0	23.8%	76.2%
No 60 (.250mm)	340.0	49.3%	504.0	73.1%	26.9%
No 100 (.150 mm)	143.0	20.8%	647.0	93.9%	6.1%
No 140 (.106 mm)	24.0	3.5%	671.0	97.4%	2.6%
No 200 (.075 mm)	8.0	1.2%	679.0	98.5%	1.5%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-12
		Sample Depth (feet):	18-20
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Black**	**Test Date:**	3/24/2011

Remarks: **Original Dry Mass of the Sample (grams):** 403

Dry Mass of the Sample after Washing (grams): 376

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **6.7**

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-17
		Sample Depth (feet):	40-42
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Brown**	**Test Date:**	3/24/2011

Remarks: **Original Dry Mass of the Sample (grams):** 297

Dry Mass of the Sample after Washing (grams): 280

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **5.7**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-22
Material Description:	**Well Graded Sand (SW), Fine to Coarse, Light Brown**	**Sample Depth (feet):** **Test Date:**	58-60 3/16/2011
Remarks:	Very few shell particles were retained at # 40 sieve	**Sample Weight (grams):**	385

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	1.0	0.3%	1.0	0.3%	99.7%
No 10 (2.00 mm)	5.0	1.3%	6.0	1.6%	98.4%
No 20 (.850 mm)	85.0	22.1%	91.0	23.6%	76.4%
No 40 (.425 mm)	289.0	75.1%	380.0	98.7%	1.3%
No 60 (.250mm)	2.0	0.5%	382.0	99.2%	0.8%
No 100 (.150 mm)	1.0	0.3%	383.0	99.5%	0.5%
No 140 (.106 mm)	0.0	0.0%	383.0	99.5%	0.5%
No 200 (.075 mm)	0.0	0.0%	383.0	99.5%	0.5%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-24
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	68-70 3/24/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	369

Dry Mass of the Sample after Washing (grams): 343

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.0**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-25
Material Description:	**Silty Sand (SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	73-75 5/9/2011

Remarks:

Original Dry Mass of the Sample (grams): 344

Dry Mass of the Sample after Washing (grams): 282

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **18.0**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-28A
		Sample Depth (feet):	88-90
Material Description:	**Clayey Sand (SC), Fine, Light Gray**	**Test Date:**	3/22/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	183

Dry Mass of the Sample after Washing (grams): 96

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **47.5**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	2
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Clayey Sand (SC), Fine, Light Gray		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	3/2/2011	**CES Project#**	L-110002.00
Collected By	CDM	**Sample #**	CMD-1, S-28A
Analysis date	3/15/2011	**Sample Depth (feet):**	88-90
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**719.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**558.0**
Mc (gm)	Mass of Container	**250.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**161.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**308.0**
W	Water Contents %	**52.27**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S29 &S30
Material Description:	**Limestone Sampled as Poorly Graded Sand with Gravel, Light Brown, Calcareous**	**Sample Depth (feet):** **Test Date:**	93-100 3/16/2011
Remarks:		**Sample Weight (grams):**	482

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	79.0	16.4%	79.0	16.4%	83.6%
No 4 (4.75 mm)	48.0	10.0%	127.0	26.3%	73.7%
No 10 (2.00 mm)	58.0	12.0%	185.0	38.4%	61.6%
No 20 (.850 mm)	69.0	14.3%	254.0	52.7%	47.3%
No 40 (.425 mm)	47.0	9.8%	301.0	62.4%	37.6%
No 60 (.250mm)	34.0	7.1%	335.0	69.5%	30.5%
No 100 (.150 mm)	51.0	10.6%	386.0	80.1%	19.9%
No 140 (.106 mm)	89.0	18.5%	475.0	98.5%	1.5%
No 200 (.075 mm)	6.0	1.2%	481.0	99.8%	0.2%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

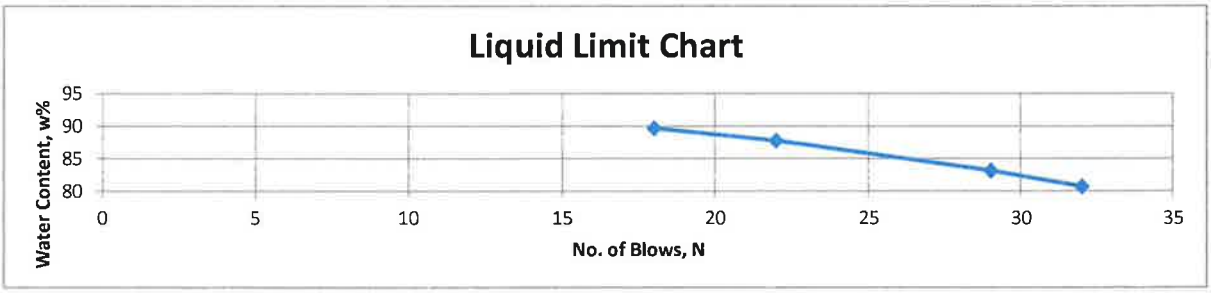
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	CDM- 1 S-36
Sampling Date:	3/3/2011	**Collected by:**	CES Lab by FedEx
Received Date:	3/4/2011	**Analysis by:**	A.U
Analysis Date:	3/17/2011	**Sample Depth:**	128-130 Feet
Description of Material:	Clayey Sand (SC), Fine, Dark Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	2	7	5	4
Me = Mass of Empty Container + Lid (grams)	25.3	24.7	24.2	23.8
Mm = Mass Container, Lid, and Moist Soil (grams)	45	45.4	45.8	46
Md = Mass of Container, Lid, and dry soil (grams)	36.2	36	35.7	35.5
Ms = Mass of Soil Solids (grams)	10.9	11.3	11.5	11.7
Mw = Mass of Pore Water (grams)	8.8	9.4	10.1	10.5
w = Water Content, w%	80.7	83.2	87.8	89.7
No. of Drops (N)	32	29	22	18



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	8	1	6
Me = Mass of Empty Container + Lid (grams)	24.2	24.4	24.3
Mm = Mass Container, Lid, and Moist Soil (grams)	33.7	34.2	34
Md = Mass of Container, Lid, and dry soil (grams)	30.1	30.5	30.3
Ms = Mass of Soil Solids (grams)	5.9	6.1	6
Mw = Mass of Pore Water (grams)	3.6	3.7	3.7
w = Water Content, w%	61.0	60.7	61.7
Plastic Limit (PL) (Average) w%	**61.1**		

Results Summary:

Liquid Limit= 85
Plastic Limit= 61
Plasticity Index 24

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	1
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Clayey Sand (SC), Fine, Dark Gray		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	3/2/2011	**CES Project#**	L-110002.00
Collected By	CDM	**Sample #**	CMD-1, S-36
Analysis date	3/15/2011	**Sample Depth (feet):**	128-130
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**596.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**505.0**
Mc (gm)	Mass of Container	**250.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**91.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**255.0**
W	Water Contents %	**35.69**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revise

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	8
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-1, S-37
Material Description:	**Clayey Sand (SC), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	133-135 5/9/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	303

Dry Mass of the Sample after Washing (grams): 226

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **25.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-2

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-5
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Gray**	**Sample Depth (feet):** **Test Date:**	6-7.5 3/25/2011

Remarks:

Original Dry Mass of the Sample (grams): 407

Dry Mass of the Sample after Washing (grams): 368

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **9.6**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-6
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Gray**	**Sample Depth (feet):** **Test Date:**	7.5-9 3/25/2011

Remarks:

Original Dry Mass of the Sample (grams): 388

Dry Mass of the Sample after Washing (grams): 360

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.2**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-7,8 & 9
Material Description:	**Poorly Graded Sand (SP), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	9-14 3/16/2011
Remarks:		**Sample Weight (grams):**	1113

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	1.0	0.1%	1.0	0.1%	99.9%
No 20 (.850 mm)	6.0	0.5%	7.0	0.6%	99.4%
No 40 (.425 mm)	213.0	19.1%	220.0	19.8%	80.2%
No 60 (.250mm)	551.0	49.5%	771.0	69.3%	30.7%
No 100 (.150 mm)	232.0	20.8%	1003.0	90.1%	9.9%
No 140 (.106 mm)	42.0	3.8%	1045.0	93.9%	6.1%
No 200 (.075 mm)	24.0	2.2%	1069.0	96.0%	4.0%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-10A
		Sample Depth (feet):	14-16
Material Description:	**Silty Sand (SM), Fine, Dark Brown**	**Test Date:**	3/25/2011

Remarks: **Original Dry Mass of the Sample (grams):** 325

Dry Mass of the Sample after Washing (grams): 268

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **17.5**

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-18B
Material Description:	**Clayey Sand (SC), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	49-49.5 3/25/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	63

Dry Mass of the Sample after Washing (grams): 55

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **12.7**

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-19
Material Description:	**Poorly Graded Sand (SP), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	53-55 3/16/2011
Remarks:		**Sample Weight (grams):**	397

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	1.0	0.3%	1.0	0.3%	99.7%
No 20 (.850 mm)	32.0	8.1%	33.0	8.3%	91.7%
No 40 (.425 mm)	169.0	42.6%	202.0	50.9%	49.1%
No 60 (.250mm)	135.0	34.0%	337.0	84.9%	15.1%
No 100 (.150 mm)	43.0	10.8%	380.0	95.7%	4.3%
No 140 (.106 mm)	7.0	1.8%	387.0	97.5%	2.5%
No 200 (.075 mm)	3.0	0.8%	390.0	98.2%	1.8%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE# 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-20
		Sample Depth (feet):	58-60
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Test Date:**	3/25/2011

Remarks: **Original Dry Mass of the Sample (grams):** 346

Dry Mass of the Sample after Washing (grams): 308

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **11.0**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-25
		Sample Depth (feet):	83-85
Material Description:	**Clayey Sand (SC), Fine, Dark Gray**	**Test Date:**	3/25/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	253

Dry Mass of the Sample after Washing (grams): 190

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **24.9**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

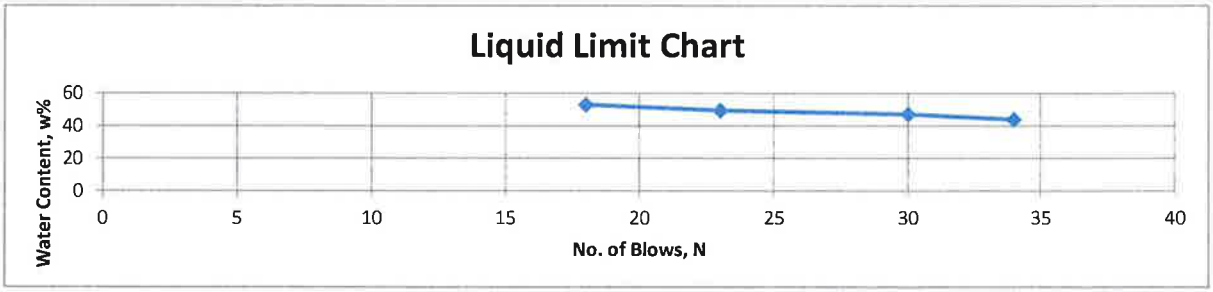
CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	CDM-2 S-25
Sampling Date:	3/3/2011	**Collected by:**	CES Lab by FedEx
Received Date:	3/4/2011	**Analysis by:**	A.U
Analysis Date:	3/17/2011	**Sample Depth:**	83-85 Feet
Description of Material:	Clayey Sand (SC), Fine, Dark Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	7	8	9	6
Me = Mass of Empty Container + Lid (grams)	25.3	24.2	24.5	24.3
Mm = Mass Container, Lid, and Moist Soil (grams)	41	42.3	42.9	44.2
Md = Mass of Container, Lid, and dry soil (grams)	36.2	36.5	36.8	37.3
Ms = Mass of Soil Solids (grams)	10.9	12.3	12.3	13
Mw = Mass of Pore Water (grams)	4.8	5.8	6.1	6.9
w = Water Content, w%	44.0	47.2	49.6	53.1
No. of Drops (N)	34	30	23	18



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	2	4	5
Me = Mass of Empty Container + Lid (grams)	25.3	23.8	24.2
Mm = Mass Container, Lid, and Moist Soil (grams)	33.1	33.8	33
Md = Mass of Container, Lid, and dry soil (grams)	31.4	31.6	31.1
Ms = Mass of Soil Solids (grams)	6.1	7.8	6.9
Mw = Mass of Pore Water (grams)	1.7	2.2	1.9
w = Water Content, w%	27.9	28.2	27.5
Plastic Limit (PL) (Average) w%	**27.9**		

Results Summary:

Liquid Limit= 49
Plastic Limit= 28
Plasticity Index 21

Respectfully Submitted

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	3
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Clayey Sand(SC), Fine, Dark Clay		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	3/4/2011	**CES Project#**	L-110002.00
Collected By	CDM	**Sample #**	CMD-2, S-25
Analysis date	3/15/2011	**Sample Depth (feet):**	83-85
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**758.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**585.0**
Mc (gm)	Mass of Container	**200.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**173.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**385.0**
W	Water Contents %	**44.94**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-27B & S28
Material Description:	**Limestone Sampled as Silty Sand, Fine to Medium, Brown, Calcareous**	**Sample Depth (feet):** **Test Date:**	93-100 3/16/2011
Remarks:		**Sample Weight (grams):**	645

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	28.0	4.3%	28.0	4.3%	95.7%
No 4 (4.75 mm)	48.0	7.4%	76.0	11.8%	88.2%
No 10 (2.00 mm)	92.0	14.3%	168.0	26.0%	74.0%
No 20 (.850 mm)	121.0	18.8%	289.0	44.8%	55.2%
No 40 (.425 mm)	86.0	13.3%	375.0	58.1%	41.9%
No 60 (.250mm)	60.0	9.3%	435.0	67.4%	32.6%
No 100 (.150 mm)	64.0	9.9%	499.0	77.4%	22.6%
No 140 (.106 mm)	16.0	2.5%	515.0	79.8%	20.2%
No 200 (.075 mm)	35.0	5.4%	550.0	85.3%	14.7%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-30
Material Description:	**Clayey Sand (SC), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	108-110 3/25/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	252

Dry Mass of the Sample after Washing (grams): 210

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **16.7**

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	8
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-2, S-32
		Sample Depth (feet):	118-120
Material Description:		**Test Date:**	3/25/2011
	Clayey Sand (SC), Fine, Light Gray		
Remarks:		**Original Dry Mass of the Sample (grams):**	250

Dry Mass of the Sample after Washing (grams): 194

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **22.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-3

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-3, S-6
		Sample Depth (feet):	7.5-9
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Test Date:**	3/22/2011

Remarks: **Original Dry Mass of the Sample (grams):** 396

Dry Mass of the Sample after Washing (grams): 352

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **11.1**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/7/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-3, S-8B,9,10
Material Description:	**Poorly Graded Sand (SP), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	N/A 3/18/2011
Remarks:		**Sample Weight (grams):**	1217

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	5.0	0.4%	5.0	0.4%	99.6%
No 20 (.850 mm)	41.0	3.4%	46.0	3.8%	96.2%
No 40 (.425 mm)	297.0	24.4%	343.0	28.2%	71.8%
No 60 (.250mm)	558.0	45.9%	901.0	74.0%	26.0%
No 100 (.150 mm)	179.0	14.7%	1080.0	88.7%	11.3%
No 140 (.106 mm)	45.0	3.7%	1125.0	92.4%	7.6%
No 200 (.075 mm)	33.0	2.7%	1158.0	95.2%	4.8%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	4
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Lean Clay (CL), Light Gray		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	3/7/2011	**CES Project#**	L-110002.00
Collected By	CDM	**Sample #**	CMD-3, S-11B
Analysis date	3/18/2011	**Sample Depth (feet):**	16-18
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**620.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**544.0**
Mc (gm)	Mass of Container	**120.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**76.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**424.0**
W	Water Contents %	**17.92**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-3, S-11B
		Sample Depth (feet):	16-18
Material Description:	**Lean Clay (CL), Light Gray**	**Test Date:**	3/22/2011

Remarks: **Original Dry Mass of the Sample (grams):** 154

Dry Mass of the Sample after Washing (grams): 35

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **77.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

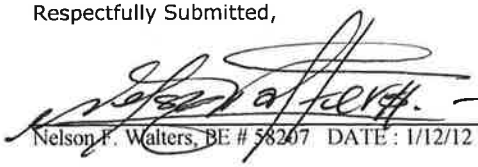
REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/7/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-3, S-14A,14B,15
		Sample Depth (feet):	28-35
Material Description:	**Poorly Graded Sand (SP), Fine, Light Brown**	**Test Date:**	3/18/2011
Remarks:		**Sample Weight (grams):**	694

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	1.0	0.1%	1.0	0.1%	99.9%
No 20 (.850 mm)	15.0	2.2%	16.0	2.3%	97.7%
No 40 (.425 mm)	154.0	22.2%	170.0	24.5%	75.5%
No 60 (.250mm)	282.0	40.6%	452.0	65.1%	34.9%
No 100 (.150 mm)	179.0	25.8%	631.0	90.9%	9.1%
No 140 (.106 mm)	33.0	4.8%	664.0	95.7%	4.3%
No 200 (.075 mm)	12.0	1.7%	676.0	97.4%	2.6%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,



Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/7/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-3, S-19,20A
Material Description:	**Poorly Graded Sand (SP), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	53-59.5 3/18/2011
Remarks:		**Sample Weight (grams):**	407

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	4.0	1.0%	4.0	1.0%	99.0%
No 20 (.850 mm)	12.0	2.9%	16.0	3.9%	96.1%
No 40 (.425 mm)	70.0	17.2%	86.0	21.1%	78.9%
No 60 (.250mm)	175.0	43.0%	261.0	64.1%	35.9%
No 100 (.150 mm)	104.0	25.6%	365.0	89.7%	10.3%
No 140 (.106 mm)	20.0	4.9%	385.0	94.6%	5.4%
No 200 (.075 mm)	8.0	2.0%	393.0	96.6%	3.4%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE #58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-3, S-21A
		Sample Depth (feet):	63-64.5
Material Description:	**Clayey Sand (SC), Fine, Light Gray**	**Test Date:**	3/22/2011

Remarks: **Original Dry Mass of the Sample (grams):** 159

Dry Mass of the Sample after Washing (grams): 133

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **16.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

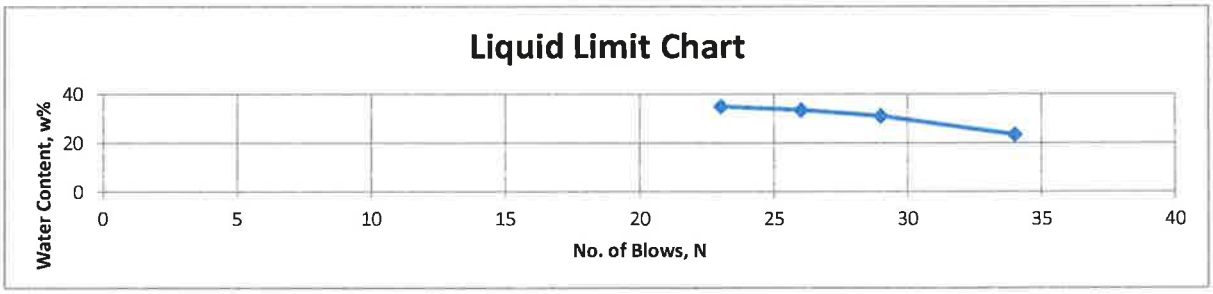
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	CDM-3 S-21A
Sampling Date:	3/8/2011	**Collected by:**	CES Lab by FedEx
Received Date:	3/9/2011	**Analysis by:**	A.U
Analysis Date:	4/13/2011	**Sample Depth:**	63-64.5 Feet
Description of Material:	Clayey Sand (SC), Fine, Light Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	15	17	23	24
Me = Mass of Empty Container + Lid (grams)	14	14.1	14.1	14.1
Mm = Mass Container, Lid, and Moist Soil (grams)	33.5	35.2	34.7	35.7
Md = Mass of Container, Lid, and dry soil (grams)	29.8	30.2	29.5	30.1
Ms = Mass of Soil Solids (grams)	15.8	16.1	15.4	16
Mw = Mass of Pore Water (grams)	3.7	5	5.2	5.6
w = Water Content, w%	23.5	31.1	33.5	35.0
No. of Drops (N)	34	29	26	23



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	4	9	18
Me = Mass of Empty Container + Lid (grams)	14.1	13.9	14
Mm = Mass Container, Lid, and Moist Soil (grams)	24.2	22.9	23.7
Md = Mass of Container, Lid, and dry soil (grams)	22	20.9	21.6
Ms = Mass of Soil Solids (grams)	7.9	7	7.6
Mw = Mass of Pore Water (grams)	2.2	2	2.1
w = Water Content, w%	27.8	28.6	27.6
Plastic Limit (PL) (Average) w%	**28.0**		

Results Summary:

Liquid Limit= 34
Plastic Limit= 28
Plasticity Index 6

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	5
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	**Clayey Sand (SC), Fine, Light Gray**		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	3/7/2011	**CES Project#**	L-110002.00
Collected By	CDM	**Sample #**	CMD-3, S-21A
Analysis date	3/18/2011	**Sample Depth (feet):**	63-64.5
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**625.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**530.0**
Mc (gm)	Mass of Container	**125.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**95.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**405.0**
W	Water Contents %	**23.46**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-4

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-4
		Sample Depth (feet):	4.5-6
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown**	**Test Date:**	3/22/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	316

Dry Mass of the Sample after Washing (grams): 298

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **5.7**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	3/9/2011	**Collected by:**	Client
Received Date:	4/8/2011	**Analysis by:**	A.U.
Report Date:	4/12/2011	**Sample No.:**	S-4; CDM-4 4 - 5.5 Feet Depth
Description of Material:	Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	3.64	%	4/11/2011
Residue	N/A	96.36	%	4/11/2011
Moisture	N/A	0.95	%	4/11/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-8,9,10
Material Description:	**Poorly Graded Sand (SP), Fine, Brown**	**Sample Depth (feet):** **Test Date:**	10.5-16 3/18/2011
Remarks:		**Sample Weight (grams):**	1068

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	6.0	0.6%	6.0	0.6%	99.4%
No 40 (.425 mm)	237.0	22.2%	243.0	22.8%	77.2%
No 60 (.250mm)	615.0	57.6%	858.0	80.3%	19.7%
No 100 (.150 mm)	169.0	15.8%	1027.0	96.2%	3.8%
No 140 (.106 mm)	15.0	1.4%	1042.0	97.6%	2.4%
No 200 (.075 mm)	7.0	0.7%	1049.0	98.2%	1.8%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-15
		Sample Depth (feet):	33-35
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Gray**	**Test Date:**	3/22/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	320

Dry Mass of the Sample after Washing (grams): 296

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.5**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-18,19
		Sample Depth (feet):	48-55
Material Description:		**Test Date:**	3/18/2011
	Well Graded Sand (SW), Fine to Coarse, Brown		
Remarks:		**Sample Weight (grams):**	719

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	3.0	0.4%	3.0	0.4%	99.6%
No 4 (4.75 mm)	5.0	0.7%	8.0	1.1%	98.9%
No 10 (2.00 mm)	65.0	9.0%	73.0	10.2%	89.8%
No 20 (.850 mm)	104.0	14.5%	177.0	24.6%	75.4%
No 40 (.425 mm)	114.0	15.9%	291.0	40.5%	59.5%
No 60 (.250mm)	203.0	28.2%	494.0	68.7%	31.3%
No 100 (.150 mm)	189.0	26.3%	683.0	95.0%	5.0%
No 140 (.106 mm)	17.0	2.4%	700.0	97.4%	2.6%
No 200 (.075 mm)	4.0	0.6%	704.0	97.9%	2.1%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-25
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	83-85 3/22/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	242

Dry Mass of the Sample after Washing (grams): 215

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **11.2**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-27
Material Description:	**Poorly Graded Sand with Clay (SP-SM), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	93-95 3/22/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	311

Dry Mass of the Sample after Washing (grams): 285

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **8.4**

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	6
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	**Sandy Silt (MH), Dark Gray**		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	3/9/2011	**CES Project#**	L-110002.00
Collected By	CDM	**Sample #**	CMD-4, S-28B
Analysis date	3/18/2011	**Sample Depth (feet):**	99-100
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**702.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**563.0**
Mc (gm)	Mass of Container	**140.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**139.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**423.0**
W	Water Contents %	**32.86**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-28B
Material Description:	**Sandy Silt (MH), Dark Gray**	**Sample Depth (feet):** **Test Date:**	99-100 3/22/2011

Remarks: **Original Dry Mass of the Sample (grams):** 190

Dry Mass of the Sample after Washing (grams): 85

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **55.3**

Respectfully Submitted,

Nelson F. Walters, PE #38207 DATE : 1/12/12 (revised)

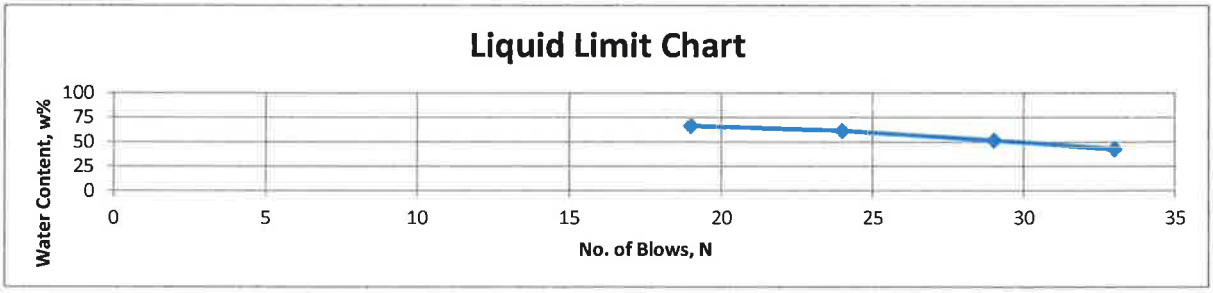
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	CDM-4 S-28B
Sampling Date:	3/9/2011	**Collected by:**	CES Lab by FedEx
Received Date:	3/10/2011	**Analysis by:**	A.U
Analysis Date:	4/13/2011	**Sample Depth:**	99-100 Feet
Description of Material:	Sandy Silt (MH), Dark Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	10	2	27	29
Me = Mass of Empty Container + Lid (grams)	13.8	14	14	13.9
Mm = Mass Container, Lid, and Moist Soil (grams)	32	33.3	34.7	35.4
Md = Mass of Container, Lid, and dry soil (grams)	26.5	26.7	26.8	26.8
Ms = Mass of Soil Solids (grams)	12.7	12.7	12.8	12.9
Mw = Mass of Pore Water (grams)	5.5	6.6	7.9	8.6
w = Water Content, w%	43.4	52.0	61.7	66.7
No. of Drops (N)	33	29	24	19



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	3	8	25
Me = Mass of Empty Container + Lid (grams)	14	14.1	14.1
Mm = Mass Container, Lid, and Moist Soil (grams)	23.8	21.5	22.6
Md = Mass of Container, Lid, and dry soil (grams)	20.5	19	19.7
Ms = Mass of Soil Solids (grams)	6.5	4.9	5.6
Mw = Mass of Pore Water (grams)	3.3	2.5	2.9
w = Water Content, w%	50.8	51.0	51.8
Plastic Limit (PL) (Average) w%	**51.2**		

Results Summary:

Liquid Limit= 58
Plastic Limit= 51
Plasticity Index 7

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-4, S-29,30
Material Description:	**Limestone Sampled as Silty Sand, Fine to Coarse, Light Gray, Calcareous**	**Sample Depth (feet):** **Test Date:**	103-110 3/18/2011
Remarks:		**Sample Weight (grams):**	649

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	30.0	4.6%	30.0	4.6%	95.4%
3 / 8 "	35.0	5.4%	65.0	10.0%	90.0%
No 4 (4.75 mm)	34.0	5.2%	99.0	15.3%	84.7%
No 10 (2.00 mm)	57.0	8.8%	156.0	24.0%	76.0%
No 20 (.850 mm)	95.0	14.6%	251.0	38.7%	61.3%
No 40 (.425 mm)	61.0	9.4%	312.0	48.1%	51.9%
No 60 (.250mm)	70.0	10.8%	382.0	58.9%	41.1%
No 100 (.150 mm)	119.0	18.3%	501.0	77.2%	22.8%
No 140 (.106 mm)	28.0	4.3%	529.0	81.5%	18.5%
No 200 (.075 mm)	20.0	3.1%	549.0	84.6%	15.4%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-5

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/10/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-4
		Sample Depth (feet):	6-7.5
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Brown**	**Test Date:**	3/23/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	325

Dry Mass of the Sample after Washing (grams): 300

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.7**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/10/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-5
		Sample Depth (feet):	6-7.5
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Brown**	**Test Date:**	3/23/2011

Remarks:

Original Dry Mass of the Sample (grams): 325

Dry Mass of the Sample after Washing (grams): 300

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.7**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	3/10/2011	**Collected by:**	Client
Received Date:	4/8/2011	**Analysis by:**	A.U.
Report Date:	4/12/2011	**Sample No.:**	S-5; CDM-5 6- 7.5 Feet Depth
Description of Material:	Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	0.31	%	4/11/2011
Residue	N/A	99.69	%	4/11/2011
Moisture	N/A	0.06	%	4/11/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-8,9
Material Description:	**Poorly Graded Sand (SP), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	3/18/2011
Remarks:		**Sample Weight (grams):**	1030

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	1.0	0.1%	1.0	0.1%	99.9%
No 20 (.850 mm)	3.0	0.3%	4.0	0.4%	99.6%
No 40 (.425 mm)	185.0	18.0%	189.0	18.3%	81.7%
No 60 (.250mm)	442.0	42.9%	631.0	61.3%	38.7%
No 100 (.150 mm)	266.0	25.8%	897.0	87.1%	12.9%
No 140 (.106 mm)	71.0	6.9%	968.0	94.0%	6.0%
No 200 (.075 mm)	38.0	3.7%	1006.0	97.7%	2.3%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/10/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-11
Material Description:	**Silty Sand (SM), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	16-18 3/23/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	355

Dry Mass of the Sample after Washing (grams): 310

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **12.7**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	3/10/2011	**Collected by:**	Client
Received Date:	4/8/2011	**Analysis by:**	A.U.
Report Date:	4/12/2011	**Sample No.:**	S-11; CDM-5 16- 18 Feet Depth
Description of Material:	Silty Sand (SM), Fine, Dark Brown		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	0.89	%	4/11/2011
Residue	N/A	99.11	%	4/11/2011
Moisture	N/A	0.19	%	4/11/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

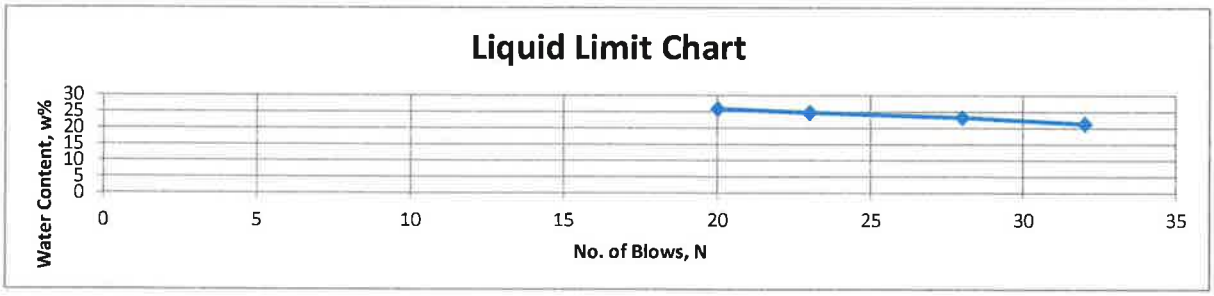
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	CDM-5 S-14
Sampling Date:	3/10/2011	**Collected by:**	CES Lab by FedEx
Received Date:	3/11/2011	**Analysis by:**	A.U
Analysis Date:	4/13/2011	**Sample Depth:**	23-25 Feet
Description of Material:	Clayey Sand (SC), Fine, Brown		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	16	13	11	24
Me = Mass of Empty Container + Lid (grams)	14	14.1	14	13.9
Mm = Mass Container, Lid, and Moist Soil (grams)	47	35.8	44.7	40.2
Md = Mass of Container, Lid, and dry soil (grams)	41.2	31.7	38.6	34.8
Ms = Mass of Soil Solids (grams)	27.2	17.6	24.6	20.9
Mw = Mass of Pore Water (grams)	5.8	4.1	6.1	5.4
w = Water Content, w%	21.3	23.3	24.8	25.8
No. of Drops (N)	32	28	23	20



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	14	5	26
Me = Mass of Empty Container + Lid (grams)	13.9	14	14.2
Mm = Mass Container, Lid, and Moist Soil (grams)	19.1	21.7	22.6
Md = Mass of Container, Lid, and dry soil (grams)	18.2	20.4	21.2
Ms = Mass of Soil Solids (grams)	4.3	6.4	7
Mw = Mass of Pore Water (grams)	0.9	1.3	1.4
w = Water Content, w%	20.9	20.3	20.0
Plastic Limit (PL) (Average) w%	**20.4**		

Results Summary:

Liquid Limit= 24
Plastic Limit= 20
Plasticity Index 4

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/10/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-14
Material Description:	**Clayey Sand (SC), Fine, Brown**	**Sample Depth (feet):** **Test Date:**	23-25 3/23/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	309

Dry Mass of the Sample after Washing (grams): 241

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **22.0**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	7
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	**Clayey Sand (SC), Fine, Brown**		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	3/10/2011	**CES Project#**	L-110002.00
Collected By	CDM	**Sample #**	CMD-5, S-14
Analysis date	3/18/2011	**Sample Depth (feet):**	23-25
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**544.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**479.0**
Mc (gm)	Mass of Container	**140.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**65.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**339.0**
W	Water Contents %	**19.17**

Respectfully Submitted,

Nelson P. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/10/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-16
		Sample Depth (feet):	33-35
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Test Date:**	3/23/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	373

Dry Mass of the Sample after Washing (grams): 342

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **8.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-20A,20B,21
Material Description:	**Poorly Graded Sand (SP), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	3/18/2011
Remarks:		**Sample Weight (grams):**	750

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	6.0	0.8%	6.0	0.8%	99.2%
No 10 (2.00 mm)	43.0	5.7%	49.0	6.5%	93.5%
No 20 (.850 mm)	76.0	10.1%	125.0	16.7%	83.3%
No 40 (.425 mm)	153.0	20.4%	278.0	37.1%	62.9%
No 60 (.250mm)	245.0	32.7%	523.0	69.7%	30.3%
No 100 (.150 mm)	165.0	22.0%	688.0	91.7%	8.3%
No 140 (.106 mm)	23.0	3.1%	711.0	94.8%	5.2%
No 200 (.075 mm)	14.0	1.9%	725.0	96.7%	3.3%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/10/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-25
Material Description:	**Poorly Graded Sand (SP), Fine, Grayish Brown with little fine gravel**	**Sample Depth (feet):** **Test Date:**	78-80 3/23/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	345

Dry Mass of the Sample after Washing (grams): 330

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **4.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

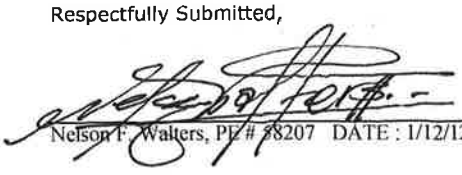
REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/9/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-29,30,31
		Sample Depth (feet):	
Material Description:	**Poorly Graded Sand (SP), Fine, Light Gray**	**Test Date:**	3/18/2011
Remarks:		**Sample Weight (grams):**	1072

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	7.0	0.7%	7.0	0.7%	99.3%
No 10 (2.00 mm)	14.0	1.3%	21.0	2.0%	98.0%
No 20 (.850 mm)	74.0	6.9%	95.0	8.9%	91.1%
No 40 (.425 mm)	447.0	41.7%	542.0	50.6%	49.4%
No 60 (.250mm)	281.0	26.2%	823.0	76.8%	23.2%
No 100 (.150 mm)	176.0	16.4%	999.0	93.2%	6.8%
No 140 (.106 mm)	41.0	3.8%	1040.0	97.0%	3.0%
No 200 (.075 mm)	18.0	1.7%	1058.0	98.7%	1.3%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,



Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/10/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/16/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-5, S-37A
Material Description:	**Clayey Sand (SC), Fine, Dark Greenish Gray**	**Sample Depth (feet):** **Test Date:**	138-140 3/23/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	198

Dry Mass of the Sample after Washing (grams): 145

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **26.8**

Respectfully Submitted,

Nelson L. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-6

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	8
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/12/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, CA-1
Material Description:	**Limstone Sampled as Silty Sand, Fine to Coarse Greenish Gray, With Traces of Gravel**	**Sample Depth (feet):** **Test Date:**	138-140 3/28/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	350

Dry Mass of the Sample after Washing (grams): 205

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **41.4**

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	3/12/2011	**Collected by:**	Client
Received Date:	4/8/2011	**Analysis by:**	A.U.
Report Date:	4/12/2011	**Sample No.:**	S-6; CDM-6 7.5- 9 Feet Depth
Description of Material:	Silty Sand (SM), Fine, Dark Black		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	0.5	%	4/11/2011
Residue	N/A	99.5	%	4/11/2011
Moisture	N/A	0.05	%	4/11/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/11/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-6
		Sample Depth (feet):	7.5-9
Material Description:	**Silty Sand (SM), Fine, Black**	**Test Date:**	3/28/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	349

Dry Mass of the Sample after Washing (grams): 302

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **13.5**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/11/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-9
Material Description:	**Silty Sand (SM), Fine, Dark Gray**	**Sample Depth (feet):** **Test Date:**	12-14 3/28/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	366

Dry Mass of the Sample after Washing (grams): 313

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **14.5**

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/12/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-11A
		Sample Depth (feet):	16-17
Material Description:	**Clayey Sand (SC), Fine, Dark Brown**	**Test Date:**	3/28/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	247

Dry Mass of the Sample after Washing (grams): 131

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **47.0**

Respectfully Submitted,

Nelson P. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/11/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-11B,12,13
Material Description:	**Poorly Graded Sand(SP), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	17-25 3/23/2011
Remarks:		**Sample Weight (grams):**	1105

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	15.0	1.4%	15.0	1.4%	98.6%
No 10 (2.00 mm)	16.0	1.4%	31.0	2.8%	97.2%
No 20 (.850 mm)	154.0	13.9%	185.0	16.7%	83.3%
No 40 (.425 mm)	409.0	37.0%	594.0	53.8%	46.2%
No 60 (.250mm)	204.0	18.5%	798.0	72.2%	27.8%
No 100 (.150 mm)	171.0	15.5%	969.0	87.7%	12.3%
No 140 (.106 mm)	64.0	5.8%	1033.0	93.5%	6.5%
No 200 (.075 mm)	44.0	4.0%	1077.0	97.5%	2.5%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE #58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/12/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-17
		Sample Depth (feet):	43-45
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Test Date:**	3/28/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	370

Dry Mass of the Sample after Washing (grams): 331

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **10.5**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/11/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-20,21
Material Description:	**Poorly Graded Sand(SP), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	58-65 3/23/2011
Remarks:	More Lighter Color was observed after # 40 Sieve	**Sample Weight (grams):**	790

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	5.0	0.6%	5.0	0.6%	99.4%
No 20 (.850 mm)	60.0	7.6%	65.0	8.2%	91.8%
No 40 (.425 mm)	172.0	21.8%	237.0	30.0%	70.0%
No 60 (.250mm)	190.0	24.1%	427.0	54.1%	45.9%
No 100 (.150 mm)	225.0	28.5%	652.0	82.5%	17.5%
No 140 (.106 mm)	80.0	10.1%	732.0	92.7%	7.3%
No 200 (.075 mm)	44.0	5.6%	776.0	98.2%	1.8%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/12/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-26
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Gray**	**Sample Depth (feet):** **Test Date:**	88-90 3/28/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	368

Dry Mass of the Sample after Washing (grams): 342

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.1**

Respectfully Submitted,

Nelson F. Walters, PE #58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/11/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-29,30
Material Description:	**Poorly Graded Sand(SP), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	103-110 3/23/2011
Remarks:		**Sample Weight (grams):**	740

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	4.0	0.5%	4.0	0.5%	99.5%
No 20 (.850 mm)	10.0	1.4%	14.0	1.9%	98.1%
No 40 (.425 mm)	83.0	11.2%	97.0	13.1%	86.9%
No 60 (.250mm)	264.0	35.7%	361.0	48.8%	51.2%
No 100 (.150 mm)	254.0	34.3%	615.0	83.1%	16.9%
No 140 (.106 mm)	81.0	10.9%	696.0	94.1%	5.9%
No 200 (.075 mm)	34.0	4.6%	730.0	98.6%	1.4%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida -- 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/12/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-33B
Material Description:	**Lean Clay (CL), Greenish Gray**	**Sample Depth (feet):** **Test Date:**	123.8-124.3 3/28/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	65

Dry Mass of the Sample after Washing (grams): 23

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **64.6**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/12/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-6, S-33C
		Sample Depth (feet):	124.3-125
Material Description:		**Test Date:**	3/28/2011
	Clayey Sand (SC), Fine, Greenish Gray		
Remarks:		**Original Dry Mass of the Sample (grams):**	120

Dry Mass of the Sample after Washing (grams): 79

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **34.2**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-7

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/13/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-4
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	4.5-6 3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	362

Dry Mass of the Sample after Washing (grams): 329

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **9.1**

Respectfully Submitted,

Nelson F. Walters PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/13/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-6
Material Description:	**Silty Sand (SM), Fine, White**	**Sample Depth (feet):** **Test Date:**	7.5-9 3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	334

Dry Mass of the Sample after Washing (grams): 241

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **27.8**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/13/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-9A
Material Description:	**Clayey Sand (SC), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	12-13 3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	247

Dry Mass of the Sample after Washing (grams): 132

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **46.6**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/13/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-10,11A,12A
Material Description:	**Poorly Graded Sand (SP), Fine Light Brown**	**Sample Depth (feet):** **Test Date:**	14-19 3/23/2011
Remarks:	Few Rock Particles were retained on # 40	**Sample Weight (grams):**	835

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	14.0	1.7%	14.0	1.7%	98.3%
No 10 (2.00 mm)	40.0	4.8%	54.0	6.5%	93.5%
No 20 (.850 mm)	160.0	19.2%	214.0	25.6%	74.4%
No 40 (.425 mm)	424.0	50.8%	638.0	76.4%	23.6%
No 60 (.250mm)	81.0	9.7%	719.0	86.1%	13.9%
No 100 (.150 mm)	70.0	8.4%	789.0	94.5%	5.5%
No 140 (.106 mm)	18.0	2.2%	807.0	96.6%	3.4%
No 200 (.075 mm)	20.0	2.4%	827.0	99.0%	1.0%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/13/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-11B
		Sample Depth (feet):	17-18
Material Description:	**Silty Sand (SM), Fine, Light Brown**	**Test Date:**	3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	328

Dry Mass of the Sample after Washing (grams): 255

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **22.3**

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida -- 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/13/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-13A
		Sample Depth (feet):	20-21.5
Material Description:		**Test Date:**	3/29/2011
	Clayey Sand (SC), Fine, Light Brown		
Remarks:		**Original Dry Mass of the Sample (grams):**	392

Dry Mass of the Sample after Washing (grams): 328

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **16.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 / DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/13/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-16
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	33-35 3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	340

Dry Mass of the Sample after Washing (grams): 300

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **11.8**

Respectfully Submitted,

Nelson F. Walters PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/14/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-19
		Sample Depth (feet):	48-50
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Gray**	**Test Date:**	3/29/2011

Remarks: **Original Dry Mass of the Sample (grams):** 363

Dry Mass of the Sample after Washing (grams): 331

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **8.8**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/14/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-21,22
		Sample Depth (feet):	58-65
Material Description:		**Test Date:**	3/24/2011
	Poorly Graded Sand (SP), Fine Light Gray		
Remarks:		**Sample Weight (grams):**	748

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	1.0	0.1%	1.0	0.1%	99.9%
No 20 (.850 mm)	3.0	0.4%	4.0	0.5%	99.5%
No 40 (.425 mm)	10.0	1.3%	14.0	1.9%	98.1%
No 60 (.250mm)	381.0	50.9%	395.0	52.8%	47.2%
No 100 (.150 mm)	312.0	41.7%	707.0	94.5%	5.5%
No 140 (.106 mm)	18.0	2.4%	725.0	96.9%	3.1%
No 200 (.075 mm)	8.0	1.1%	733.0	98.0%	2.0%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	8
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/14/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-23
Material Description:	**Silty Sand (SM), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	68-70 3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	359

Dry Mass of the Sample after Washing (grams): 315

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **12.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	9
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3-14-111
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-28
		Sample Depth (feet):	93-95
Material Description:	**Silty Sand (SM), Fine, Light Gray**	**Test Date:**	3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	342

Dry Mass of the Sample after Washing (grams): 300

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **12.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/14/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-29,30,31
		Sample Depth (feet):	98-110
Material Description:		**Test Date:**	3/24/2011
	Poorly Graded Sand (SP), Fine Light Brown		
Remarks:		**Sample Weight (grams):**	1065

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	1.0	0.1%	1.0	0.1%	99.9%
No 20 (.850 mm)	10.0	0.9%	11.0	1.0%	99.0%
No 40 (.425 mm)	110.0	10.3%	121.0	11.4%	88.6%
No 60 (.250mm)	344.0	32.3%	465.0	43.7%	56.3%
No 100 (.150 mm)	457.0	42.9%	922.0	86.6%	13.4%
No 140 (.106 mm)	88.0	8.3%	1010.0	94.8%	5.2%
No 200 (.075 mm)	27.0	2.5%	1037.0	97.4%	2.6%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	10
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3-14-111
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-32
Material Description:	**Limestone: Sample as Clayey Sand, Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	113-115 3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	251

Dry Mass of the Sample after Washing (grams): 145

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **42.2**

Respectfully Submitted,

Nelson F. Walters, PE #58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	11
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3-14-111
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-7, S-35
		Sample Depth (feet):	128-130
Material Description:	**Clayey Sand (SC), Fine Light Gray**	**Test Date:**	3/29/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	214

Dry Mass of the Sample after Washing (grams): 119

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **44.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-8

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-4B
Material Description:	**Silty Sand (SM), Fine, Brown**	**Sample Depth (feet):** **Test Date:**	5.5-6 3/30/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	284

Dry Mass of the Sample after Washing (grams): 248

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **12.7**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

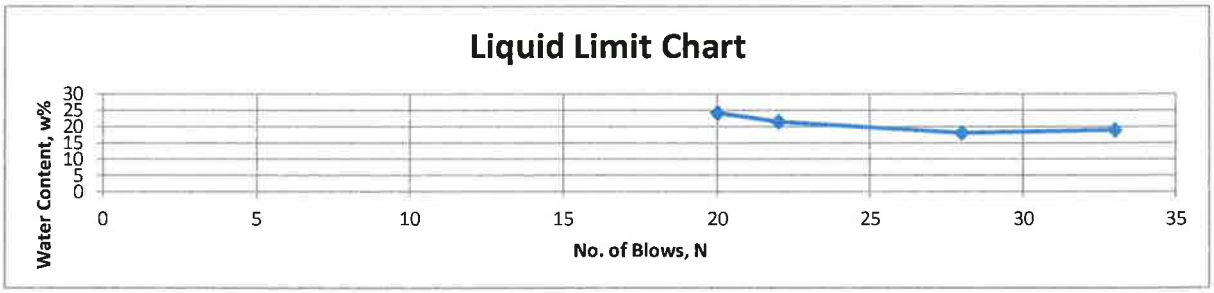
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	CDM-8-S-5
Sampling Date:	3/15/2011	**Collected by:**	CES Lab by FedEx
Received Date:	3/16/2011	**Analysis by:**	A.U
Analysis Date:	4/13/2011	**Sample Depth:**	6-7.5 Feet
Description of Material:	Poorly Graded sand with Silt (SP-SM), Fine, Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	20	22	25	28
Me = Mass of Empty Container + Lid (grams)	14.1	14	14	13.9
Mm = Mass Container, Lid, and Moist Soil (grams)	50.7	53.1	54.2	52.3
Md = Mass of Container, Lid, and dry soil (grams)	44.9	47.1	47.1	44.8
Ms = Mass of Soil Solids (grams)	30.77	33.1	33.1	30.9
Mw = Mass of Pore Water (grams)	5.83	6	7.1	7.5
w = Water Content, w%	18.9	18.1	21.5	24.3
No. of Drops (N)	33	28	22	20



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	0	0	0
Me = Mass of Empty Container + Lid (grams)	0	0	0
Mm = Mass Container, Lid, and Moist Soil (grams)	0	0	0
Md = Mass of Container, Lid, and dry soil (grams)	0	0	0
Ms = Mass of Soil Solids (grams)	0	0	0
Mw = Mass of Pore Water (grams)	0	0	0
w = Water Content, w%	0	0	0
Plastic Limit (PL) (Average) w%	0		

Results Summary:

Liquid Limit= 21
Plastic Limit= Cannot be determined
Plasticity Index N/A

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-5
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	6-7.5 3/30/2011

Remarks: **Original Dry Mass of the Sample (grams):** 394

Dry Mass of the Sample after Washing (grams): 363

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.9**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 / DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-7
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Brown**	**Sample Depth (feet):** **Test Date:**	9-10.5 3/30/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	359

Dry Mass of the Sample after Washing (grams): 338

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **5.8**

Respectfully Submitted,

Nelson F. Walters, PE # 68207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-8,9,10
Material Description:	**Poorly Graded Sand(SP), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	10.5-16 3/23/2011
Remarks:		**Sample Weight (grams):**	1150

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	34.0	3.0%	34.0	3.0%	97.0%
No 20 (.850 mm)	25.0	2.2%	59.0	5.1%	94.9%
No 40 (.425 mm)	264.0	23.0%	323.0	28.1%	71.9%
No 60 (.250mm)	538.0	46.8%	861.0	74.9%	25.1%
No 100 (.150 mm)	246.0	21.4%	1107.0	96.3%	3.7%
No 140 (.106 mm)	20.0	1.7%	1127.0	98.0%	2.0%
No 200 (.075 mm)	10.0	0.9%	1137.0	98.9%	1.1%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12 (revised)

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-12
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	18-20 3/30/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	356

Dry Mass of the Sample after Washing (grams): 332

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **6.7**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-17
		Sample Depth (feet):	43-45
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Test Date:**	3/30/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	375

Dry Mass of the Sample after Washing (grams): 340

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **9.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-19,20
Material Description:	**Poorly Graded Sand (SP), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	53-60 3/23/2011
Remarks:		**Sample Weight (grams):**	675

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	5.0	0.7%	5.0	0.7%	99.3%
No 20 (.850 mm)	3.0	0.4%	8.0	1.2%	98.8%
No 40 (.425 mm)	12.0	1.8%	20.0	3.0%	97.0%
No 60 (.250mm)	184.0	27.3%	204.0	30.2%	69.8%
No 100 (.150 mm)	420.0	62.2%	624.0	92.4%	7.6%
No 140 (.106 mm)	20.0	3.0%	644.0	95.4%	4.6%
No 200 (.075 mm)	15.0	2.2%	659.0	97.6%	2.4%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

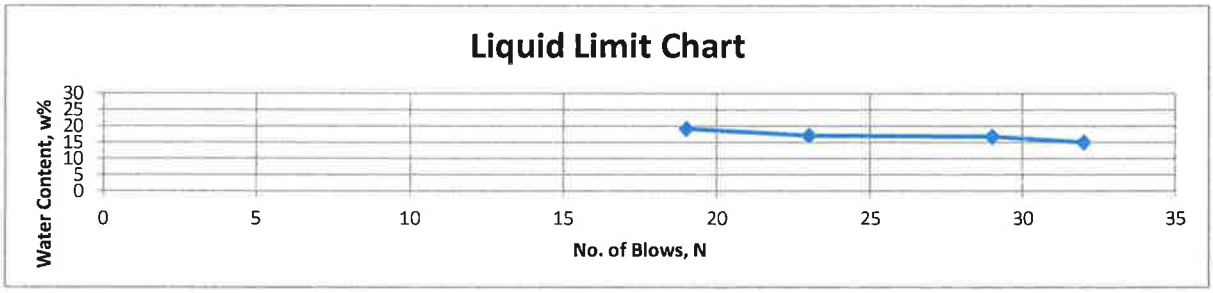
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	CDM-8 S23
Sampling Date:	3/3/2011	**Collected by:**	CES Lab by FedEx
Received Date:	3/4/2011	**Analysis by:**	A.U
Analysis Date:	4/13/2011	**Sample Depth:**	73-75 Feet
Description of Material:	Poorly Graded sand with Silt (SP-SM), Fine, Light Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	32	19	30	21
Me = Mass of Empty Container + Lid (grams)	13.8	14	14.1	14
Mm = Mass Container, Lid, and Moist Soil (grams)	49.2	52.2	51.7	53.1
Md = Mass of Container, Lid, and dry soil (grams)	44.6	46.7	46.2	46.8
Ms = Mass of Soil Solids (grams)	30.76	32.7	32.1	32.8
Mw = Mass of Pore Water (grams)	4.64	5.5	5.5	6.3
w = Water Content, w%	15.1	16.8	17.1	19.2
No. of Drops (N)	32	29	23	19



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	0	0	0
Me = Mass of Empty Container + Lid (grams)	0	0	0
Mm = Mass Container, Lid, and Moist Soil (grams)	0	0	0
Md = Mass of Container, Lid, and dry soil (grams)	0	0	0
Ms = Mass of Soil Solids (grams)	0	0	0
Mw = Mass of Pore Water (grams)	0	0	0
w = Water Content, w%	0	0	0
Plastic Limit (PL) (Average) w%	0		

Results Summary:

Liquid Limit= 17
Plastic Limit= Cannot be determined
Plasticity Index N/A

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-23
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	73-75 3/30/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	303

Dry Mass of the Sample after Washing (grams): 277

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **8.6**

Respectfully Submitted,

Nelson F. Walters, PE #58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	3/21/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-8, S-26B
Material Description:	**Limestone Sampled as Silty Sand, Fine to Medium, Light Gray**	**Sample Depth (feet):** **Test Date:**	89-90 3/30/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	334

Dry Mass of the Sample after Washing (grams): 209

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **37.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-9

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	11/8/2011	**Collected by:**	Client
Received Date:	12/5/2011	**Analysis by:**	A.U.
Report Date:	12/23/2011	**Sample No.:**	S-2; CDM-9 2-4 Feet Depth
Description of Material:	Poorly Graded sand with Silt (SP-SM), Fine, Dark Brown		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	8.78	%	12/23/2011
Residue	N/A	91.22	%	12/23/2011
Moisture	N/A	73.2	%	12/23/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson F. Walters P.E.# 58207 Date- 12/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/8/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-9,S-2
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	2 - 4 12/12/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	173

Dry Mass of the Sample after Washing (grams): 163

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **5.8**

Respectfully Submitted,

Nelson F. Walters PE # 58207 DATE : 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of Moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	1
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Organic Soil (PT) Fine, Very Dark Brown		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	11/8/2011	**CES Project#**	J-110003-00
Collected By	CDM **Sample #**	CDM-9,S-3	
Analysis date	12/12/2011 **Sample Depth (feet):**		4 - 6
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**235.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**75.0**
Mc (gm)	Mass of Container	**0.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**160.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**75.0**
W	Water Contents %	**213.33**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/5/12

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	11/8/2011	**Collected by:**	Client
Received Date:	12/5/2011	**Analysis by:**	A.U.
Report Date:	12/23/2011	**Sample No.:**	S-3; CDM-9, 4-6 Feet Depth
Description of Material:	Organic Soil (PT) Fine, Very Dark Brown		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	12.35	%	12/23/2011
Residue	N/A	87.65	%	12/23/2011
Moisture	N/A	213.33	%	12/23/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson F. Walters P.E.# 58207 Date- 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/8/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-9,S-3
		Sample Depth (feet):	4 - 5
Material Description:	**Organic Soil(PT) Fine, Very Dark Brown**	**Test Date:**	12/12/2011

Remarks:

Original Dry Mass of the Sample (grams): 258

Dry Mass of the Sample after Washing (grams): 61

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **76.4**

Respectfully Submitted,

Nelson F. Walters PE # 58207 DATE : 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/8/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-9,S-11
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	23-25 12/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	408

Dry Mass of the Sample after Washing (grams): 369

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **9.6**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/9/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/8/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-9,S-17
		Sample Depth (feet):	53-55
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, light Brown**	**Test Date:**	12/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	314

Dry Mass of the Sample after Washing (grams): 277

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **11.8**

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/6/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/8/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-9,S-24
		Sample Depth (feet):	88-90
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Greenish Gray**	**Test Date:**	12/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	408

Dry Mass of the Sample after Washing (grams): 382

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **6.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/9/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/8/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-9,S-29
		Sample Depth (feet):	113-115
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Greenish Gray**	**Test Date:**	12/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	354

Dry Mass of the Sample after Washing (grams): 339

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **4.2**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/9/12

CDM-10

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	12
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-10,S-2
		Sample Depth (feet):	2-4
Material Description:	**Poorly Graded Sand (SP), Fine, Brown**	**Test Date:**	12/12/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	351

Dry Mass of the Sample after Washing (grams): 341

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **2.8**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	11
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-10,S-12
		Sample Depth (feet):	28-30
Material Description:	**Fat Clay (CH), Brown**	**Test Date:**	12/12/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	200

Dry Mass of the Sample after Washing (grams): 73

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **63.5**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 12/12/12

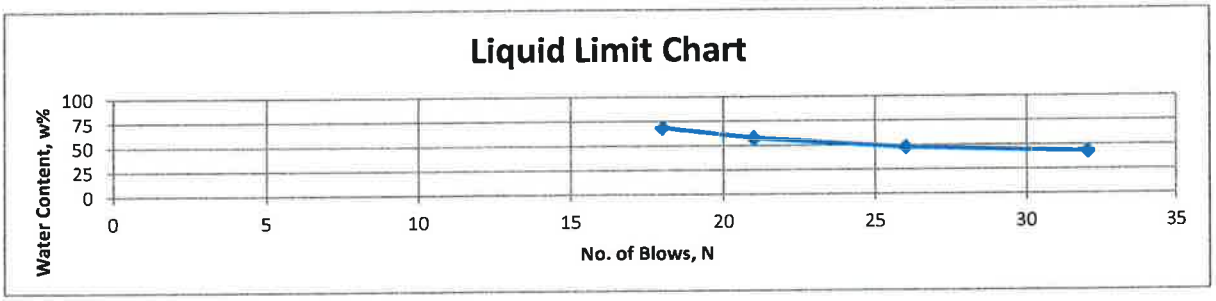
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	J-110003.00
	Duval Co. Florida	**Sample No:**	1, CDM-10-S-12
Sampling Date:	11/15/2011	**Collected by:**	CES Lab by FedEx
Received Date:	12/5/2011	**Analysis by:**	J.M/ A.U
Analysis Date:	12/12/2011	**Sample Depth**	28-30 Feet
Description of Material:	Fat Clay (CH) Dark Brown		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	1	2	3	4
Me = Mass of Empty Container + Lid (grams)	14.2	14.3	14.7	14.8
Mm = Mass Container, Lid, and Moist Soil (grams)	22.5	29.4	33.3	28.6
Md = Mass of Container, Lid, and dry soil (grams)	20	24.5	26.5	23
Ms = Mass of Soil Solids (grams)	5.8	10.2	11.8	8.2
Mw = Mass of Pore Water (grams)	2.5	4.9	6.8	5.6
w = Water Content, w%	43.1	48.0	57.6	68.3
No. of Drops (N)	32	26	21	18



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	5	6	7
Me = Mass of Empty Container + Lid (grams)	15.3	14.5	15.6
Mm = Mass Container, Lid, and Moist Soil (grams)	19.1	18.6	21.4
Md = Mass of Container, Lid, and dry soil (grams)	18.1	17.5	19.9
Ms = Mass of Soil Solids (grams)	2.8	3	4.3
Mw = Mass of Pore Water (grams)	1	1.1	1.5
w = Water Content, w%	35.7	36.7	34.9
Plastic Limit (PL) (Average) w%	**36**		

Results Summary:

Liquid Limit= 51
Plastic Limit= 36
Plasticity Index 15

Respectfully Submitted,

Nelson F. Walters P.E # 58207 Date- 1/9/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	10
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/15/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-10,S-18
		Sample Depth (feet):	58-60
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, light Brown**	**Test Date:**	12/12/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	318

Dry Mass of the Sample after Washing (grams): 304

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **4.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/5/12

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of Moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division			
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		**Report No:**	2
Project	**Trail Ridge Landfill Class 1 Cell Permitting**			
Address	Duval Co, Florida			
Matrix	Fat Clay (CH), Brown			
Sample Location	Sample received at the CES Lab by FedEx			
Sampling date	11/15/2011		**CES Project#**	J-110003.00
Collected By	CDM	**Sample #**	CDM-10,S-12	
Analysis date	12/12/2011	**Sample Depth (feet):**		28-30
Analysis By	A.U		**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**352.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**221.0**
Mc (gm)	Mass of Container	**0.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**131.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**221.0**
W	Water Contents %	**59.28**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/9/12

CDM-101

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	13
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-101,S-2
		Sample Depth (feet):	2-4
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, light Gray**	**Test Date:**	12/12/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	421

Dry Mass of the Sample after Washing (grams): 389

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.6**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	14
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-101,S-5
		Sample Depth (feet):	8-10
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, light Brown**	**Test Date:**	12/12/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	426

Dry Mass of the Sample after Washing (grams): 395

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **7.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	15
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-101,S-7
Material Description:	**Light Gray Sand with some Silt, Clay and Foreign Material**	**Sample Depth (feet):** **Test Date:**	12-14 12/12/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	371

Dry Mass of the Sample after Washing (grams): 234

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **36.9**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/5/12

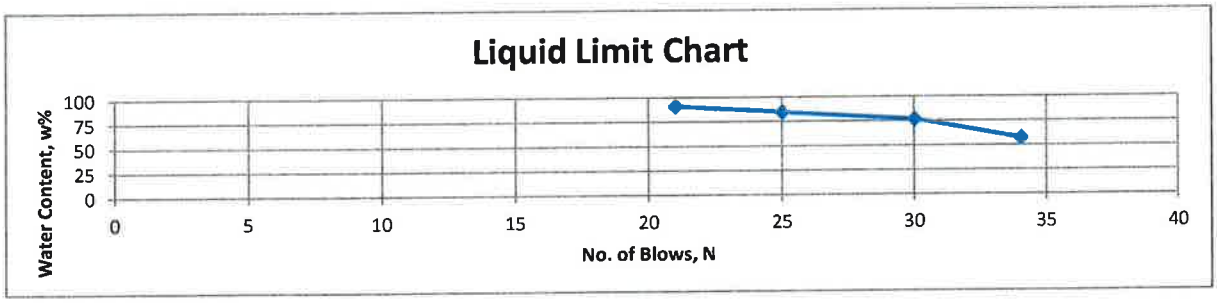
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	J-110003.00
	Duval Co. Florida	**Sample No:**	2, CDM-101-S-7
Sampling Date:	11/4/2011	**Collected by:**	CES Lab by FedEx
Received Date:	12/5/2011	**Analysis by:**	J.M/ A.U
Analysis Date:	12/12/2011	**Sample Depth**	23-25 Feet
Description of Material:	Light Gray Sand with some Silt, Clay and Foreign Material		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	8	9	10	11
Me = Mass of Empty Container + Lid (grams)	14.5	15.4	14.6	15.2
Mm = Mass Container, Lid, and Moist Soil (grams)	20.8	21.6	20.7	21.5
Md = Mass of Container, Lid, and dry soil (grams)	18.5	18.9	17.9	18.5
Ms = Mass of Soil Solids (grams)	4	3.5	3.3	3.3
Mw = Mass of Pore Water (grams)	2.3	2.7	2.8	3
w = Water Content, w%	57.5	77.1	84.8	90.9
No. of Drops (N)	34	30	25	21



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	12	13	14
Me = Mass of Empty Container + Lid (grams)	15.2	14.4	14.6
Mm = Mass Container, Lid, and Moist Soil (grams)	22.4	20.3	21.4
Md = Mass of Container, Lid, and dry soil (grams)	20.2	18.41	19.2
Ms = Mass of Soil Solids (grams)	5	4.01	4.6
Mw = Mass of Pore Water (grams)	2.2	1.89	2.2
w = Water Content, w%	44.0	47.1	47.8
Plastic Limit (PL) (Average) w%	**46**		

Results Summary:

Liquid Limit= 83
Plastic Limit= 46
Plasticity Index 37

Respectfully Submitted,

Nelson F. Walters P.E # 58207 Date- 12/5/12

CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Laboratory Analysis Report

Organic Content

CES Project No.: J-110003.00

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting		
	Duval Co, Florida		
Sampling Date:	11/8/2011	**Collected by:**	Client
Received Date:	12/5/2011	**Analysis by:**	A.U.
Report Date:	12/23/2011	**Sample No.:**	S-7; CDM-101, 12-14 Feet Depth
Description of Material:	Light Gray Sand with Some Silt, Clay & Foreign Material		

Parameter	Method No.	Result	Unit	Date Analysis
Organic Contents	ASTM D-2974	0.85	%	12/23/2011
Residue	N/A	99.15	%	12/23/2011
Moisture	N/A	19.68	%	12/23/2011

Analysis performed in accordance with E.P.A., A.S.T.M., Standard Methods, or other approved methods.

Remarks :

Respectfully Submitted,

Nelson F. Walters P.E # 58207 Date- 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of Moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	3
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Light Gray Sand with some Silt, Clay and Foreign Material		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	11/4/2011	**CES Project#**	J-110003.00
Collected By	CDM **Sample #**		CDM-101,S-7
Analysis date	12/12/2011	**Sample Depth (feet):**	12-14
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**444.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**371.0**
Mc (gm)	Mass of Container	**0.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**73.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**371.0**
W	Water Contents %	**19.68**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/4/12

CDM-102

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-102, S-4
		Sample Depth (feet):	6- 8
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Gray**	**Test Date:**	11/17/2011
Remarks:		**Sample Weight (grams):**	422

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	4.0	0.9%	4.0	0.9%	99.1%
No 20 (.850 mm)	14.0	3.3%	18.0	4.3%	95.7%
No 40 (.425 mm)	104.0	24.6%	122.0	28.9%	71.1%
No 60 (.250mm)	187.0	44.3%	309.0	73.2%	26.8%
No 100 (.150 mm)	65.0	15.4%	374.0	88.6%	11.4%
No 140 (.106 mm)	15.0	3.6%	389.0	92.2%	7.8%
No 200 (.075 mm)	10.0	2.4%	399.0	94.5%	5.5%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	8
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-102, S-5A
		Sample Depth (feet):	8 - 9
Material Description:	**Silty Sand (SM), Fine, Gray**	**Test Date:**	11/17/2011
Remarks:		**Sample Weight (grams):**	325

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	6.0	1.8%	6.0	1.8%	98.2%
No 40 (.425 mm)	82.0	25.2%	88.0	27.1%	72.9%
No 60 (.250mm)	120.0	36.9%	208.0	64.0%	36.0%
No 100 (.150 mm)	47.0	14.5%	255.0	78.5%	21.5%
No 140 (.106 mm)	8.0	2.5%	263.0	80.9%	19.1%
No 200 (.075 mm)	5.0	1.5%	268.0	82.5%	17.5%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-102,S-5A
		Sample Depth (feet):	8 - 9
Material Description:	**Silty Sand (SM), Fine, Gray**	**Test Date:**	11/17/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	359

Dry Mass of the Sample after Washing (grams): 291

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **18.9**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-102,S-9 (1) & (2) Combined
Material Description:	**Silty Sand (SM), Fine, Gray**	**Sample Depth (feet):** **Test Date:**	16 - 18 11/17/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	294

Dry Mass of the Sample after Washing (grams): 184

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **37.4**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

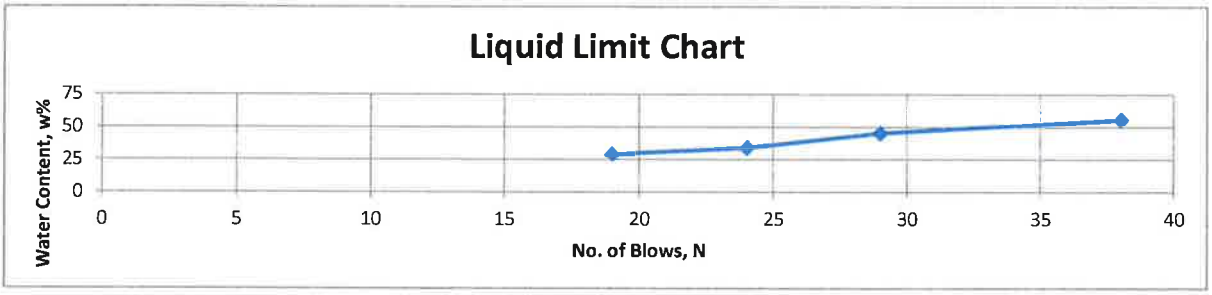
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	2, CDM-102-S-9(Combined)
Sampling Date:	11/2/2011	**Collected by:**	CES Lab by FedEx
Received Date:	11/14/2011	**Analysis by:**	M.J.A/ A.U
Analysis Date:	11/28/2011	**Sample Depth**	16-18 Feet
Description of Material:	Silty Sand (SM), Fine, Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	16	10	5	24
Me = Mass of Empty Container + Lid (grams)	21.2	21	21	21.2
Mm = Mass Container, Lid, and Moist Soil (grams)	41.8	42.4	45.7	42.3
Md = Mass of Container, Lid, and dry soil (grams)	34.4	35.7	39.4	37.5
Ms = Mass of Soil Solids (grams)	13.2	14.7	18.4	16.3
Mw = Mass of Pore Water (grams)	7.4	6.7	6.3	4.8
w = Water Content, w%	56.1	45.6	34.2	29.4
No. of Drops (N)	38	29	24	19



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	15	17	8
Me = Mass of Empty Container + Lid (grams)	21	21	21.2
Mm = Mass Container, Lid, and Moist Soil (grams)	34.8	31.5	33.6
Md = Mass of Container, Lid, and dry soil (grams)	32.4	29.7	31.5
Ms = Mass of Soil Solids (grams)	11.4	8.7	10.3
Mw = Mass of Pore Water (grams)	2.4	1.8	2.1
w = Water Content, w%	21.1	20.7	20.4
Plastic Limit (PL) (Average) w%	**20.73**		

Results Summary:

Liquid Limit= 37
Plastic Limit= 21
Plasticity Index 16

Respectfully Submitted,

Nelson E. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	3
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Silty Sand (SM), Fine, Gray		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	11/3/2011	**CES Project#**	L-110002.00
Collected By	CDM **Sample #**	CMD-102, S-9 (1) & (2) Combined	
Analysis date	3/17/2011 **Sample Depth (feet):**	16-18	
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**460.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**408.0**
Mc (gm)	Mass of Container	**135.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**52.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**273.0**
W	Water Contents %	**19.05**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	9
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-102, S-16
		Sample Depth (feet):	48 - 50
Material Description:	**Poorly Graded Sand (SP), Fine, Greenish Gray**	**Test Date:**	11/17/2011
Remarks:		**Sample Weight (grams):**	274

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	4.0	1.5%	4.0	1.5%	98.5%
No 20 (.850 mm)	8.0	2.9%	12.0	4.4%	95.6%
No 40 (.425 mm)	22.0	8.0%	34.0	12.4%	87.6%
No 60 (.250mm)	51.0	18.6%	85.0	31.0%	69.0%
No 100 (.150 mm)	162.0	59.1%	247.0	90.1%	9.9%
No 140 (.106 mm)	18.0	6.6%	265.0	96.7%	3.3%
No 200 (.075 mm)	5.0	1.8%	270.0	98.5%	1.5%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-104

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-104, S-3
		Sample Depth (feet):	4 - 6
Material Description:	**Silty Sand (SM), Fine, Ver Dark Brown**	**Test Date:**	11/16/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	357

Dry Mass of the Sample after Washing (grams): 287

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **19.6**

Respectfully Submitted,

Nelson F. Walters, PE #58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-104, S-7
		Sample Depth (feet):	12 - 14
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Gray**	**Test Date:**	11/16/2011
Remarks:		**Sample Weight (grams):**	409

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	5.0	1.2%	5.0	1.2%	98.8%
No 40 (.425 mm)	58.0	14.2%	63.0	15.4%	84.6%
No 60 (.250mm)	159.0	38.9%	222.0	54.3%	45.7%
No 100 (.150 mm)	95.0	23.2%	317.0	77.5%	22.5%
No 140 (.106 mm)	33.0	8.1%	350.0	85.6%	14.4%
No 200 (.075 mm)	22.0	5.4%	372.0	91.0%	9.0%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-104, S-8
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Gray**	**Sample Depth (feet):** **Test Date:**	14- 16 11/16/2011
Remarks:		**Sample Weight (grams):**	397

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	3.0	0.8%	3.0	0.8%	99.2%
No 40 (.425 mm)	96.0	24.2%	99.0	24.9%	75.1%
No 60 (.250mm)	163.0	41.1%	262.0	66.0%	34.0%
No 100 (.150 mm)	83.0	20.9%	345.0	86.9%	13.1%
No 140 (.106 mm)	15.0	3.8%	360.0	90.7%	9.3%
No 200 (.075 mm)	7.0	1.8%	367.0	92.4%	7.6%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-104,S-11 (1) & (2) Combined
Material Description:	**Fat Clay (CH), Light Gray**	**Sample Depth (feet):** **Test Date:**	23 - 24.5 11/16/2011

Remarks:

Original Dry Mass of the Sample (grams): 189

Dry Mass of the Sample after Washing (grams): 77

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **59.3**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

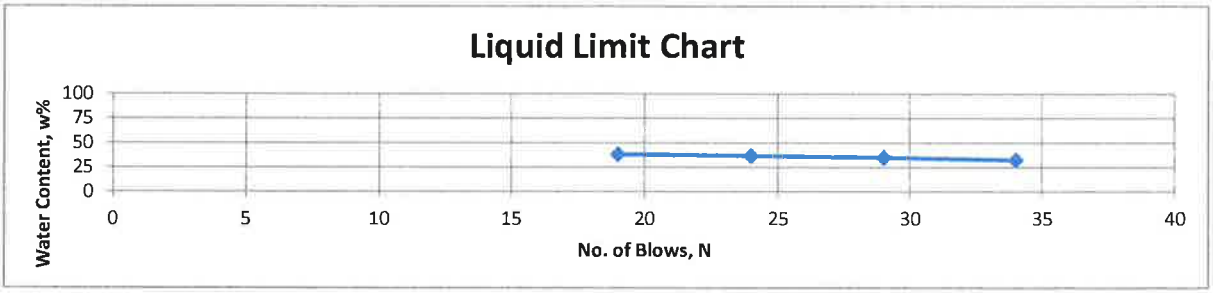
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	3, CDM-104-S-11(Combined)
Sampling Date:	11/2/2011	**Collected by:**	CES Lab by FedEx
Received Date:	11/14/2011	**Analysis by:**	M.J.A/ A.U
Analysis Date:	11/28/2011	**Sample Depth**	23-24.5 Feet
Description of Material:	Fat Clay (CH), Light Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	14	11	22	24
Me = Mass of Empty Container + Lid (grams)	21	21.2	21	21.2
Mm = Mass Container, Lid, and Moist Soil (grams)	49.5	49.3	46.3	45.3
Md = Mass of Container, Lid, and dry soil (grams)	42.5	42	39.5	38.6
Ms = Mass of Soil Solids (grams)	21.5	20.8	18.5	17.4
Mw = Mass of Pore Water (grams)	7	7.3	6.8	6.7
w = Water Content, w%	32.6	35.1	36.8	38.5
No. of Drops (N)	34	29	24	19



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	13	6	20
Me = Mass of Empty Container + Lid (grams)	21.2	21.1	21.2
Mm = Mass Container, Lid, and Moist Soil (grams)	34.3	35.3	33.6
Md = Mass of Container, Lid, and dry soil (grams)	32.2	33	31.6
Ms = Mass of Soil Solids (grams)	11.1	11.9	10.4
Mw = Mass of Pore Water (grams)	2.1	2.3	2
w = Water Content, w%	19.1	19.3	19.2
Plastic Limit (PL) (Average) w%	**19.2**		

Results Summary:

Liquid Limit= 36
Plastic Limit= 19
Plasticity Index 17

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	2
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Fat Clay (CH), Light Gray		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	11/3/2011	**CES Project#**	L-110002.00
Collected By	CDM **Sample #**	CMD-104, S-11 (1) & (2) Combined	
Analysis date	3/16/2011 **Sample Depth (feet):**		23-24.5
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**295.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**207.0**
Mc (gm)	Mass of Container	**20.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**88.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**187.0**
W	Water Contents %	**47.06**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/3/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-104, S-15B
Material Description:	**Poorly Graded Sand (SP), Fine, Greenish Gray**	**Sample Depth (feet):** **Test Date:**	44- 45 11/16/2011
Remarks:		**Sample Weight (grams):**	395

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	12.0	3.0%	12.0	3.0%	97.0%
No 10 (2.00 mm)	4.0	1.0%	16.0	4.1%	95.9%
No 20 (.850 mm)	34.0	8.6%	50.0	12.7%	87.3%
No 40 (.425 mm)	100.0	25.3%	150.0	38.0%	62.0%
No 60 (.250mm)	119.0	30.1%	269.0	68.1%	31.9%
No 100 (.150 mm)	92.0	23.3%	361.0	91.4%	8.6%
No 140 (.106 mm)	18.0	4.6%	379.0	95.9%	4.1%
No 200 (.075 mm)	8.0	2.0%	387.0	98.0%	2.0%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson L. Walters, PE # 58207 DATE : 1/12/12 (revised)

CDM-105

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	9
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-105,S-4
		Sample Depth (feet):	6-8
Material Description:	**Silty Sand (SM), Fine, Dark Gray**	**Test Date:**	12/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	419

Dry Mass of the Sample after Washing (grams): 364

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **13.1**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/5/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	8
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-105,S-7
		Sample Depth (feet):	12-14
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Brown**	**Test Date:**	12/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	401

Dry Mass of the Sample after Washing (grams): 368

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **8.2**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/9/12

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	J-110003.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/4/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	12/5/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-105,S-11
		Sample Depth (feet):	23-25
Material Description:	**Poorly Graded Sand (SP), Fine, Grayish Brown**	**Test Date:**	12/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	326

Dry Mass of the Sample after Washing (grams): 311

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **4.6**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE :

CDM-106

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-106, S-4(1)and S-4(2) Combined
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	6 - 8 11/15/2011
Remarks:		**Sample Weight (grams):**	773

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	8.0	1.0%	8.0	1.0%	99.0%
No 40 (.425 mm)	135.0	17.5%	143.0	18.5%	81.5%
No 60 (.250mm)	353.0	45.7%	496.0	64.2%	35.8%
No 100 (.150 mm)	157.0	20.3%	653.0	84.5%	15.5%
No 140 (.106 mm)	40.0	5.2%	693.0	89.7%	10.3%
No 200 (.075 mm)	29.0	3.8%	722.0	93.4%	6.6%

Remarks:

Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-106, S-5(1)and(2) Combined
		Sample Depth (feet):	8 - 10
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown**	**Test Date:**	11/15/2011
Remarks:		**Sample Weight (grams):**	681

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	19.0	2.8%	19.0	2.8%	97.2%
No 40 (.425 mm)	101.0	14.8%	120.0	17.6%	82.4%
No 60 (.250mm)	307.0	45.1%	427.0	62.7%	37.3%
No 100 (.150 mm)	153.0	22.5%	580.0	85.2%	14.8%
No 140 (.106 mm)	24.0	3.5%	604.0	88.7%	11.3%
No 200 (.075 mm)	19.0	2.8%	623.0	91.5%	8.5%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-106, S-13 (1) & (2) Combined
		Sample Depth (feet):	33 - 35
Material Description:	**Fat Clay (CH), Greenish Gray**	**Test Date:**	11/15/2011

Remarks: **Original Dry Mass of the Sample (grams):** 178

Dry Mass of the Sample after Washing (grams): 87

Calculation:

$A = [(B-C)/B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **51.1**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	1
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Fat Clay (CH), Greenish Gray		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	11/2/2011	**CES Project#**	L-110002.00
Collected By	CDM **Sample #**	CMD-106, S-13 (1) & (2) Combined	
Analysis date	3/15/2011 **Sample Depth (feet):**		33-35
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**365.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**218.0**
Mc (gm)	Mass of Container	**21.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**147.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**197.0**
W	Water Contents %	**74.62**

Respectfully Submitted,

Nelson F Walters, PE # 58207 DATE : 1/12/12 (revised)

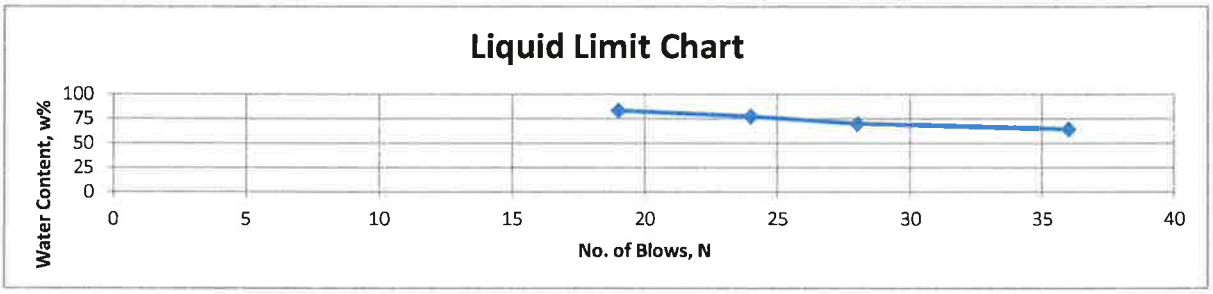
CES CONSULTANTS, INC.
6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.cesconsult.com

Liquid Limit, Plastic Limit and Plasticity Index of Soils Report (ASTM D-4318)

Client Name & Address	**CDM Geotechnical Service Division**		
	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751		
Project Name & Address	Trail Ridge Landfill Class 1 Cell Permitting	**Project No**	L-110002.00
	Duval Co. Florida	**Sample No:**	1, CDM-106-S-13(Combined)
Sampling Date:	11/2/2011	**Collected by:**	CES Lab by FedEx
Received Date:	11/14/2011	**Analysis by:**	M.J.A/ A.U
Analysis Date:	11/28/2011	**Sample Depth:**	33-35 Feet
Description of Material:	Fat Clay (CH), Greenish Gray		
Sample Location:	Sample received at the CES Lab by FedEx		

Liquid Limit Determination:

Trial No.	1	2	3	4
Water Content Container No.	16	10	5	19
Me = Mass of Empty Container + Lid (grams)	21.2	21.1	21	21.2
Mm = Mass Container, Lid, and Moist Soil (grams)	37	37.6	39.3	40.1
Md = Mass of Container, Lid, and dry soil (grams)	30.8	30.8	31.3	31.5
Ms = Mass of Soil Solids (grams)	9.6	9.7	10.3	10.3
Mw = Mass of Pore Water (grams)	6.2	6.8	8	8.6
w = Water Content, w%	64.6	70.1	77.7	83.5
No. of Drops (N)	36	28	24	19



Plastic Limit Determination:

Trial No.	1	2	3
Water Content Container No.	13	6	20
Me = Mass of Empty Container + Lid (grams)	21.3	21.3	21.2
Mm = Mass Container, Lid, and Moist Soil (grams)	30.8	30.5	21.1
Md = Mass of Container, Lid, and dry soil (grams)	28.3	28.1	28.5
Ms = Mass of Soil Solids (grams)	7	6.8	7.3
Mw = Mass of Pore Water (grams)	2.5	2.4	2.6
w = Water Content, w%	35.7	35.3	35.6
Plastic Limit (PL) (Average) w%	**35.53**		

Results Summary:

Liquid Limit= 76
Plastic Limit= 36
Plasticity Index 40

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12

CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

Determination of moisture Content of Soils (ASTM 2216)

Client	CDM Geotechnical Service Division		
Address	2301 Maitland Center Parkway, Suite 300, Maitland, Florida 32751	**Report No:**	1
Project	**Trail Ridge Landfill Class 1 Cell Permitting**		
Address	Duval Co, Florida		
Matrix	Fat Clay (CH), Greenish Gray		
Sample Location	Sample received at the CES Lab by FedEx		
Sampling date	11/2/2011	**CES Project#**	L-110002.00
Collected By	CDM **Sample #**	CMD-106, S-13 (1) & (2) Combined	
Analysis date	3/15/2011 **Sample Depth (feet):**	33-35	
Analysis By	A.U	**Approved By**	N.W

TEST RESULTS

CALCULATION

W = [(Mcws- Mcds) / (Mcds-Mc)] X 100 = Mw/Ms X100

Where:

Mcws (gm)	Mass of Container & Wet Specimen	**365.0**
Mcds (gm)	Mass of Container & Oven Dry Specimen	**218.0**
Mc (gm)	Mass of Container	**21.0**
Mw (gm)	Mass of Water (Mw = Mcws -Mcds)	**147.0**
Ms (gm)	Mass of Soil Particles (Ms = Mcds -Mc)	**197.0**
W	Water Contents %	**74.62**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	11/2/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	11/14/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	CDM-106, S-15 & S-16 Combined
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	43-45 and 48-50 11/16/2011
Remarks:		**Sample Weight (grams):**	498

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	3.0	0.6%	3.0	0.6%	99.4%
No 10 (2.00 mm)	6.0	1.2%	9.0	1.8%	98.2%
No 20 (.850 mm)	45.0	9.0%	54.0	10.8%	89.2%
No 40 (.425 mm)	165.0	33.1%	219.0	44.0%	56.0%
No 60 (.250mm)	140.0	28.1%	359.0	72.1%	27.9%
No 100 (.150 mm)	68.0	13.7%	427.0	85.7%	14.3%
No 140 (.106 mm)	18.0	3.6%	445.0	89.4%	10.6%
No 200 (.075 mm)	10.0	2.0%	455.0	91.4%	8.6%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised)

TEST PIT
Lab Results

April 14, 2011

Eng. Steve Manis, P.E.
CES Consultants, Inc.
9432 Baymeadows Road
Jacksonville, Florida 32256

Reference: Laboratory Test Results
Trail Ridge Landfill Class 1 Cell Permitting
Duval County, Florida
E&A Project No. 3636-0001

Dear Steve:

Ellis & Associates, Inc. has completed the requested laboratory testing for the subject project. This letter presents the results of our testing.

We performed laboratory permeability tests and determined the soil density on 4, 3-inch diameter and 6-inch long relatively undisturbed tube soil samples obtained by others on March 29, 2011. The tube samples were delivered to our laboratory on April 4, 2011. The testing was performed in general accordance with ASTM D 2434. The results of the permeability tests indicated the following vertical/horizontal permeabilities:

Boring No.	Sample No.	Sample Depth (feet)	Dry Density (pcf)	Measured Permeability (cm/sec)
TP-1	Tube #1	3.5 Horizontal	109.4	7.209E10-4
TP-1	Tube #2	5.3 to 5.8 Vertical	118.9	2.451E-6
TP-2	Tube #2	5.8 to 6.3 Vertical	116.0	5.893E-6
TP-3	Tube #1	4.5 Horizontal	117.7	2.431E-4

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

Very truly yours,

ELLIS & ASSOCIATES, INC.

_____

Nemer (Nick) Y. Oweis, P.E.
Senior Project Engineer
Registered, Florida No. 44755

Distribution: Mr. Steve Manis, P.E. - CES Consultants, Inc. 1 pdf

TP-1

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	1
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-1, S-2
Material Description:	**Poorly Graded Sand (SP), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	2.5 thru 3.5 4/5/2011
Remarks:		**Sample Weight (grams):**	509

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	1.0	0.2%	1.0	0.2%	99.8%
No 40 (.425 mm)	78.0	15.3%	79.0	15.5%	84.5%
No 60 (.250mm)	240.0	47.2%	319.0	62.7%	37.3%
No 100 (.150 mm)	120.0	23.6%	439.0	86.2%	13.8%
No 140 (.106 mm)	33.0	6.5%	472.0	92.7%	7.3%
No 200 (.075 mm)	17.0	3.3%	489.0	96.1%	3.9%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	2
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-1, S-3
Material Description:	**Dark Brown Fine Sand**	**Sample Depth (feet):** **Test Date:**	5 thru 6 4/5/2011
Remarks:		**Sample Weight (grams):**	744

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	1.0	0.1%	1.0	0.1%	99.9%
No 20 (.850 mm)	1.0	0.1%	2.0	0.3%	99.7%
No 40 (.425 mm)	124.0	16.7%	126.0	16.9%	83.1%
No 60 (.250mm)	366.0	49.2%	492.0	66.1%	33.9%
No 100 (.150 mm)	163.0	21.9%	655.0	88.0%	12.0%
No 140 (.106 mm)	38.0	5.1%	693.0	93.1%	6.9%
No 200 (.075 mm)	20.0	2.7%	713.0	95.8%	4.2%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, P.E. 58207 Date: 4/11/11

TP-2

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	3
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-2, S-3
Material Description:	**Poorly Graded Sand (SP), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	6 thru 7 4/5/2011
Remarks:		**Sample Weight (grams):**	696

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	4.0	0.6%	4.0	0.6%	99.4%
No 20 (.850 mm)	10.0	1.4%	14.0	2.0%	98.0%
No 40 (.425 mm)	128.0	18.4%	142.0	20.4%	79.6%
No 60 (.250mm)	337.0	48.4%	479.0	68.8%	31.2%
No 100 (.150 mm)	139.0	20.0%	618.0	88.8%	11.2%
No 140 (.106 mm)	30.0	4.3%	648.0	93.1%	6.9%
No 200 (.075 mm)	15.0	2.2%	663.0	95.3%	4.7%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised

TP-3

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF SIEVE ANALYSIS

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	4
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-3, S-2
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	3.5 thru 6 4/5/2011
Remarks:		**Sample Weight (grams):**	988

SIEVE SIZE:	Individual Weight Retained (gm)	% Individual Weight Retained	Cumulative Weight Retained (gm)	% Cumulative Weight Retained	% Weight Passing
3 / 4 "	0.0	0.0%	0.0	0.0%	100.0%
3 / 8 "	0.0	0.0%	0.0	0.0%	100.0%
No 4 (4.75 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 10 (2.00 mm)	0.0	0.0%	0.0	0.0%	100.0%
No 20 (.850 mm)	3.0	0.3%	3.0	0.3%	99.7%
No 40 (.425 mm)	142.0	14.4%	145.0	14.7%	85.3%
No 60 (.250mm)	391.0	39.6%	536.0	54.3%	45.7%
No 100 (.150 mm)	245.0	24.8%	781.0	79.0%	21.0%
No 140 (.106 mm)	96.0	9.7%	877.0	88.8%	11.2%
No 200 (.075 mm)	59.0	6.0%	936.0	94.7%	5.3%

Remarks:
Gradation Analysis as specified by CDM (Client).

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised

TP-4

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	5
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-4, S-1
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Gray**	**Sample Depth (feet):** **Test Date:**	0 - 2 4/8/2011

Remarks:

Original Dry Mass of the Sample (grams): 857

Dry Mass of the Sample after Washing (grams): 809

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **5.6**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	6
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-4, S-2
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Light Brown**	**Sample Depth (feet):** **Test Date:**	2 4/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	1597

Dry Mass of the Sample after Washing (grams): 1435

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **10.1**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	7
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-4, S-3
Material Description:	**Poorly Graded Sand with Silt (SP-SM), Fine, Dark Brown**	**Sample Depth (feet):** **Test Date:**	4 4/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	1242

Dry Mass of the Sample after Washing (grams): 1118

Calculation:

A= [(B-C) /B] *100

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **10.0**

Respectfully Submitted,

Nelson F. Walters, PE # 38207 DATE : 1/12/12 (revised

CES CONSULTANTS, INC.

6157 NW 167 Street, Suite-F8 Miami, Florida – 33015
Telephone: 786-639-0041 Fax: 786-639-0094 Web: www.sim-gtech.com

REPORT OF % Passing -200, ASTM D-1140

Client:	**CDM**		
	Geotechnical Services Division	**Job No:**	L-110002.00
Address:	2301 Maitland Center Parkway, Suite 300 Maitland, Florida 32751	**Report No:**	8
Project:	Trail Ridge Landfill Class 1 Cell Permitting	**Sample Date:**	3/29/2011
Address:	Duval Co, Florida	**Sample Rcvd:**	4/4/2011
Sample Location:	**Sample received at the CES Lab by FedEx**	**Sample No:**	TP-4, S-4
Material Description:	**Poorly Graded Sand (SP), Fine, Light Gray**	**Sample Depth (feet):** **Test Date:**	8 4/8/2011
Remarks:		**Original Dry Mass of the Sample (grams):**	683

Dry Mass of the Sample after Washing (grams): 664

Calculation:

$A = [(B-C) / B] * 100$

where:

A = percentage of material finer than the 75-µm sieve by washing, nearest 0.1 %

B = original dry mass of sample, g, and

C = dry mass of specimen retained on the 75-µm sieve including the amount retained on an upper sieve after washing, g.

RESULTS:

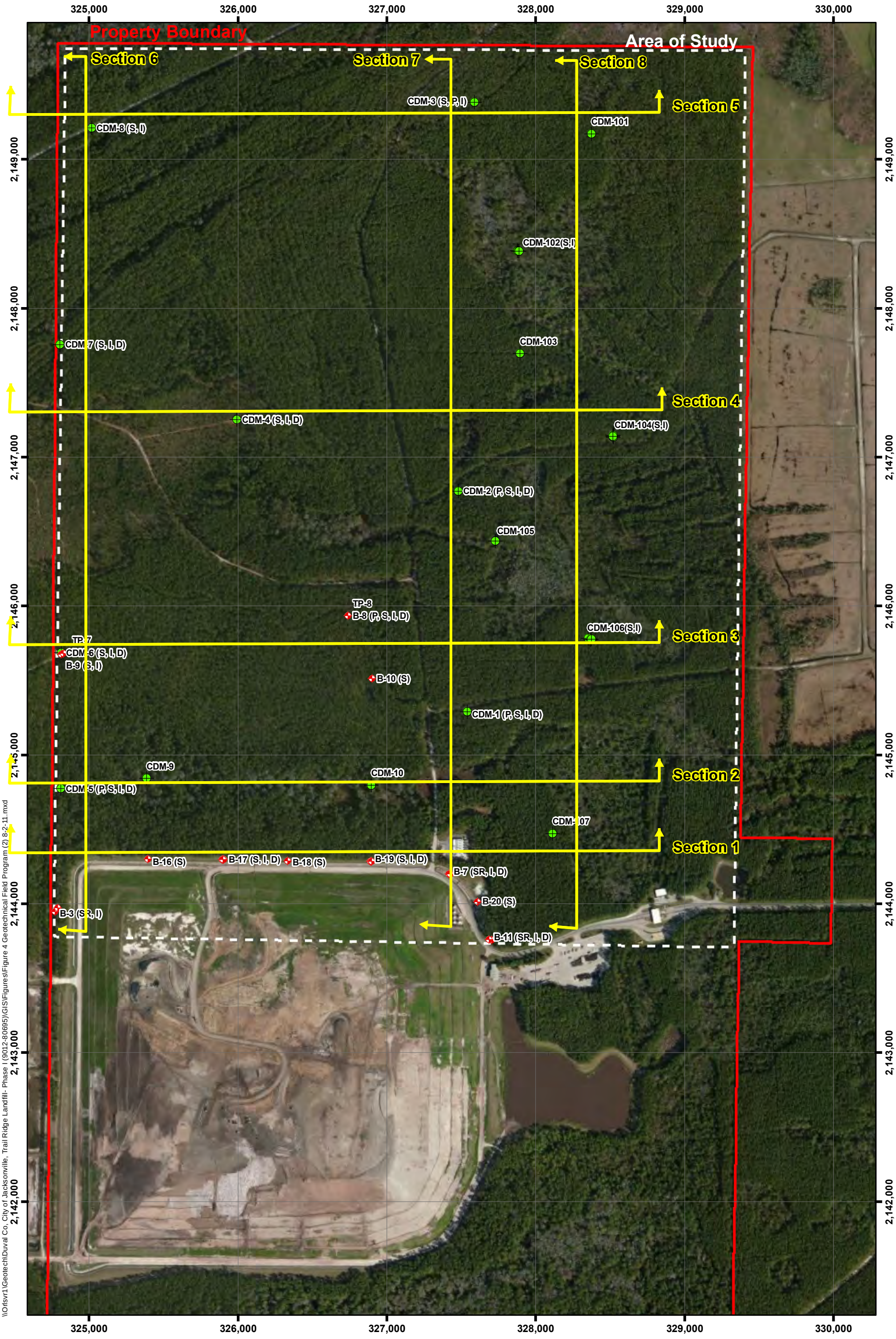
The percentage of material finer than the 75-µm sieve by washing for the above mentioned sample was **2.8**

Respectfully Submitted,

Nelson F. Walters, PE # 58207 DATE : 1/12/12 (revised

Appendix H

Cross Sections and Soil Profiles



\\Orlsvr1\Geotech\Duval Co, City of Jacksonville, Trail Ridge Landfill- Phase I (9012-80695)\GIS\Figures\Figure 4 Geotechnical Field Program (2) 8-2-11.mxd

New Boring/Monitor Well or Piezometer Cluster (by CDM Smith)

Previous Boring/Monitor Well Cluster (by others)

Cluster Data: Shallow (S), Intermediate (I), Deep (D), Piezometer (P)

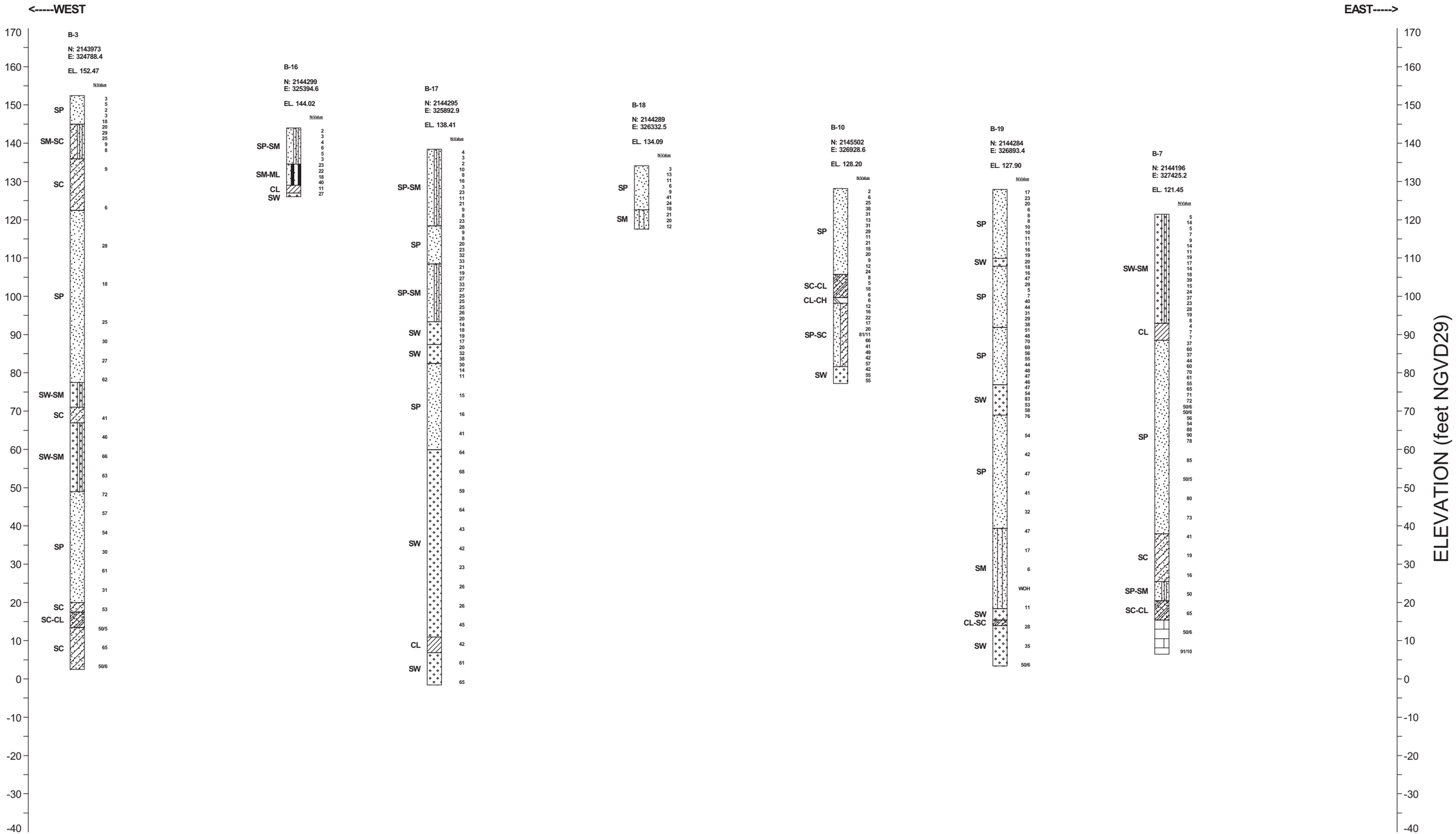
Figure H-1
Cross Sections and Soil Profiles
Trail Ridge Landfill Expansion
Duval County, Florida

N W E S

0 300 600 Feet

CDM Smith

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12



LEGEND

- USCS Poorly-graded Sand
- Clayey Sand and Sandy Clay
- USCS Low to High Plasticity Clay
- USCS Poorly-graded Sand with Clay
- USCS Well-graded Sand
- USCS Poorly-graded Sand with Silt
- USCS Elastic Silt with Sand
- USCS Low Plasticity Clay
- USCS Silty Sand
- USCS Silty Sand - Clayey Sand
- USCS Clayey Sand
- USCS Well-graded Sand with Silt
- Water Level

CDM Smith

0 200
Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

SECTION 1
WEST-EAST
South Side of Cell 6

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12

<----WEST

EAST---->

ELEVATION (feet NGVD29)

CDM-5

N: 2144765
E: 324811.1

EL. 145.6

	N-Value
SP-SM	7
	9
	15
	12
SP	10
	19
	9
	12
	16
SM	42
	39
	29
SW	26
	16
SC	
SM	13
	13
SP-SM	24
	33
SW	68
	71
	37
SP	40
	42
	44
	57
	47
	30
	28
	29
SP	29
	27
	27
	9
	6
	11
SM	WOR
SC	45

CDM-9

N: 2144841
E: 325385.3

EL. 134.9

	N-Value
SP-SM	WOH
PT	WOH
	2
SP-SM	13
	18
	40
SM	42
	52
	12
SP-SM	11
	11
	16
SW	36
	35
SP	45
	28
	74
SP-SM	21
	35
SP	38
	33
	57
	52
	64
SP-SM	98/11
	93/9
	36
	27
SP	25
SP	90
	50/5
	50/5
	62
	50/3
ML	50/5
	50/5

CDM-10

N: 2144796
E: 326893.7

EL. 117.2

	N-Value
SP-SM	4
	8
	16
SP-SM	31
SP	29
	29
SP-SM	53
	27
	54
SP	15
	3
SM	
MH	4
	29
	66
	58
	71
SP	50/5
	50/5
	89
	23
	30
SP-SM	16
	42
SP-SM	
SP-SM	28
	22
SC	19
CH	50/5
	76/10
SM	50/5
SM-SC	50/5
	50/5
ML	50/5
	50/4
SM	50/5
	50/5
ML	50/4
	50/3

LEGEND

- Topsoil
- USCS Poorly-graded Sand with Silt
- USCS Poorly-graded Sand
- USCS Silty Sand
- USCS Elastic Silt
- USCS Clayey Sand
- USCS High Plasticity Clay
- Limestone
- USCS Silty Sand - Clayey Sand
- USCS Silt
- USCS Well-graded Sand
- USCS Peat
- Water Level

CDM Smith

0 200
Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

SECTION 2
WEST-EAST
Middle of Cell 6

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12

<----WEST

EAST----->

ELEVATION (feet NGVD29)

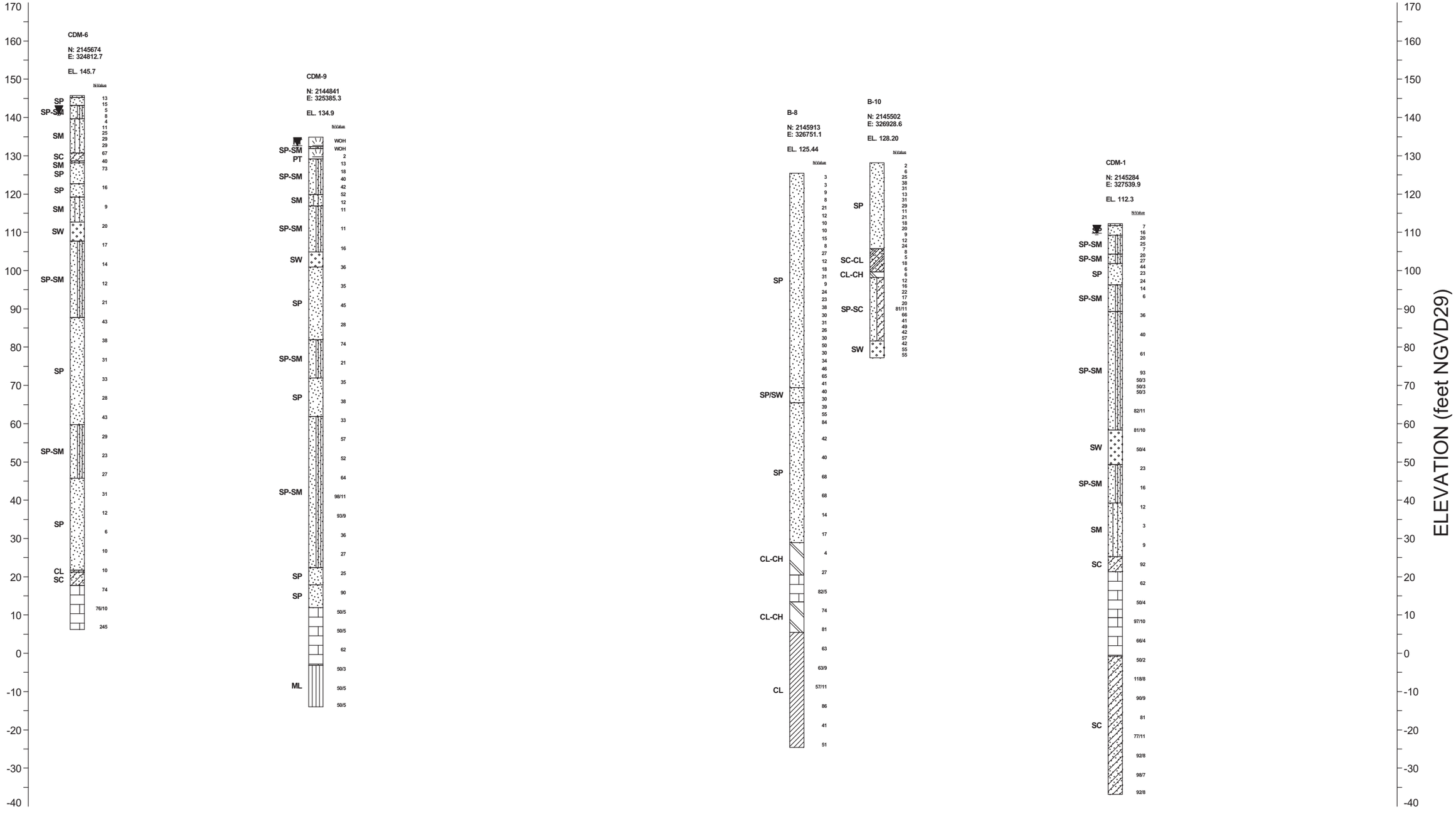
CDM-6
N: 2145674
E: 324812.7
EL. 145.7

CDM-9
N: 2144841
E: 325385.3
EL. 134.9

B-8
N: 2145913
E: 326751.1
EL. 125.44

B-10
N: 2145502
E: 326928.6
EL. 128.20

CDM-1
N: 2145284
E: 327539.9
EL. 112.3



LEGEND

- USCS Poorly-graded Sand
- Clayey Sand and Sandy Clay
- USCS Low to High Plasticity Clay
- USCS Poorly-graded Sand with Clay
- USCS Well-graded Sand
- Limestone
- USCS Low Plasticity Clay
- Topsoil
- USCS Poorly-graded Sand with Silt
- USCS Silty Sand
- USCS Clayey Sand
- USCS Peat
- Water Level

CDM Smith

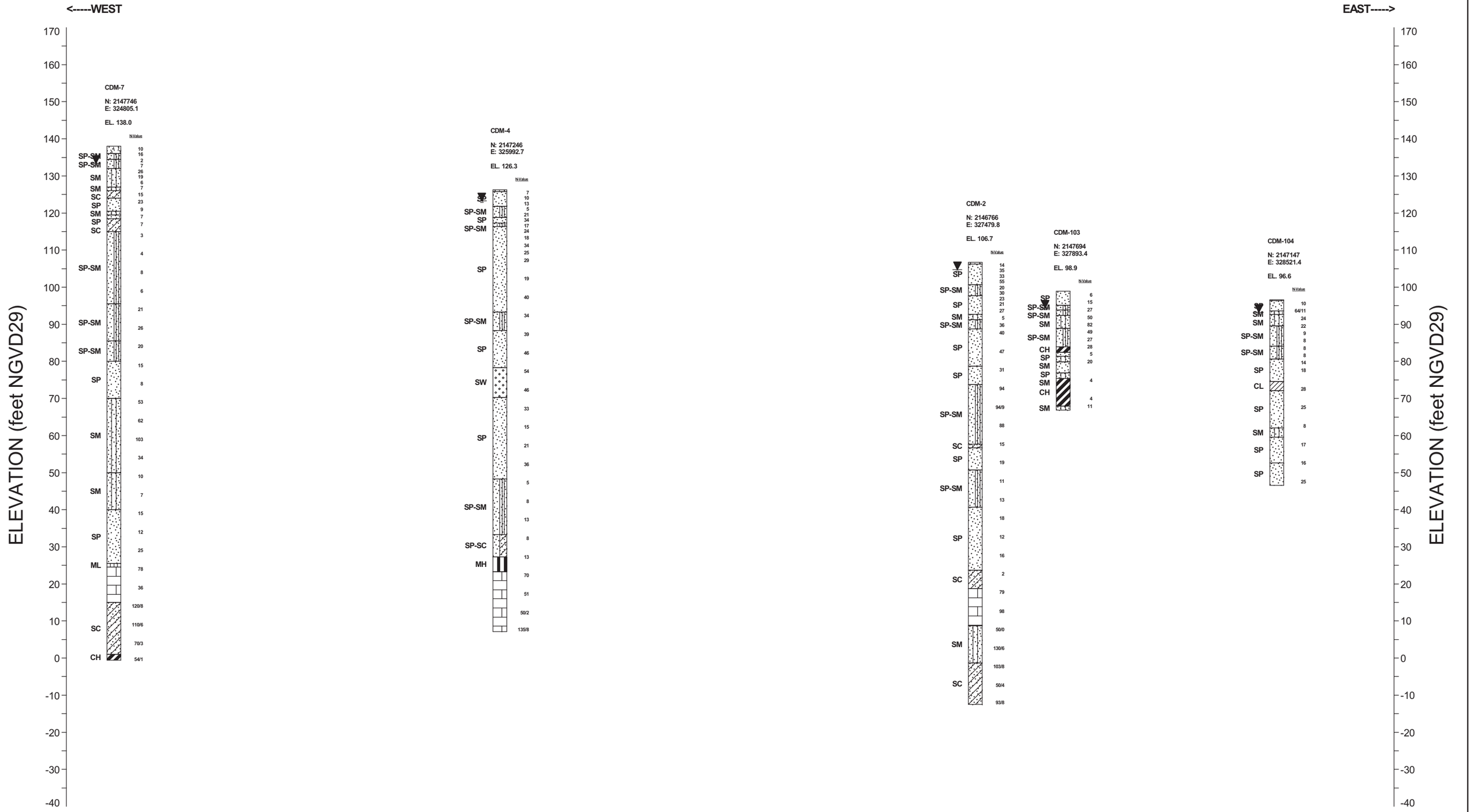
0 250
Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

SECTION 3
WEST-EAST
North Side of Cell 6

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12



LEGEND

- USCS Poorly-graded Sand
- USCS Poorly-graded Sand with Silt
- USCS Silty Sand
- USCS High Plasticity Clay
- Topsoil
- USCS Low Plasticity Clay
- USCS Clayey Sand
- Limestone
- USCS Well-graded Sand
- USCS Poorly-graded Sand with Clay
- USCS Elastic Silt
- USCS Silt
- Water Level

CDM Smith

0 300
Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

SECTION 4
WEST-EAST
Approximately 2400 feet South of
North Side of Landfill Expansion

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12

<----WEST

EAST---->

ELEVATION (feet NGVD29)

CDM-8

N: 2149211
E: 325033.7

EL. 127.1

	N-Value
SP	8
SP-SM	10
	3
SM	35
SP-SM	20
	7
SP-SM	12
SP-SM	18
	8
SP	12
	11
SP-SM	22
	31
SP	
	41
SP	
GW	30
	11
SP-SM	
	10
	9
SP-SC	
	12
SP	
	5
	5
SM	
	6
	9
SP-SM	
	10
SM	
SM	109/7
	39
	70
SP-SM	
	94
	73/10
SC	69
	83/10
	83/10

CDM-3

N: 2149378
E: 327587.3

EL. 104.6

	N-Value
	9
SP	16
	22
SP-SM	20
	40
SM	72
SP-SM	50
	80
SP	44
CL	23
SC	15
	5
SP-SM	12
	43
SP	98
	9
SC	
	5
	4
SP	
	1
SM	15
	19
SC	60/10
SM	93/9
	75/4
	106/9
	88/8
	100/10
	96/9
	84/10
	102/8
SC	72
	83/9
	95/11
	100/9
	120/8
	68
	92/9

CDM-101

N: 2149171
E: 328374.5

EL. 97.2

	N-Value
	4
SP-SM	5
	10
SP-SM	14
	23
SM	20
	2
SM	6
SM	13
SP-SM	14
	26
CH	13

LEGEND

- USCS Poorly-graded Sand
- USCS Poorly-graded Sand with Silt
- USCS Silty Sand
- USCS High Plasticity Clay
- Topsoil
- USCS Low Plasticity Clay
- USCS Clayey Sand
- Limestone
- USCS Well-graded Gravel
- USCS Poorly-graded Sand with Clay
- Water Level

CDM Smith

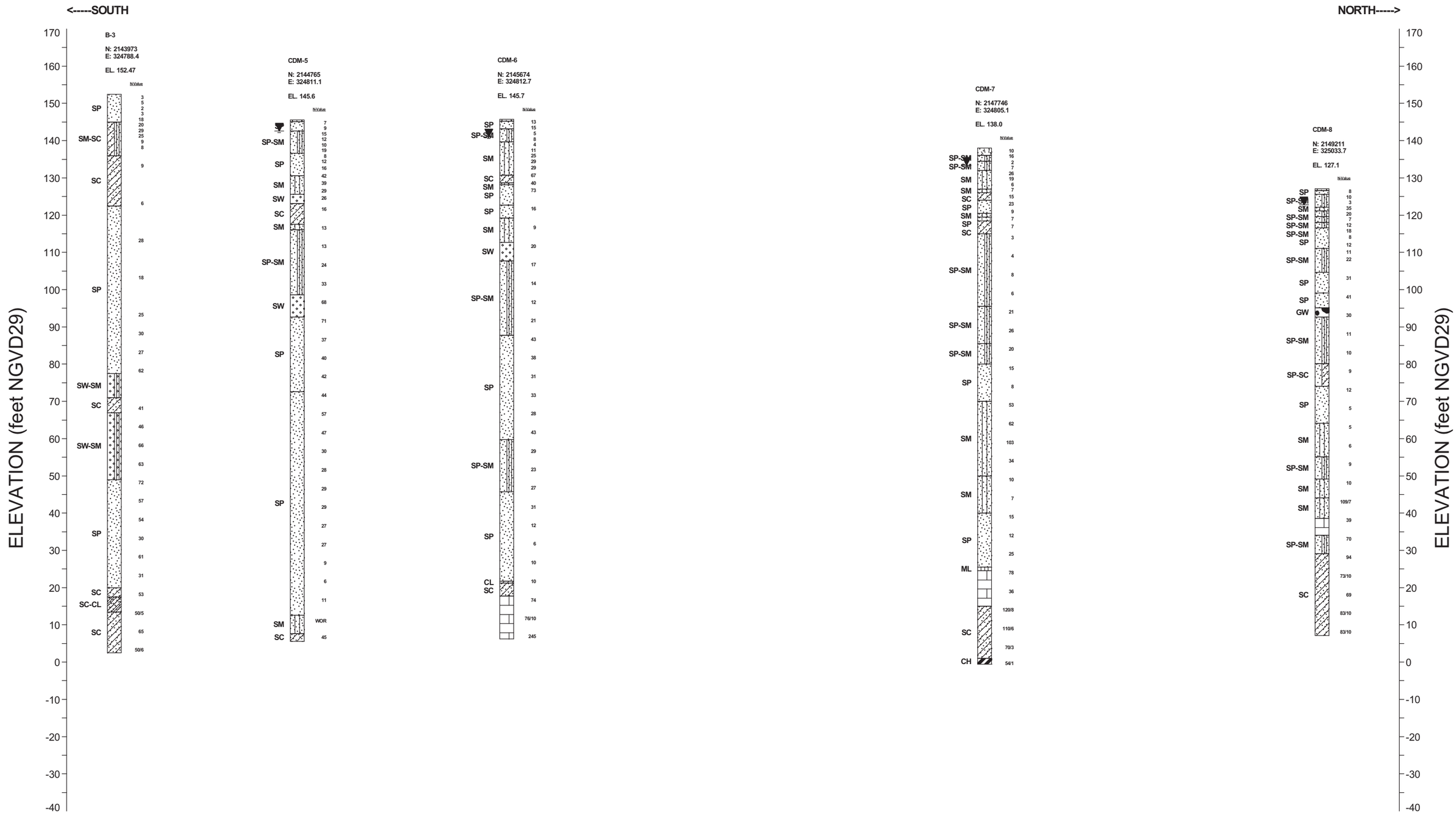
0 300
Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

SECTION 5
WEST-EAST
North Side of Landfill Expansion

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12



LEGEND

- USCS Poorly-graded Sand
- USCS Silty Sand - Clayey Sand
- USCS Clayey Sand
- USCS Well-graded Sand with Silt
- Clayey Sand and Sandy Clay
- Topsoil
- USCS Poorly-graded Sand with Silt
- USCS Silty Sand
- USCS Well-graded Sand
- USCS Low Plasticity Clay
- Limestone
- USCS Silt
- Water Level

CDM Smith

0 400
Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

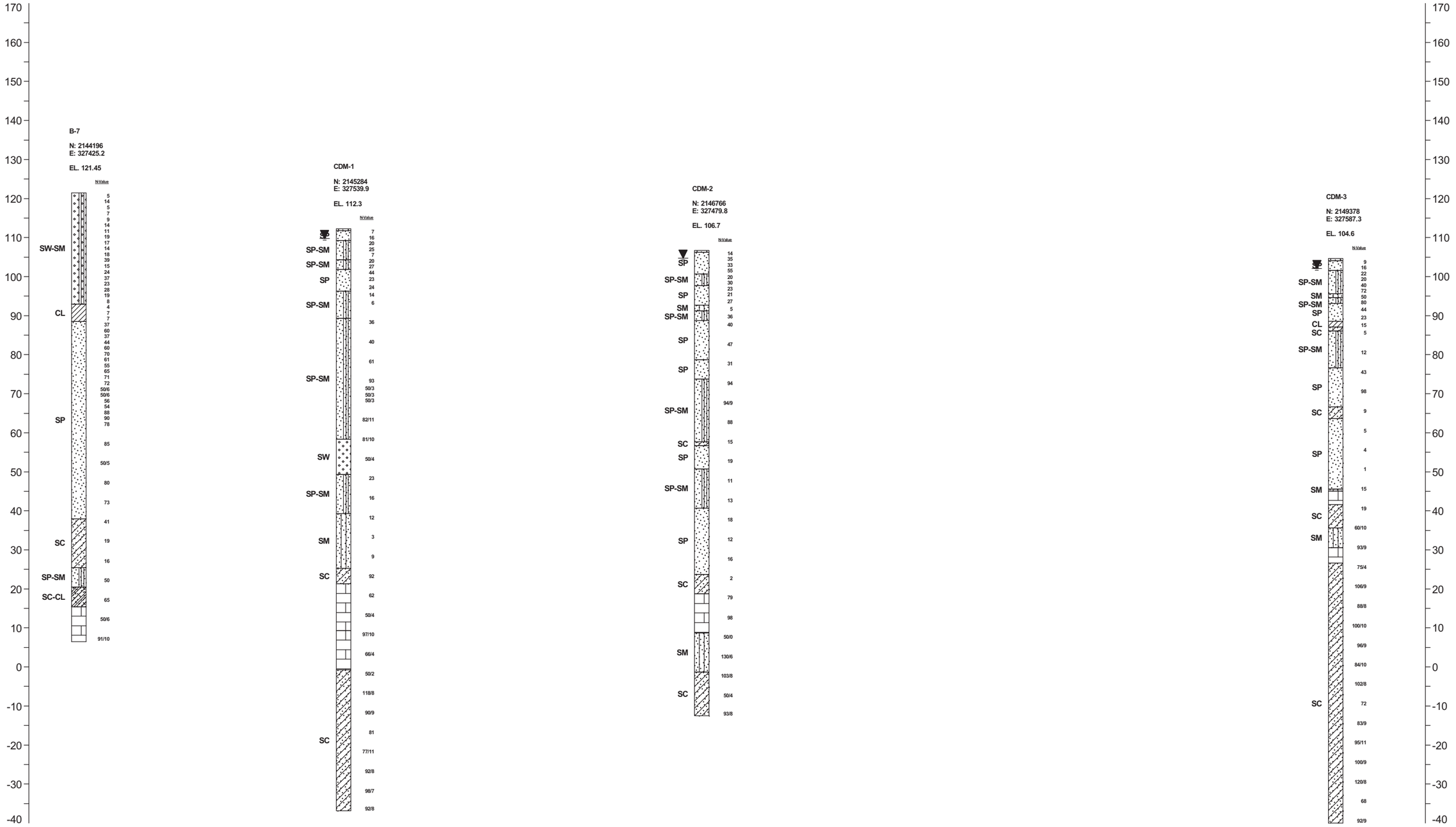
SECTION 6
SOUTH-NORTH
West Side of Landfill Expansion

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12

<----SOUTH

NORTH----->

ELEVATION (feet NGVD29)



LEGEND

- USCS Well-graded Sand with Silt
- USCS Low Plasticity Clay
- USCS Poorly-graded Sand
- USCS Clayey Sand
- USCS Poorly-graded Sand with Silt
- Clayey Sand and Sandy Clay
- Limestone
- Topsoil
- USCS Well-graded Sand
- USCS Silty Sand
- Water Level

CDM Smith

0 400

Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

SECTION 7
SOUTH-NORTH
East Side of Landfill Expansion

FENCE - TRLF - 11X17 REDUCED SIZE 2012 TRLF- PHASE I AND II BORINGS CONSOLIDATED 1-3-2012.GPJ CDM_CORP.GDT 02/08/12

LEGEND

- USCS Poorly-graded Sand
- USCS Poorly-graded Sand with Silt
- USCS Silty Sand
- USCS High Plasticity Clay
- Topsoil
- USCS Low Plasticity Clay
- Water Level

CDM Smith

0 400
Horizontal Scale (ft.)

City of Jacksonville

Trail Ridge Landfill Expansion

SECTION 8
SOUTH-NORTH
Stormwater Ponds

Attachment B

Sinkhole Analyses

Memorandum

To: *Public Works Department – Solid Waste Division*
City of Jacksonville, Florida

From: *Eduardo Gutiérrez-Pacheco, P.E. and E. Woody Lingo, P.E.*

Date: *May 2, 2013*

Subject: *Geotechnical Evaluation for Sinkhole Potential*
Trail Ridge Landfill Expansion
City of Jacksonville, Duval County, Florida

CDM Smith is providing professional engineering services for the expansion to the Trail Ridge Landfill (TRLF) for the City of Jacksonville, Florida. The information contained and referenced herein evaluates the potential for sinkhole development in the vicinity and under the proposed expansion cells for the TRLF. This evaluation of the potential for sinkhole development at the site has utilized the results of prior field investigations and laboratory testing that was provided in the "*Trail Ridge Landfill Geotechnical Data Report*" prepared by CDM Smith dated February, 2012.

The 944-acre TRLF site is located in Duval County, Florida within Sections 18 and 19 of Township 3 South, Range 23 East. The approximate location of the site is shown superimposed on a reproduction of the 2001 Maxville, Florida, USGS Quadrangle Map presented as the General Location Map, Figure 1-1 of the *Geotechnical Data Report.* The site is bounded to the west by Baker County; undeveloped lands border the landfill to the north, east and south. Principal access to the landfill site is off of US Highway 301, which is east of the landfill.

Horizontal and Vertical Survey Datum

The site surveys used the horizontal and vertical control network established by the National Geodetic Survey (NGS). Horizontal survey data in this report references the East Zone of the Florida State Plane Coordinate System based on North American Datum (NAD) of 1927, 1983 adjustment. All elevations noted herein are in feet and are referenced to the 1929 National Geodetic Vertical Datum (NGVD 29).

Purpose and Scope

This memorandum references the available information for the proposed northern expansion of the existing TRLF site. The Florida Department of Environmental Protection (FDEP) and the Florida Administrative Code (F.A.C.) rules contained in Chapter 62-701 for Solid Waste Management Facilities, require that a geotechnical evaluation be performed for the potential of sinkhole development at a solid waste landfill site.

Regional Geology

The geology of Duval County consists of the six geologic units listed below (Leve, 1966; Fairchild, 1972; Miller, 1986; Krause and Randolph, 1989; Phelps, 1993) in descending order starting from the ground surface:

- Undifferentiated clastic deposits of Holocene, Pleistocene, and Pliocene age;
- Hawthorn Group of Miocene age;
- Ocala Limestone of late Eocene age;
- Avon Park Formation of middle Eocene age;
- Oldsmar Formation of middle to early Eocene age; and
- Cedar Keys Formation of early Eocene and late Paleocene age.

An east-to-west geologic section through Duval County is presented on **Figure 1**, on the following page.

Each of these geologic units is briefly described in Section 4 of the *Geotechnical Data Report.*

Based on the above information and the Florida Geological Survey (FGS) Map presented in **Figure 2**, contained in the Attachments, Trail Ridge Landfill site is located in a portion of the Trail Ridge Sands (Qtr) of the Quaternary period underlain by Undifferentiated Tertiary and Quaternary Sediments (TQu) of the Pleistocene and Pliocene age, over the Hawthorne Group (Th and Thcc) formed in the Miocene age.

Under the Hawthorne Group at a depth of about 350 feet, the Ocala limestone (To) of the Eocene age is one of the most permeable rock units and is the top formation of the Floridian Aquifer System.

Soil Survey

A review of the Soil Survey Maps for Duval County and Baker County, Florida, prepared by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), indicates that eight soil units are mapped within the area of study. In general, the soils in the area are poorly drained sand with varying amounts of silt; and up to 1 foot of peat or organic soil may overlie the sand. The soil units typically occurring in the wetland areas have about two feet of silty sand underlain by clayey and clayey-silty sand to depths on the order of 6 feet.

A summary of the various soil units that occur on and around the TRLF site is presented in Table 2-1 of the *Geotechnical Data Report***.**

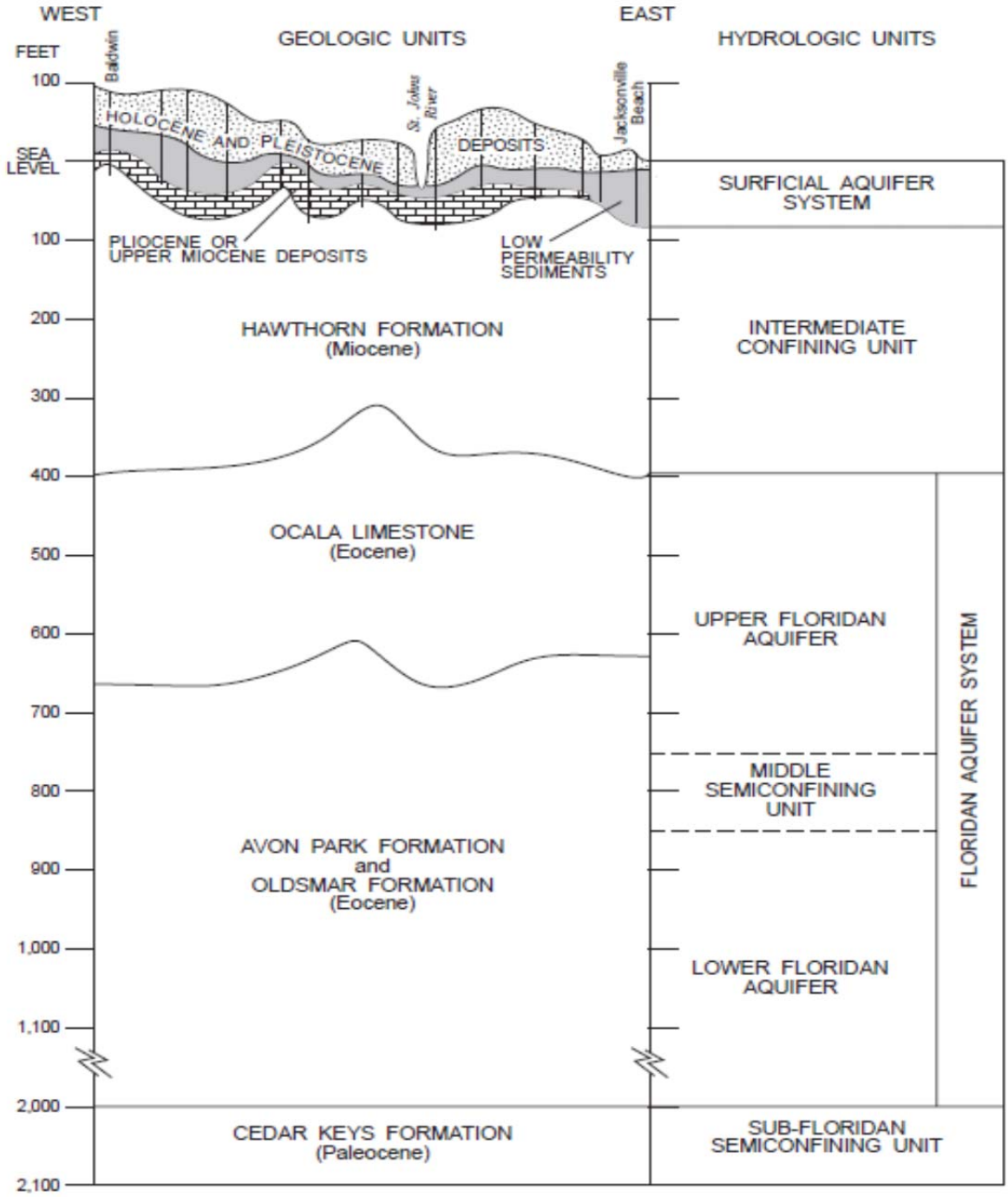


Figure-1. East-West Hydrogeologic/Geologic Cross Section through Duval County, FL (Adapted from Phelps, 1993)

Subsurface Stratigraphy based on Geotechnical Explorations

Subsurface soil conditions described in this section are based upon the results of visual classification and laboratory testing of the soils and rock encountered during recent and previous field exploration programs performed by CDM Smith and others. The stratigraphy presented herein is generalized and highlights four major layers and the predominant soil types that comprise each layer. Layers 1, 2 and 3 comprise the surficial aquifer system, and Layer 4 corresponds to the Hawthorne Group. For more information on each layer and the detailed boring records refer to the geotechnical explorations in the *Geotechnical Data Report.*

Subsurface conditions encountered at the site consist of the following layers in order of their occurrence below land surface:

Leaves, topsoil, root mat, and peat: Approximately six inches of leaves, topsoil and root mat were typically encountered at the ground surface in the test boring and test pit locations.

Layer 1: Is typically comprised of sandy soils classified in accordance with the Unified Soil Classification System as clean sand (SP), well graded sand (SW), and poorly- or well-graded sand with silt or clay (SP-SM, SP-SC or SW-SM). Based on the results of laboratory grain size analyses, the percent fines for Layer 1 soils ranged from 1 to 12.

Layer 2: Typically consists of low permeability sediments and are classified as silty sand (SM), clayey sand (SC), low or highly elastic silt (ML or MH) and clay (CL or CH). The laboratory grain size analyses indicated a percentage of fines ranging from 16 to 65. Generally the soils are more silty than clayey. The soils were calcareous in some borings.

Layer 3: This layer is a limestone formation that has varying degrees of weathering. Some of the material that was obtained from split-spoon samples was described as gravelly, sandy and silty. The grain size analyses on the non-cemented portions of the samples had a range of fines from 1 to 42 percent. This layer was encountered in all of the deeper borings at the site.

Layer 4: The soils in this layer consist of silty sand (SM) and clayey sand (SC) with sand-size phosphate particles as well as low elasticity silt (ML) and lean clay (CL). The fines content in this layer ranged from 17 to 25.

Sinkhole Potential

The Trail Ridge Landfill site is located in a potential sinkhole area designated as Area IV by the United States Geological Survey (USGS), which includes most of Duval County. A cover-collapse type sinkhole, according to the USGS, is the most common type of sinkhole that has occurred in Area IV and that while they are relatively few compared to other areas of the state there have been some deep, large diameter sinkholes in Area IV.

A cover-collapse sinkhole occurs when a solution cavity develops in the limestone bedrock to such a size that the overlying sediments can no longer support its own weight. Such a collapse is typically

abrupt and generally provides dramatic changes in the local topography. They may occur in areas of soluble rock; however, they are less likely to occur in an area with a deeper limestone formation. This type of sinkhole generally occurs where the limestone formation is relatively close to the land surface and the limestone aquifer is below the groundwater table. **Figure 3,** which is attached, presents the USGS map "Sinkhole Type, Development and Distribution in Florida".

Sinkhole Investigation

A survey of subsidence/sinkholes reported to the FDEP and FGS has been conducted by CDM Smith. The database used for this survey is dated November 29, 2012. The information that is contained in this database was obtained from a variety of sources. The FGS maintains and provides a downloadable database of reported subsidence incidents statewide.

The subsidence incident records listed, in many instances, have not been field checked or verified by a FDEP/FGS professional geologist or professional engineer, and the cause of subsidence is not always known. Each of the reported events is termed a subsidence incident. It is very likely that the precision implied by the database exceeds the actual conditions in many cases. The approximate location of the reported subsidence/sinkhole incidents is shown on **Figure 4,** in the Attachments**.**

The closest reported incident to the Trail Ridge Landfill site is located approximately 17 miles to the east, near the downtown area of Jacksonville. This reported incident had a dimension of about 3 feet in diameter and was only one foot deep. It is possible that this and other reported subsidence incidents are the result of collapsed sewer lines, failed septic tank systems, improperly compacted backfill, or buried trash, logs and other debris.

Other reported subsidence incidents are farther than 20 miles from the TRLF site, as shown on **Figure 4**. It has been stated by the Florida Sinkhole Research Institute that all reported incidents in Duval County are suspect and require further investigation.

Ancient sinkholes have developed south of the TRLF site. The closest group of these sinkholes is located north of Keystone Heights, which is approximately 25 miles south of the TRLF. There are a series of lakes in the Keystone Heights area that were formed by sink activity.

Conclusions Regarding Potential Sinkhole Development at the TRLF

- The potential for a sinkhole to develop in or near Trail Ridge Landfill area is considered to be very low based on our review of the site data obtained over the past 20+ years, site observations and an evaluation of incidents reported in Duval County.

- The historical data, annual aerial surveys, and the FGS and USGS databases, also indicate a very low risk potential for sinkhole development within 15 to 25 miles of the Trail Ridge Landfill site.

Attachments:

- Figure 2 - Geologic Map of the State of Florida, FGS
- Figure 3 - Sinkhole Type, Development, Distribution in Florida, USGS
- Figure 4 - Reported Sinkhole Map Near TRLF, Duval Co., FL, FDEP/FGS

ATTACHMENTS

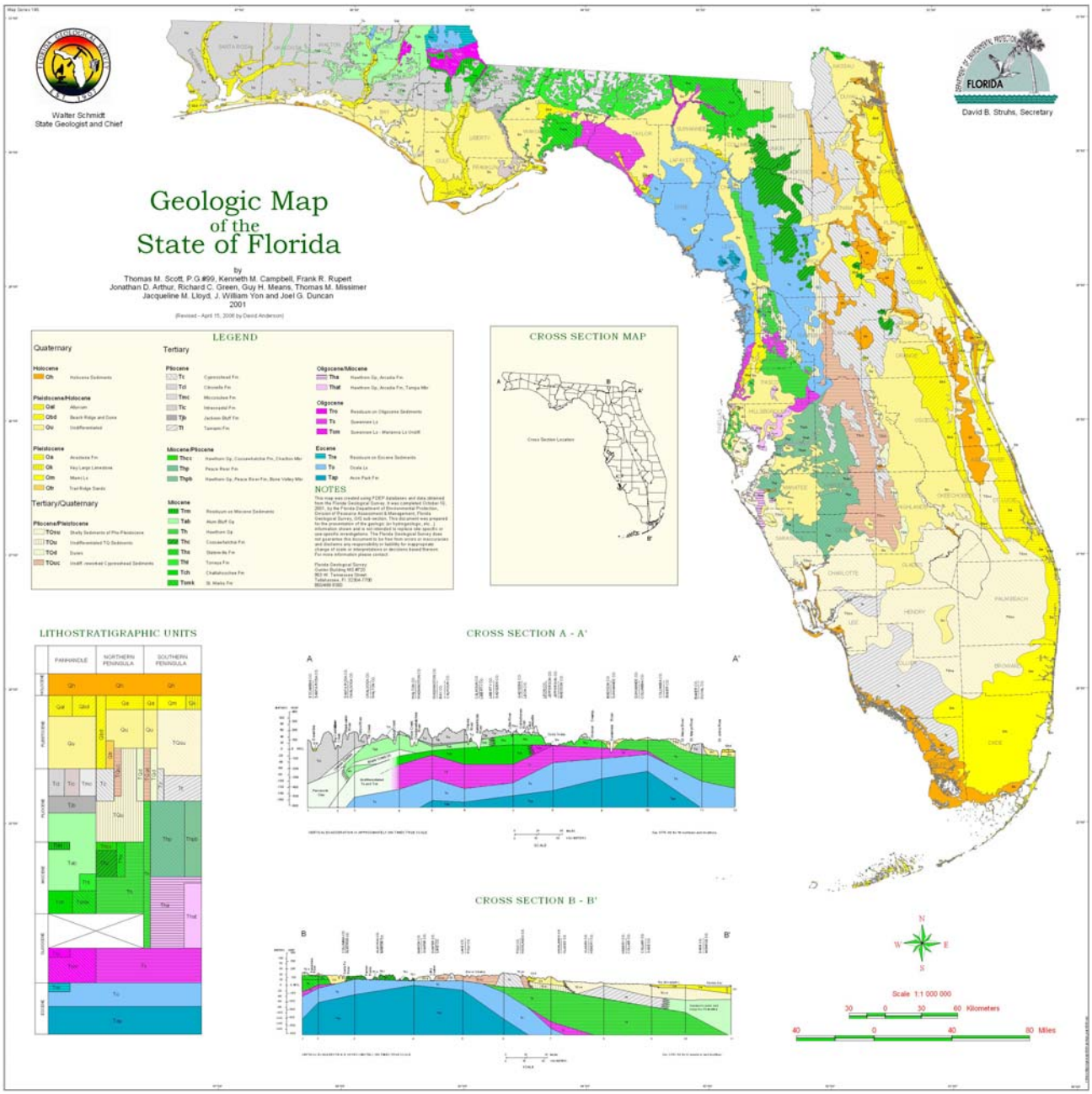


Figure 2 - Geologic Map of the State of Florida, FGS

CDM Smith

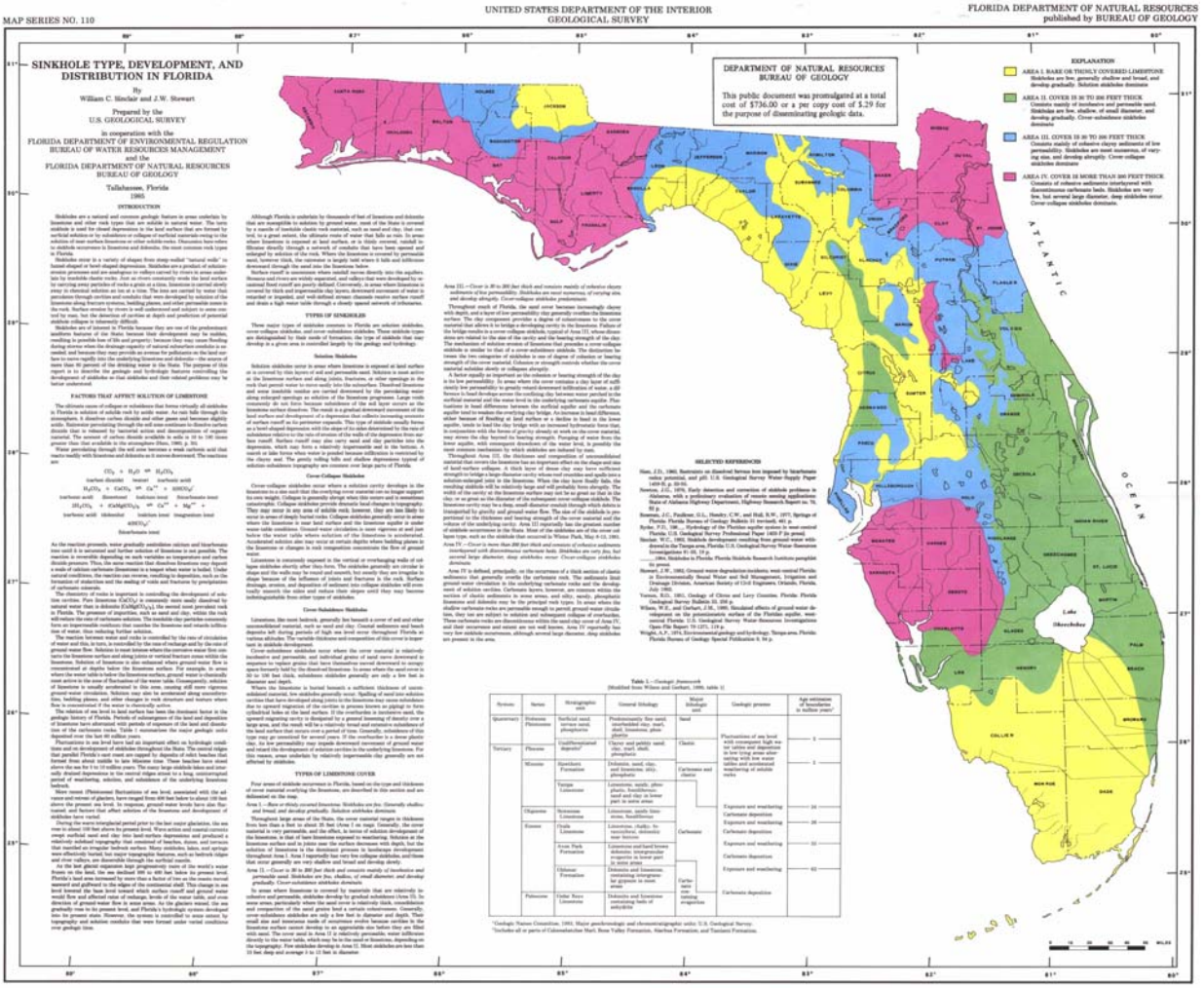


Figure 3 - Sinkhole Type, Development, Distribution in Florida, USGS

CDM Smith

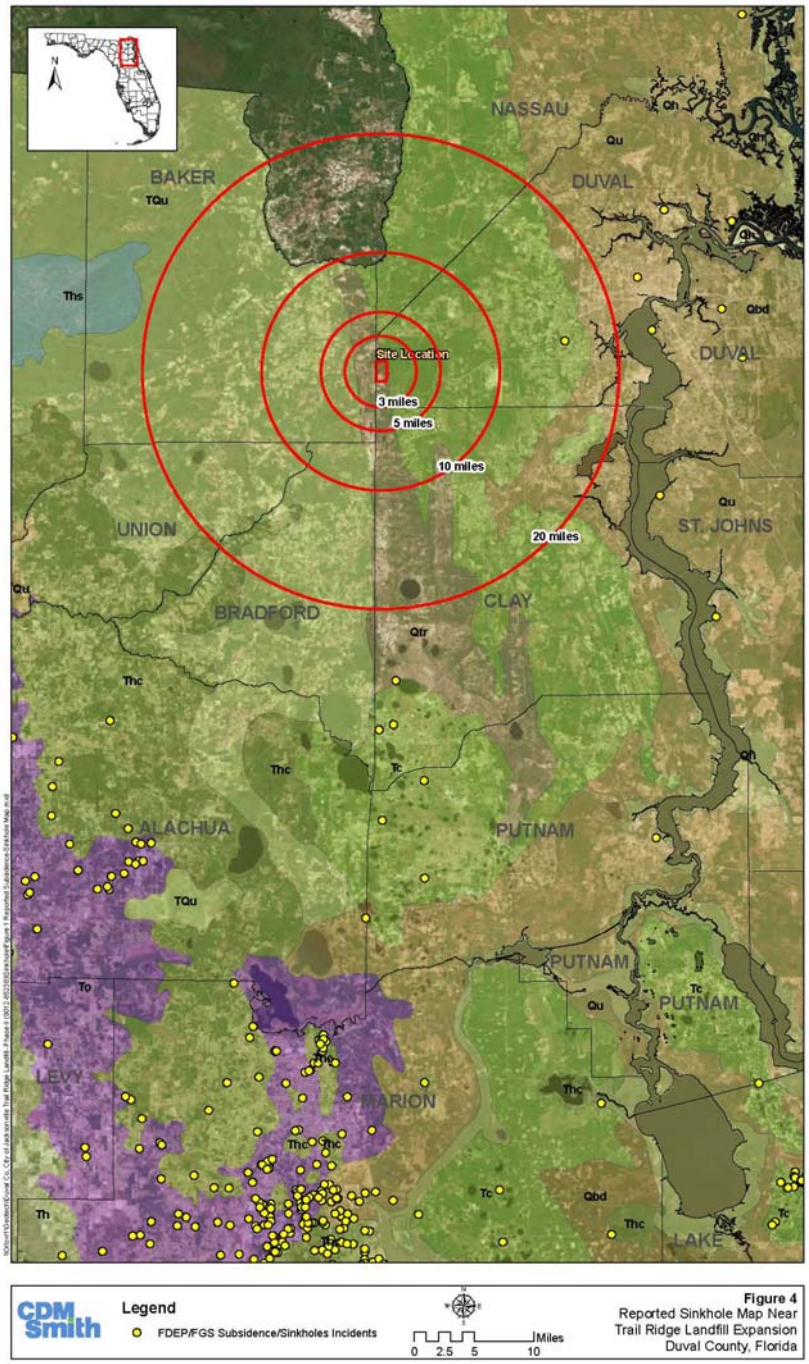


Figure 4 - Reported Sinkhole Map Near TRLF, Duval Co., FL, FDEP/FGS

Attachment C

Bearing Capacity Calculation

Client: City of Jacksonville
Project Name: Trailridge Landfill Expansion
Project No: 85238

Computed By: E. Phelps
Date: 04/22/13
Checked By: JW
Date: 04/22/13

Trailridge Landfill Expansion
Jacksonville , FL

Bearing Capacity Calculation - Assuming Foundation Soil is Sand

Note:
γ = unit weight (pcf) Φ = friction angle(degree) c = unit cohesion(ksf)

Soil Properties:

For	SAND	use unit weight of	γ =	110	pcf
		use friction angle of	Φ =	31	^{O}
		use unit soil cohesion	c =	0	ksf

Depth: 0 ft-bgs

D= 0 ft-bgs

B= 2,300.0 ft

L= 10000 ft

SAND :		
γ =	110	pcf
ϕ =	31	^{O}
c =	0	ksf

Ultimate Bearing Capacity Equation

For foundations bearing in cohesionless soils;

$$q_u = c\,Nc\,\zeta c + 0.5\,B'\,\gamma'_H\,N\gamma\,\zeta\gamma + \sigma'_D\,Nq\,\zeta q$$

For friction angle : See Table 4-4 of EM 1110-2-1905

Nq = 20.79
Nγ = 18.845
Nc = 32.815
Nϕ = 3.1

For large footing where B > 6 ft apply reduction factor r_γ (page 4-14 EM 1110-1-1905, October 30, 1992).

$r_\gamma = 1 - 0.25 \times \log_{10}(B/6)$
$= 1 - 0.25 \times \log_{10}(2300/6)$
$= 0.35$

Using Meyerhof:

$\zeta_\gamma = \zeta\gamma s^* \zeta\gamma i^* \zeta\gamma d = (1+0.1*N\phi*B/W)*(1.0)*(1+.1*N\phi\text{^}0.5*D/B)$
$\zeta_q = \zeta qs^* \zeta qi^* \zeta qd = (1+0.1*N\phi*B/W)*(1.0)*(1+.1*N\phi\text{^}0.5*D/B)$
$\zeta_c = \zeta cs^* \zeta ci^* \zeta cd = (1+0.2*N\phi*B/W)*(1.0)*(1+.2*N\phi\text{^}0.5*D/B)$

$\zeta_\gamma = 1.07$
$\zeta_q = 1.07$
$\zeta_c = 1.14$

σ'_D = γD = 0.000 ksf
γ'_H = 0.110 ksf

$$q_u = c\,Nc\,\zeta c + 0.5\,B'\,\gamma'_H\,N\gamma\,\zeta\gamma + \sigma'_D\,Nq\,\zeta q$$

$q_u = 0 + 0.5 \times 2300 \times 0.110 \times 18.85 \times 1.07 \times 0.35 + 0$
$= 904.824 + 0.000$
$= 904.82$ ksf

Ultimate bearing capacity = 904.82 ksf

Use Factor of Safety = 3.00

Allowable Bearing Capacity = 301.61 ksf

Using Class I Waste unit weight of 74 pcf and maximum height of 230 ft;

The anticipated load of Landfill is about 17 ksf.

Attachment D

Settlement Calculations

Settlement Calculation

At West Toe

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference:

1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Assumptions:

- Vertical stress increases are based on Boussinesq stress distribution.
- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)
- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.
- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.
- All split spoon sampling was carried out according to ASTM D1586.
- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions (1)

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
1	10	25	10	5	133.5
2	20	49	10	15	123.5
3	30	15	10	25	113.5
4	40	16	10	35	103.5
5	50	17	10	45	93.5
6	60	41	10	55	83.5
7	70	32	10	65	73.5
8	80	36	10	75	63.5
9	90	26	10	85	53.5
10	100	29	10	95	43.5
11	110	9	10	105	33.5
12	120	10	10	115	23.5
13	130	10	10	125	13.5
14	133.5	10	3.5	131.75	10

133.5

Note:

1. Design SPT N-values are from CDM-6.

2. All depths are in ft below the landfill bottom.

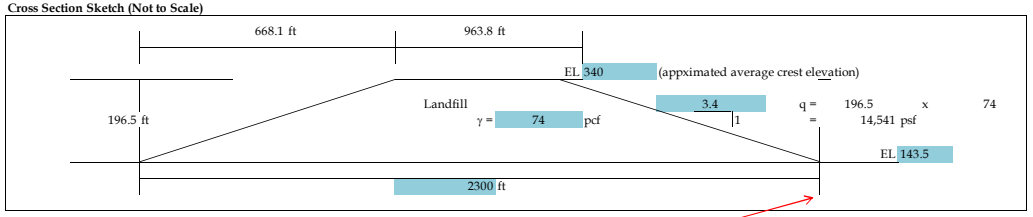
3. Soil below EL 10 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,300	
L/B	4.35	
Z/B	2.74	
Compressible Layer Thickness (H) ft.	133.5	
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.27	
Foundation Load (psf)	14,541	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 668.1 **b= 481.9** **at toe of Landfill, x= 1150**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	-1.563	1.568	0.004	0.001	1.563	0.002
2	15	-1.548	1.562	0.013	0.003	1.548	0.007
3	25	-1.533	1.555	0.022	0.004	1.533	0.012
4	35	-1.518	1.549	0.031	0.006	1.518	0.017
5	45	-1.504	1.543	0.040	0.008	1.504	0.021
6	55	-1.489	1.537	0.048	0.010	1.489	0.026
7	65	-1.474	1.531	0.057	0.012	1.474	0.031
8	75	-1.459	1.525	0.066	0.013	1.459	0.036
9	85	-1.444	1.519	0.075	0.015	1.444	0.040
10	95	-1.430	1.513	0.083	0.017	1.430	0.045
11	105	-1.415	1.507	0.092	0.019	1.415	0.050
12	115	-1.400	1.500	0.100	0.020	1.400	0.054
13	125	-1.386	1.494	0.109	0.022	1.386	0.059
14	131.75	-1.376	1.490	0.114	0.023	1.376	0.062

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	D/E
≤ 10	1.2
$11 \leq N \leq 20$	1.35
$21 \leq N \leq 30$	1.5
$31 \leq N \leq 40$	1.8
$41 \leq N$	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County
PROJECT: Trail Ridge Landfill
DETAIL: Elastic Settlement at West Toe, use CDM-6

JOB NO: 9012-85238
DATE CHK: 5/2/2013
CHECK BY: SC

COMP BY: J. Wen
DATE: 2/3/2012

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	10	25	99	247.14	1.50	370.7	346.1	5.0	0.002	0.0001
2	10	49	196	490.00	2.10	1029.0	688.5	15.0	0.007	0.0001
3	10	15	58	145.00	1.35	195.8	202.9	25.0	0.012	0.0006
4	10	16	62	155.00	1.35	209.3	216.9	35.0	0.017	0.0008
5	10	17	66	165.00	1.35	222.8	230.8	45.0	0.021	0.0009
6	10	41	162	405.00	2.10	850.5	574.4	55.0	0.026	0.0005
7	10	32	128	320.00	1.80	576.0	452.0	65.0	0.031	0.0007
8	10	36	142	355.00	1.80	639.0	502.1	75.0	0.036	0.0007
9	10	26	104	260.00	1.50	390.0	365.0	85.0	0.040	0.0011
10	10	29	116	290.00	1.50	435.0	407.3	95.0	0.045	0.0011
11	10	9	36	90.00	1.20	108.0	125.1	105.0	0.050	0.0040
12	10	10	40	100.00	1.20	120.0	138.9	115.0	0.054	0.0039
13	10	10	40	100.00	1.20	120.0	138.8	125.0	0.059	0.0042
14	3.5	10	40	100.00	1.20	120.0	138.8	131.8	0.062	0.0016
Total:	133.5	ft							Total Settlement/tsf	0.0202 ft/tsf

Settlement:

t = 0 years δ = **1.8** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_t equals 1.
6. Df = (3.5/2.5)xE + Izx[D-(3.5/2.5)xE]

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 2/3/2012
DETAIL: Elastic Settlement at West Toe, use CDM-5 | **CHECK BY:** SC | **PAGE NO:** 1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference:

1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Assumptions:
- Vertical stress increases are based on Boussinesq stress distribution.
- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)
- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.
- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.
- All split spoon sampling was carried out according to ASTM D1586.
- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions (1)

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
1	10	17	10	5	133.5
2	20	30	10	15	123.5
3	30	13	10	25	113.5
4	40	29	10	35	103.5
5	50	70	10	45	93.5
6	60	39	10	55	83.5
7	70	43	10	65	73.5
8	80	52	10	75	63.5
9	90	29	10	85	53.5
10	100	29	10	95	43.5
11	110	27	10	105	33.5
12	120	8	10	115	23.5
13	130	6	10	125	13.5
14	133.5	45	3.5	131.75	10

133.5

Note:

1. Design SPT N-values are from CDM-5.

2. All depths are in ft below the landfill bottom.

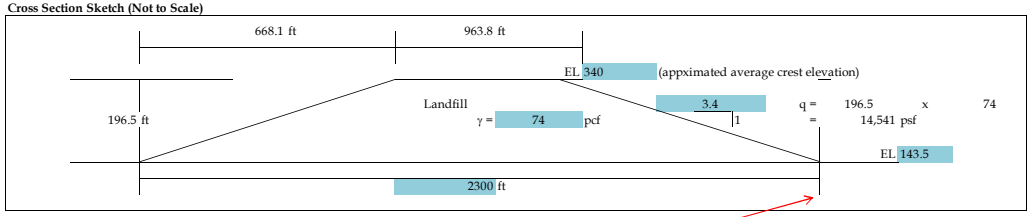
3. Soil below EL 10 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,300	
L/B	4.35	
Z/B	2.74	
Compressible Layer Thickness (H) ft.	133.5	
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.27	
Foundation Load (psf)	14,541	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 668.1 **b= 481.9** **at toe of Landfill, x= 1150**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	-1.563	1.568	0.004	0.001	1.563	0.002
2	15	-1.548	1.562	0.013	0.003	1.548	0.007
3	25	-1.533	1.555	0.022	0.004	1.533	0.012
4	35	-1.518	1.549	0.031	0.006	1.518	0.017
5	45	-1.504	1.543	0.040	0.008	1.504	0.021
6	55	-1.489	1.537	0.048	0.010	1.489	0.026
7	65	-1.474	1.531	0.057	0.012	1.474	0.031
8	75	-1.459	1.525	0.066	0.013	1.459	0.036
9	85	-1.444	1.519	0.075	0.015	1.444	0.040
10	95	-1.430	1.513	0.083	0.017	1.430	0.045
11	105	-1.415	1.507	0.092	0.019	1.415	0.050
12	115	-1.400	1.500	0.100	0.020	1.400	0.054
13	125	-1.386	1.494	0.109	0.022	1.386	0.059
14	131.75	-1.376	1.490	0.114	0.023	1.376	0.062

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	D/E
≤ 10	1.2
11 ≤ N ≤ 20	1.35
21 ≤ N ≤ 30	1.5
31 ≤ N ≤ 40	1.8
41 ≤ N	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	10	17	68	170.00	1.35	229.5	238.0	5.0	0.002	0.0001
2	10	30	122	304.00	1.80	547.2	426.5	15.0	0.007	0.0002
3	10	13	52	130.00	1.35	175.5	181.9	25.0	0.012	0.0007
4	10	29	114	285.00	1.50	427.5	399.5	35.0	0.017	0.0004
5	10	70	278	695.00	2.10	1459.5	983.4	45.0	0.021	0.0002
6	10	39	154	385.00	1.80	693.0	543.0	55.0	0.026	0.0005
7	10	43	172	430.00	2.10	903.0	611.3	65.0	0.031	0.0005
8	10	52	208	520.00	2.10	1092.0	740.9	75.0	0.036	0.0005
9	10	29	116	290.00	1.50	435.0	407.2	85.0	0.040	0.0010
10	10	29	116	290.00	1.50	435.0	407.3	95.0	0.045	0.0011
11	10	27	108	270.00	1.50	405.0	379.3	105.0	0.050	0.0013
12	10	8	30	75.00	1.20	90.0	104.2	115.0	0.054	0.0052
13	10	6	24	60.00	1.20	72.0	83.3	125.0	0.059	0.0071
14	3.5	45	180	450.00	2.10	945.0	649.5	131.8	0.062	0.0003
Total:	133.5	ft							Total Settlement/tsf	0.0190 ft/tsf

Settlement:

t = 0 years δ = **1.7** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.
6. Df = (3.5/2.5)xE + Izx[D-(3.5/2.5)xE]

Settlement Calculation

At West Crest

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 10/6/2011
DETAIL: Elastic Settlement at West Crest use CDM-9 | **CHECK BY:** SC | **PAGE NO:** 1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference: 1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Soil Information: Average

Assumptions: - Vertical stress increases are based on Boussinesq stress distribution.

- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)

- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.

- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.

- All split spoon sampling was carried out according to ASTM D1586.

- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions (1)

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
	0				
1	10	15	10	5	126.5
2	20	26	10	15	116.5
3	30	22	10	25	106.5
4	40	21	10	35	96.5
5	50	39	10	45	86.5
6	60	49	10	55	76.5
7	70	43	10	65	66.5
8	80	35	10	75	56.5
9	90	47	10	85	46.5
10	100	72	10	95	36.5
11	110	79	10	105	26.5
12	120	29	10	115	16.5
13	125.5	58	5.5	122.75	11

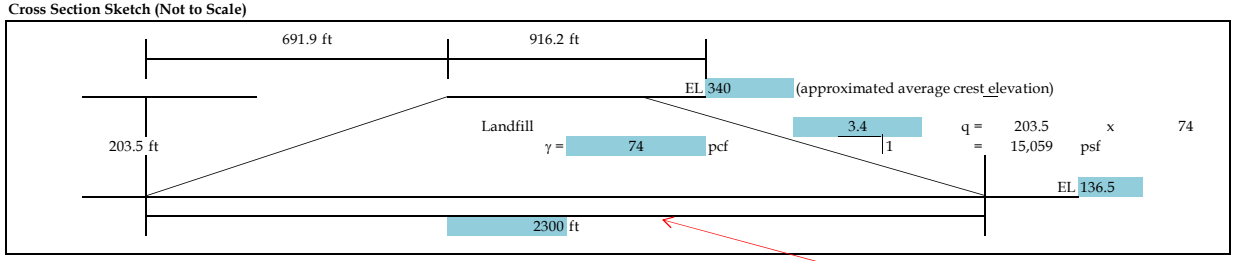
Note:
1. Design SPT N-values are from CDM-9 .
2. All depths are in ft below the landfill bottom.
3. Soil below EL 11 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,280	
L/B	4.39	
Z/B	2.75	
Compressible Layer Thickness (H) ft.	0	(Assume settlements from soil below EL 0 can be ignored and incompressible)
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.53	
Foundation Load (psf)	**15,059**	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 691.9 **b= 458.1** **at Crest of Landfill, x= 458.1**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	0.000	1.565	1.565	0.002	1.564	0.998
2	15	0.000	1.554	1.554	0.007	1.549	0.993
3	25	0.000	1.544	1.544	0.012	1.535	0.989
4	35	0.000	1.533	1.533	0.016	1.520	0.984
5	45	0.000	1.522	1.522	0.021	1.506	0.979
6	55	0.000	1.511	1.511	0.026	1.491	0.975
7	65	0.000	1.500	1.500	0.030	1.477	0.970
8	75	0.000	1.489	1.489	0.035	1.463	0.966
9	85	0.000	1.478	1.478	0.040	1.449	0.961
10	95	0.000	1.467	1.467	0.044	1.434	0.956
11	105	0.000	1.457	1.457	0.049	1.420	0.952
12	115	0.000	1.446	1.446	0.053	1.406	0.947
13	122.75	0.000	1.438	1.438	0.057	1.395	0.944

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	**D/E**
≤ 10	1.2
$11 \leq N \leq 20$	1.35
$21 \leq N \leq 30$	1.5
$31 \leq N \leq 40$	1.8
$41 \leq N$	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County
PROJECT: Trail Ridge Landfill
DETAIL: Elastic Settlement at West Crest use CDM-9

JOB NO: 9012-85238
DATE CHK: May 2 2013
CHECK BY: SC

COMP BY: J. Wen
DATE: 10/6/2011

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	10	15	60	150.00	1.35	202.5	202.5	5.0	0.998	0.0493
2	10	26	102	256.00	1.50	384.0	383.8	15.0	0.993	0.0259
3	10	22	86	215.00	1.50	322.5	322.3	25.0	0.989	0.0307
4	10	21	84	210.00	1.50	315.0	314.7	35.0	0.984	0.0313
5	10	39	155	386.67	1.80	696.0	692.8	45.0	0.979	0.0141
6	10	49	196	490.00	2.10	1029.0	1020.3	55.0	0.975	0.0096
7	10	43	173	433.33	2.10	910.0	900.9	65.0	0.970	0.0108
8	10	35	141	353.33	1.80	636.0	631.1	75.0	0.966	0.0153
9	10	47	189	473.33	2.10	994.0	981.1	85.0	0.961	0.0098
10	10	72	288	720.00	2.10	1512.0	1490.1	95.0	0.956	0.0064
11	10	79	315	786.67	2.10	1652.0	1625.5	105.0	0.952	0.0059
12	10	29	117	293.33	1.50	440.0	438.5	115.0	0.947	0.0216
13	5.5	58	230	575.00	2.10	1207.5	1184.9	122.8	0.944	0.0044
Total:	125.5	ft						Total Settlement/tsf	0.2349	ft/tsf

Settlement:

t = 0 years δ = **21.2** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.
6. Df = (3.5/2.5)xE + Izx[D-(3.5/2.5)xE]

CLIENT:	Duval County	**JOB NO:**	9012-85238	**COMP BY:**	J. Wen
PROJECT:	Trail Ridge Landfill	**DATE CHK:**	May 2 2013	**DATE:**	10/6/2011
DETAIL:	Elastic Settlement at West Crest use Average	**CHECK BY:**	SC	**PAGE NO:**	1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference: 1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Soil Information: Average

Assumptions: - Vertical stress increases are based on Boussinesq stress distribution.

- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)

- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.

- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.

- All split spoon sampling was carried out according to ASTM D1586.

- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions [1]

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
	0				
1	5	26	5	2.5	131.5
2	10	33	5	7.5	126.5
3	15	29	5	12.5	121.5
4	20	11	5	17.5	116.5
5	25	18	5	22.5	111.5
6	30	19	5	27.5	106.5
7	35	25	5	32.5	101.5
8	40	38	5	37.5	96.5
9	45	41	5	42.5	91.5
10	50	35	5	47.5	86.5
11	55	45	5	52.5	81.5
12	60	39	5	57.5	76.5
13	65	37	5	62.5	71.5
14	70	41	5	67.5	66.5
15	75	42	5	72.5	61.5
16	80	46	5	77.5	56.5
17	85	42	5	82.5	51.5
18	90	48	5	87.5	46.5
19	95	54	5	92.5	41.5
20	100	48	5	97.5	36.5
21	105	25	5	102.5	31.5
22	110	27	5	107.5	26.5
23	115	18	5	112.5	21.5
24	120	51	5	117.5	16.5
25	125.5	51	5.5	122.75	11

125.5

Note:

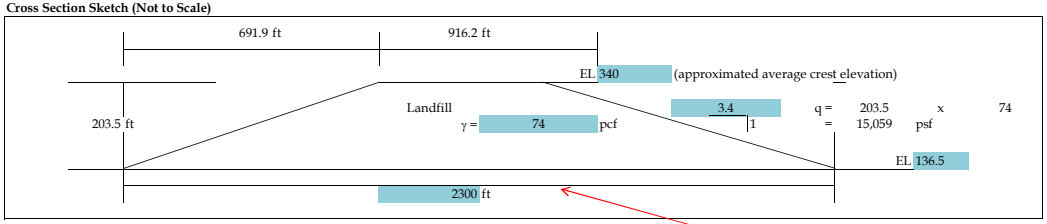
1. Design SPT N-values from average of CDM-5, CDM-6, CDM-9, B-3 and B-16.
2. All depths are in ft below the landfill bottom.
3. Soil below EL 11 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,280	
L/B	4.39	
Z/B	2.75	
Compressible Layer Thickness (H) ft.	125.5	(Assume settlements from soil below EL 0 can be ignored and incompressible)
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.53	
Foundation Load (psf)	**15,059**	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 691.9 | **b= 458.1** | **at Crest of Landfill, x= 458.1**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	0.000	1.565	1.565	0.002	1.564	0.998
2	7.5	0.000	1.563	1.563	0.004	1.560	0.997
3	12.5	0.000	1.557	1.557	0.006	1.553	0.994
4	17.5	0.000	1.552	1.552	0.008	1.546	0.992
5	22.5	0.000	1.546	1.546	0.011	1.538	0.990
6	27.5	0.000	1.541	1.541	0.013	1.531	0.987
7	32.5	0.000	1.535	1.535	0.015	1.524	0.985
8	37.5	0.000	1.530	1.530	0.018	1.517	0.983
9	42.5	0.000	1.524	1.524	0.020	1.509	0.980
10	47.5	0.000	1.519	1.519	0.022	1.502	0.978
11	52.5	0.000	1.514	1.514	0.025	1.495	0.976
12	57.5	0.000	1.508	1.508	0.027	1.488	0.974
13	62.5	0.000	1.503	1.503	0.029	1.481	0.971
14	67.5	0.000	1.497	1.497	0.032	1.474	0.969
15	72.5	0.000	1.492	1.492	0.034	1.466	0.967
16	77.5	0.000	1.486	1.486	0.036	1.459	0.964
17	82.5	0.000	1.481	1.481	0.039	1.452	0.962
18	87.5	0.000	1.476	1.476	0.041	1.445	0.960
19	92.5	0.000	1.470	1.470	0.043	1.438	0.958
20	97.5	0.000	1.465	1.465	0.045	1.431	0.955
21	102.5	0.000	1.459	1.459	0.048	1.424	0.953
22	107.5	0.000	1.454	1.454	0.050	1.417	0.951
23	112.5	0.000	1.449	1.449	0.052	1.410	0.949
24	117.5	0.000	1.443	1.443	0.055	1.403	0.946
25	122.75	0.000	1.438	1.438	0.057	1.395	0.944

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	**D/E**
≤ 10	1.2
11 ≤ N ≤ 20	1.35
21 ≤ N ≤ 30	1.5
31 ≤ N ≤ 40	1.8
41 ≤ N	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County
PROJECT: Trail Ridge Landfill
DETAIL: Elastic Settlement at West Crest use Average

JOB NO: 9012-85238
DATE CHK: May 2 2013
CHECK BY: SC

COMP BY: J. Wen
DATE: 10/6/2011

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	5	26	102	256.15	1.50	384.2	384.2	2.5	0.998	0.0130
2	5	33	132	330.00	1.80	594.0	593.5	7.5	0.997	0.0084
3	5	29	115	286.67	1.50	430.0	429.8	12.5	0.994	0.0116
4	5	11	45	112.50	1.35	151.9	151.9	17.5	0.992	0.0326
5	5	18	72	180.00	1.35	243.0	243.1	22.5	0.990	0.0204
6	5	19	76	190.00	1.35	256.5	256.6	27.5	0.987	0.0192
7	5	25	101	252.50	1.50	378.8	378.4	32.5	0.985	0.0130
8	5	38	153	383.33	1.80	690.0	687.4	37.5	0.983	0.0071
9	5	41	162	405.00	2.10	850.5	845.0	42.5	0.980	0.0058
10	5	35	138	345.00	1.80	621.0	618.0	47.5	0.978	0.0079
11	5	45	179	447.50	2.10	939.8	932.2	52.5	0.976	0.0052
12	5	39	156	390.00	1.80	702.0	697.9	57.5	0.974	0.0070
13	5	37	149	373.33	1.80	672.0	667.7	62.5	0.971	0.0073
14	5	41	164	410.00	2.10	861.0	852.1	67.5	0.969	0.0057
15	5	42	169	422.50	2.10	887.3	877.4	72.5	0.967	0.0055
16	5	46	182	455.00	2.10	955.5	944.2	77.5	0.964	0.0051
17	5	42	166	415.00	2.10	871.5	860.5	82.5	0.962	0.0056
18	5	48	192	480.00	2.10	1008.0	994.5	87.5	0.960	0.0048
19	5	54	217	542.50	2.10	1139.3	1123.1	92.5	0.958	0.0043
20	5	48	193	482.50	2.10	1013.3	998.2	97.5	0.955	0.0048
21	5	25	99	247.50	1.50	371.3	370.1	102.5	0.953	0.0129
22	5	27	107	267.50	1.50	401.3	399.9	107.5	0.951	0.0119
23	5	18	72	180.00	1.35	243.0	243.5	112.5	0.949	0.0195
24	5	51	205	513.33	2.10	1078.0	1058.7	117.5	0.946	0.0045
25	5.5	51	202	505.00	2.10	1060.5	1040.7	122.8	0.944	0.0050
Total:	125.5	ft						Total Settlement/tsf	0.2480	ft/tsf

Settlement:

t = 0 years δ = **22.4** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.
6. Df = (3.5/2.5)xE + Izx[D-(3.5/2.5)xE]

Settlement Calculation

At Center

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 10/6/2011
DETAIL: Elastic Settlement at LF Peak use B-17 | **CHECK BY:** SC | **PAGE NO:** 1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference:

1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Soil Information: use average N-value from all borings on site.

Assumptions:
- Vertical stress increases are based on Boussinesq stress distribution.

- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)

- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.

- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.

- All split spoon sampling was carried out according to ASTM D1586.

- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions (1)

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
	0				
1	10	12	10	5	122
2	20	17	10	15	112
3	30	27	10	25	102
4	40	23	10	35	92
5	50	25	10	45	82
6	60	13	10	55	72
7	70	29	10	65	62
8	80	66	10	75	52
9	90	62	10	85	42
10	100	43	10	95	32
11	110	25	10	105	22
12	119	36	9	114.5	13

119

Note:

1. Design SPT N-values are from B-17.

2. All depths are in ft below the landfill bottom.

3. Soil below EL 13 is assumed incompressible.

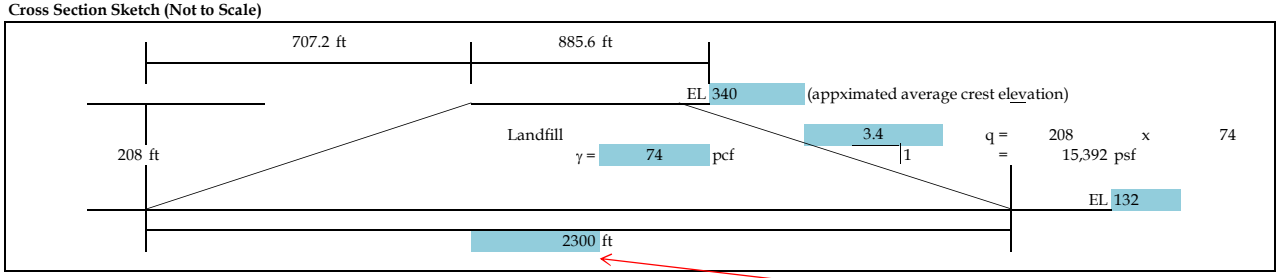
CLIENT:	Duval County	**JOB NO:**	9012-85238	**COMP BY:**	J. Wen
PROJECT:	Trail Ridge Landfill	**DATE CHK:**	May 2 2013	**DATE:**	10/6/2011
DETAIL:	Elastic Settlement at LF Peak use B-17	**CHECK BY:**	SC	**PAGE NO:**	3 of 6

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,280	
L/B	4.39	
Z/B	2.75	
Compressible Layer Thickness (H) ft.	119	
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.70	
Foundation Load (psf)	**15,392**	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 707.2 | **b= 442.8** | **at Center below Landfill, x= 0**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	1.560	1.560	3.119	0.007	0.007	1.000
2	15	1.537	1.537	3.074	0.021	0.021	1.000
3	25	1.514	1.514	3.029	0.035	0.035	1.000
4	35	1.492	1.492	2.984	0.048	0.048	1.000
5	45	1.470	1.470	2.939	0.062	0.062	1.000
6	55	1.447	1.447	2.894	0.076	0.076	1.000
7	65	1.425	1.425	2.850	0.089	0.089	1.000
8	75	1.403	1.403	2.806	0.103	0.103	0.999
9	85	1.381	1.381	2.762	0.116	0.116	0.999
10	95	1.359	1.359	2.719	0.129	0.129	0.999
11	105	1.338	1.338	2.676	0.142	0.142	0.999
12	114.5	1.318	1.318	2.636	0.154	0.154	0.998

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	D/E
≤ 10	1.2
$11 \leq N \leq 20$	1.35
$21 \leq N \leq 30$	1.5
$31 \leq N \leq 40$	1.8
$41 \leq N$	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 10/6/2011
DETAIL: Elastic Settlement at LF Peak use B-17 | **CHECK BY:** SC | **PAGE NO:** 6 of 6

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Depth to Mid Layer (ft)	I [4]	(Iz/D)*Delta Z [5]
1	10	12	49.5	123.75	1.35	167.1	5.0	1.000	0.0599
2	10	17	68.0	170.00	1.35	229.5	15.0	1.000	0.0436
3	10	27	109.7	274.29	1.50	411.4	25.0	1.000	0.0243
4	10	23	90.0	225.00	1.50	337.5	35.0	1.000	0.0296
5	10	25	99.4	248.57	1.50	372.9	45.0	1.000	0.0268
6	10	13	53.3	133.33	1.35	180.0	55.0	1.000	0.0555
7	10	29	114.0	285.00	1.50	427.5	65.0	1.000	0.0234
8	10	66	264.0	660.00	2.10	1386.0	75.0	0.999	0.0072
9	10	62	246.0	615.00	2.10	1291.5	85.0	0.999	0.0077
10	10	43	170.0	425.00	2.10	892.5	95.0	0.999	0.0112
11	10	25	98.0	245.00	1.50	367.5	105.0	0.999	0.0272
12	9	36	142.0	355.00	1.80	639.0	114.5	0.998	0.0141
Total:	119	ft						Total Settlement/tsf	0.3305 ft/tsf

Settlement:

t = 0 years δ = **30.5** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 10/6/2011
DETAIL: Elastic Settlement at LF Peak use Average | **CHECK BY:** SC | **PAGE NO:** 1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference:

1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Soil Information: use average N-value from all borings on site.

Assumptions:
- Vertical stress increases are based on Boussinesq stress distribution.

- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)

- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.

- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.

- All split spoon sampling was carried out according to ASTM D1586.

- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions [1]

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
	0				
1	5	11	5	2.5	127
2	10	27	5	7.5	122
3	15	17	5	12.5	117
4	20	19	5	17.5	112
5	25	18	5	22.5	107
6	30	27	5	27.5	102
7	35	22	5	32.5	97
8	40	32	5	37.5	92
9	45	40	5	42.5	87
10	50	45	5	47.5	82
11	55	46	5	52.5	77
12	60	52	5	57.5	72
13	65	43	5	62.5	67
14	70	57	5	67.5	62
15	75	66	5	72.5	57
16	80	64	5	77.5	52
17	85	47	5	82.5	47
18	90	57	5	87.5	42
19	95	52	5	92.5	37
20	100	34	5	97.5	32
21	105	21	5	102.5	27
22	110	19	5	107.5	22
23	115	37	5	112.5	17
24	119	45	4	117	13

119

Note:

1. Design SPT N-values are from average of CDM-9, CDM-10, B-10, B-17, and B-19.

2. All depths are in ft below the landfill bottom.

3. Soil below EL 13 is assumed incompressible.

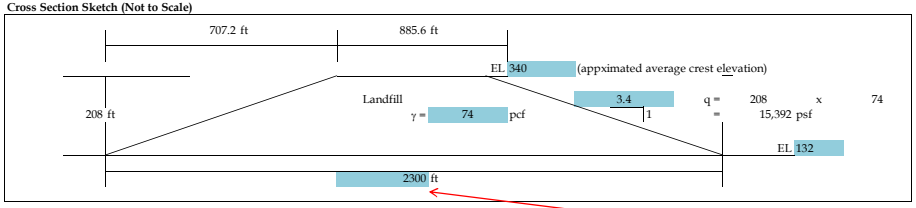
CLIENT:	Duval County	**JOB NO:**	9012-85238	**COMP BY:**	J. Wen
PROJECT:	Trail Ridge Landfill	**DATE CHK:**	May 2 2013	**DATE:**	10/6/2011
DETAIL:	Elastic Settlement at LF Peak use Average	**CHECK BY:**	SC	**PAGE NO:**	3 of 6

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,280	
L/B	4.39	
Z/B	2.75	
Compressible Layer Thickness (H) ft.	119	
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.70	
Foundation Load (psf)	**15,392**	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 707.2 | **b= 442.8** | **at Center below Landfill, x= 0**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	2.5	1.565	1.565	3.130	0.003	0.003	1.000
2	7.5	1.554	1.554	3.108	0.010	0.010	1.000
3	12.5	1.543	1.543	3.085	0.017	0.017	1.000
4	17.5	1.531	1.531	3.063	0.024	0.024	1.000
5	22.5	1.520	1.520	3.040	0.031	0.031	1.000
6	27.5	1.509	1.509	3.018	0.038	0.038	1.000
7	32.5	1.498	1.498	2.995	0.045	0.045	1.000
8	37.5	1.486	1.486	2.973	0.052	0.052	1.000
9	42.5	1.475	1.475	2.950	0.059	0.059	1.000
10	47.5	1.464	1.464	2.928	0.066	0.066	1.000
11	52.5	1.453	1.453	2.906	0.072	0.072	1.000
12	57.5	1.442	1.442	2.883	0.079	0.079	1.000
13	62.5	1.431	1.431	2.861	0.086	0.086	1.000
14	67.5	1.420	1.420	2.839	0.093	0.093	1.000
15	72.5	1.409	1.409	2.817	0.099	0.099	1.000
16	77.5	1.398	1.398	2.795	0.106	0.106	0.999
17	82.5	1.387	1.387	2.773	0.113	0.113	0.999
18	87.5	1.376	1.376	2.751	0.119	0.119	0.999
19	92.5	1.365	1.365	2.730	0.126	0.126	0.999
20	97.5	1.354	1.354	2.708	0.132	0.132	0.999
21	102.5	1.343	1.343	2.687	0.139	0.139	0.999
22	107.5	1.333	1.333	2.665	0.145	0.145	0.998
23	112.5	1.322	1.322	2.644	0.151	0.151	0.998
24	117	1.312	1.312	2.625	0.157	0.157	0.998

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	D/E
≤ 10	1.2
$11 \leq N \leq 20$	1.35
$21 \leq N \leq 30$	1.5
$31 \leq N \leq 40$	1.8
$41 \leq N$	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 10/6/2011
DETAIL: Elastic Settlement at LF Peak use Average | **CHECK BY:** SC | **PAGE NO:** 6 of 6

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Depth to Mid Layer (ft)	I [4]	(Iz/D)*Delta Z [5]
1	5	11	45.1	112.86	1.35	152.4	2.5	1.000	0.0328
2	5	27	109.6	273.89	1.50	410.8	7.5	1.000	0.0122
3	5	17	67.6	168.89	1.35	228.0	12.5	1.000	0.0219
4	5	19	74.9	187.22	1.35	252.8	17.5	1.000	0.0198
5	5	18	72.9	182.22	1.35	246.0	22.5	1.000	0.0203
6	5	27	106.5	266.30	1.50	399.4	27.5	1.000	0.0125
7	5	22	89.8	224.38	1.50	336.6	32.5	1.000	0.0149
8	5	32	129.3	323.13	1.80	581.6	37.5	1.000	0.0086
9	5	40	160.0	400.00	1.80	720.0	42.5	1.000	0.0069
10	5	45	179.3	448.13	2.10	941.1	47.5	1.000	0.0053
11	5	46	182.3	455.71	2.10	957.0	52.5	1.000	0.0052
12	5	52	208.0	520.00	2.10	1092.0	57.5	1.000	0.0046
13	5	43	170.0	425.00	2.10	892.5	62.5	1.000	0.0056
14	5	57	228.0	570.00	2.10	1197.0	67.5	1.000	0.0042
15	5	66	263.0	657.50	2.10	1380.8	72.5	1.000	0.0036
16	5	64	256.0	640.00	2.10	1344.0	77.5	0.999	0.0037
17	5	47	187.0	467.50	2.10	981.8	82.5	0.999	0.0051
18	5	57	226.0	565.00	2.10	1186.5	87.5	0.999	0.0042
19	5	52	206.0	515.00	2.10	1081.5	92.5	0.999	0.0046
20	5	34	137.0	342.50	1.80	616.5	97.5	0.999	0.0081
21	5	21	84.0	210.00	1.50	315.0	102.5	0.999	0.0159
22	5	19	74.0	185.00	1.35	249.8	107.5	0.998	0.0200
23	5	37	146.0	365.00	1.80	657.0	112.5	0.998	0.0076
24	4	45	180.0	450.00	2.10	945.0	117.0	0.998	0.0042
Total:	119	ft					Total Settlement/tsf	0.2518	ft/tsf

Settlement:

t = 0 years δ = **23.3** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.

Settlement Calculation

At East Crest

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 10/6/2011
DETAIL: Elastic Settlement at East Crest use CDM-10 | **CHECK BY:** SC | **PAGE NO:** 1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference: 1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Soil Information: Average

Assumptions: - Vertical stress increases are based on Boussinesq stress distribution.

- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)

- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.

- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.

- All split spoon sampling was carried out according to ASTM D1586.

- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions [1]

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
	0				
1	10	15	10	5	117
2	20	13	10	15	107
3	30	34	10	25	97
4	40	24	10	35	87
5	50	17	10	45	77
6	60	62	10	55	67
7	70	86	10	65	57
8	80	95	10	75	47
9	90	27	10	85	37
10	100	29	10	95	27
11	110	25	10	105	17
12	113	19	3	111.5	14

113

Note:

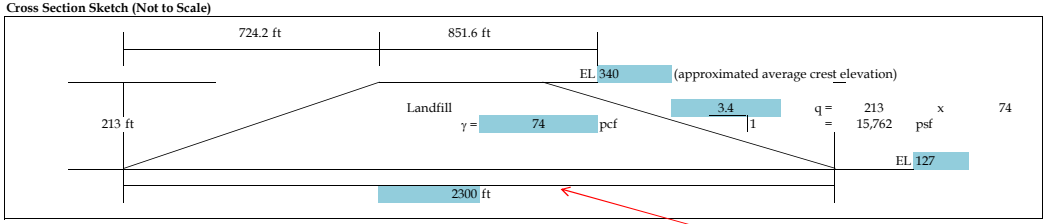
1. Design SPT N-values fromCDM-10
2. All depths are in ft below the landfill bottom.
3. Soil below EL 14 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,280	
L/B	4.39	
Z/B	2.75	
Compressible Layer Thickness (H) ft.	113	(Assume settlements from soil below EL 0 can be ignored and incompressible)
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.88	
Foundation Load (psf)	**15,762**	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 724.2 | **b= 425.8** | **at Crest of Landfill, x= 425.8**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	0.000	1.565	1.565	0.003	1.564	0.998
2	15	0.000	1.553	1.553	0.008	1.550	0.993
3	25	0.000	1.541	1.541	0.013	1.536	0.989
4	35	0.000	1.530	1.530	0.019	1.523	0.985
5	45	0.000	1.518	1.518	0.024	1.509	0.980
6	55	0.000	1.506	1.506	0.030	1.495	0.976
7	65	0.000	1.495	1.495	0.035	1.481	0.971
8	75	0.000	1.483	1.483	0.040	1.468	0.967
9	85	0.000	1.471	1.471	0.046	1.454	0.963
10	95	0.000	1.460	1.460	0.051	1.440	0.958
11	105	0.000	1.448	1.448	0.056	1.427	0.954
12	111.5	0.000	1.441	1.441	0.060	1.418	0.951

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	**D/E**
≤ 10	1.2
11 ≤ N ≤ 20	1.35
21 ≤ N ≤ 30	1.5
31 ≤ N ≤ 40	1.8
41 ≤ N	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County
PROJECT: Trail Ridge Landfill
DETAIL: Elastic Settlement at East Crest use CDM-10

JOB NO: 9012-85238
DATE CHK: May 2 2013
CHECK BY: SC

COMP BY: J. Wen
DATE: 10/6/2011

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	10	15	60	150.00	1.35	202.5	202.5	5.0	0.998	0.0493
2	10	13	52	130.00	1.35	175.5	175.5	15.0	0.993	0.0566
3	10	34	135	338.00	1.80	608.4	606.9	25.0	0.989	0.0163
4	10	24	95	236.67	1.50	355.0	354.6	35.0	0.985	0.0278
5	10	17	66	165.00	1.35	222.8	222.9	45.0	0.980	0.0440
6	10	62	248	620.00	2.10	1302.0	1291.5	55.0	0.976	0.0076
7	10	86	342	855.00	2.10	1795.5	1778.4	65.0	0.971	0.0055
8	10	95	378	945.00	2.10	1984.5	1962.7	75.0	0.967	0.0049
9	10	27	106	265.00	1.50	397.5	396.5	85.0	0.963	0.0243
10	10	29	116	290.00	1.50	435.0	433.8	95.0	0.958	0.0221
11	10	25	100	250.00	1.50	375.0	373.9	105.0	0.954	0.0255
12	3	19	76	190.00	1.35	256.5	257.0	111.5	0.951	0.0111
Total:	113	ft						Total Settlement/tsf	0.2948	ft/tsf

Settlement:

t = 0 years δ = **27.9** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming Ç equals 1.
6. Df = (3.5/2.5)xE + Izx[D-(3.5/2.5)xE]

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 10/6/2011
DETAIL: Elastic Settlement at East Crest use Average | **CHECK BY:** SC | **PAGE NO:** 1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference:

1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Soil Information: Average

Assumptions:
- Vertical stress increases are based on Boussinesq stress distribution.
- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)
- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.
- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.
- All split spoon sampling was carried out according to ASTM D1586.
- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions [1]

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
	0				
1	5	20	5	2.5	122
2	10	16	5	7.5	117
3	15	18	5	12.5	112
4	20	17	5	17.5	107
5	25	25	5	22.5	102
6	30	23	5	27.5	97
7	35	35	5	32.5	92
8	40	50	5	37.5	87
9	45	45	5	42.5	82
10	50	53	5	47.5	77
11	55	61	5	52.5	72
12	60	74	5	57.5	67
13	65	77	5	62.5	62
14	70	71	5	67.5	57
15	75	68	5	72.5	52
16	80	32	5	77.5	47
17	85	31	5	82.5	42
18	90	32	5	87.5	37
19	95	30	5	92.5	32
20	100	17	5	97.5	27
21	105	12	5	102.5	22
22	110	15	5	107.5	17
23	113	15	3	111.5	14

113

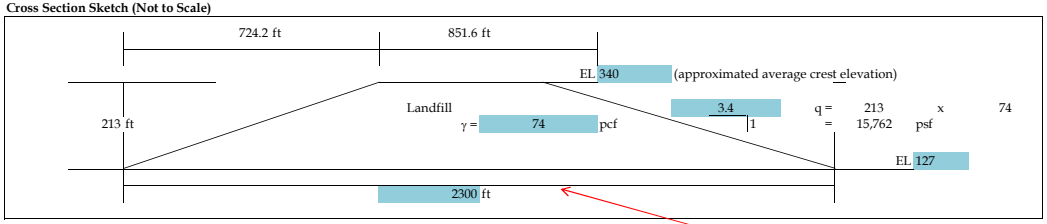
Note:
1. Design SPT N-values from average of CDM-10, B-10 and B-19.
2. All depths are in ft below the landfill bottom.
3. Soil below EL 14 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,280	
L/B	4.39	
Z/B	2.75	
Compressible Layer Thickness (H) ft.	113	(Assume settlements from soil below EL 0 can be ignored and incompressible)
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	7.88	
Foundation Load (psf)	**15,762**	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 724.2 | **b= 425.8** | **at Crest of Landfill, x= 425.8**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	0.000	1.565	1.565	0.003	1.564	0.998
2	7.5	0.000	1.562	1.562	0.004	1.560	0.997
3	12.5	0.000	1.556	1.556	0.007	1.554	0.995
4	17.5	0.000	1.550	1.550	0.009	1.547	0.992
5	22.5	0.000	1.544	1.544	0.012	1.540	0.990
6	27.5	0.000	1.539	1.539	0.015	1.533	0.988
7	32.5	0.000	1.533	1.533	0.018	1.526	0.986
8	37.5	0.000	1.527	1.527	0.020	1.519	0.984
9	42.5	0.000	1.521	1.521	0.023	1.512	0.981
10	47.5	0.000	1.515	1.515	0.026	1.505	0.979
11	52.5	0.000	1.509	1.509	0.028	1.498	0.977
12	57.5	0.000	1.503	1.503	0.031	1.492	0.975
13	62.5	0.000	1.498	1.498	0.034	1.485	0.973
14	67.5	0.000	1.492	1.492	0.036	1.478	0.970
15	72.5	0.000	1.486	1.486	0.039	1.471	0.968
16	77.5	0.000	1.480	1.480	0.042	1.464	0.966
17	82.5	0.000	1.474	1.474	0.044	1.457	0.964
18	87.5	0.000	1.468	1.468	0.047	1.451	0.962
19	92.5	0.000	1.463	1.463	0.050	1.444	0.959
20	97.5	0.000	1.457	1.457	0.052	1.437	0.957
21	102.5	0.000	1.451	1.451	0.055	1.430	0.955
22	107.5	0.000	1.445	1.445	0.057	1.423	0.953
23	111.5	0.000	1.441	1.441	0.060	1.418	0.951
24	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
25	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	**D/E**
≤ 10	1.2
11 ≤ N ≤ 20	1.35
21 ≤ N ≤ 30	1.5
31 ≤ N ≤ 40	1.8
41 ≤ N	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County
PROJECT: Trail Ridge Landfill
DETAIL: Elastic Settlement at East Crest use Average

JOB NO: 9012-85238
DATE CHK: May 2 2013
CHECK BY: SC

COMP BY: J. Wen
DATE: 10/6/2011
PAGE NO: 6 of 6

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	5	20	81	201.43	1.50	302.1	302.1	2.5	0.998	0.0165
2	5	16	63	156.25	1.35	210.9	211.0	7.5	0.997	0.0236
3	5	18	72	178.75	1.35	241.3	241.4	12.5	0.995	0.0206
4	5	17	69	173.13	1.35	233.7	233.8	17.5	0.992	0.0212
5	5	25	98	245.56	1.50	368.3	368.1	22.5	0.990	0.0134
6	5	23	94	234.29	1.50	351.4	351.1	27.5	0.988	0.0141
7	5	35	140	348.75	1.80	627.8	625.8	32.5	0.986	0.0079
8	5	50	202	503.75	2.10	1057.9	1052.1	37.5	0.984	0.0047
9	5	45	181	452.86	2.10	951.0	945.1	42.5	0.981	0.0052
10	5	53	211	526.67	2.10	1106.0	1098.3	47.5	0.979	0.0045
11	5	61	245	612.00	2.10	1285.2	1275.3	52.5	0.977	0.0038
12	5	74	294	735.00	2.10	1543.5	1530.5	57.5	0.975	0.0032
13	5	77	308	770.00	2.10	1617.0	1602.2	62.5	0.973	0.0030
14	5	71	284	710.00	2.10	1491.0	1476.3	67.5	0.970	0.0033
15	5	68	272	680.00	2.10	1428.0	1412.9	72.5	0.968	0.0034
16	5	32	128	320.00	1.80	576.0	571.6	77.5	0.966	0.0084
17	5	31	124	310.00	1.80	558.0	553.5	82.5	0.964	0.0087
18	5	32	126	315.00	1.80	567.0	562.2	87.5	0.962	0.0086
19	5	30	118	295.00	1.50	442.5	441.3	92.5	0.959	0.0109
20	5	17	68	170.00	1.35	229.5	229.9	97.5	0.957	0.0208
21	5	12	46	115.00	1.35	155.3	155.5	102.5	0.955	0.0307
22	5	15	60	150.00	1.35	202.5	202.9	107.5	0.953	0.0235
23	3	15	60	150.00	1.35	202.5	202.9	111.5	0.951	0.0141
Total:	113	ft						Total Settlement/tsf		0.2741 ft/tsf

Settlement:

t = 0 years δ = **25.9** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.

Settlement Calculation

At East Toe

CLIENT:	Duval County	**JOB NO:**	9012-85238	**COMP BY:**	J. Wen
PROJECT:	Trail Ridge Landfill	**DATE CHK:**	May 2 2013	**DATE:**	2/3/2012
DETAIL:	Elastic Settlement at East Toe, use CDM-1 and B-7	**CHECK BY:**	SC	**PAGE NO:**	1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference:

1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Assumptions:

- Vertical stress increases are based on Boussinesq stress distribution.
- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)
- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.
- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.
- All split spoon sampling was carried out according to ASTM D1586.
- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions (1)

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
1	5	9	5	2.5	116
2	10	13	5	7.5	111
3	15	17	5	12.5	106
4	20	29	5	17.5	101
5	25	22	5	22.5	96
6	30	6	5	27.5	91
7	35	35	5	32.5	86
8	40	54	5	37.5	81
9	45	61	5	42.5	76
10	50	89	5	47.5	71
11	55	80	5	52.5	66
12	60	89	5	57.5	61
13	65	93	5	62.5	56
14	70	100	5	67.5	51
15	75	52	5	72.5	46
16	80	40	5	77.5	41
17	85	27	5	82.5	36
18	90	11	5	87.5	31
19	95	13	5	92.5	26
20	100	71	5	97.5	21
21	103.5	65	3.5	101.75	17.5

103.5

Note:

1. Design SPT N-values are from average of CDM-1 and B-7.

2. All depths are in ft below the landfill bottom.

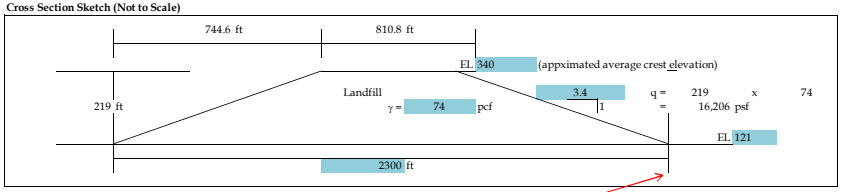
3. Soil below EL 17.5 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,300	
L/B	4.35	
Z/B	2.74	
Compressible Layer Thickness (H) ft.	103.5	
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	8.10	
Foundation Load (psf)	16,206	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 744.6 **b= 405.4** **at toe of Landfill, x= 1150**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	-1.564	1.568	0.004	0.001	1.564	0.002
2	7.5	-1.561	1.566	0.005	0.002	1.561	0.003
3	12.5	-1.554	1.563	0.009	0.003	1.554	0.005
4	17.5	-1.547	1.560	0.012	0.004	1.547	0.007
5	22.5	-1.541	1.556	0.016	0.005	1.541	0.010
6	27.5	-1.534	1.553	0.019	0.006	1.534	0.012
7	32.5	-1.527	1.550	0.023	0.007	1.527	0.014
8	37.5	-1.520	1.547	0.026	0.008	1.520	0.016
9	42.5	-1.514	1.543	0.030	0.009	1.514	0.018
10	47.5	-1.507	1.540	0.033	0.010	1.507	0.020
11	52.5	-1.500	1.537	0.037	0.011	1.500	0.022
12	57.5	-1.494	1.534	0.040	0.012	1.494	0.025
13	62.5	-1.487	1.531	0.044	0.013	1.487	0.027
14	67.5	-1.480	1.527	0.047	0.014	1.480	0.029
15	72.5	-1.474	1.524	0.050	0.015	1.474	0.031
16	77.5	-1.467	1.521	0.054	0.016	1.467	0.033
17	82.5	-1.460	1.518	0.057	0.017	1.460	0.035
18	87.5	-1.454	1.515	0.061	0.018	1.454	0.037
19	92.5	-1.447	1.511	0.064	0.019	1.447	0.039
20	97.5	-1.441	1.508	0.068	0.020	1.441	0.041
21	101.75	-1.435	1.505	0.070	0.021	1.435	0.043

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	D/E
≤ 10	1.2
$11 \leq N \leq 20$	1.35
$21 \leq N \leq 30$	1.5
$31 \leq N \leq 40$	1.8
$41 \leq N$	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County | **JOB NO:** 9012-85238 | **COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill | **DATE CHK:** May 2 2013 | **DATE:** 2/3/2012
DETAIL: Elastic Settlement at East Toe, use CDM-1 and B-7 | **CHECK BY:** SC | **PAGE NO:** 6 of 6

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	5	9	35	87.50	1.20	105.0	122.5	2.5	0.002	0.0001
2	5	13	54	134.00	1.35	180.9	187.6	7.5	0.003	0.0001
3	5	17	67	168.33	1.35	227.3	235.6	12.5	0.005	0.0001
4	5	29	118	294.29	1.50	441.4	412.2	17.5	0.007	0.0001
5	5	22	87	218.33	1.50	327.5	305.9	22.5	0.010	0.0002
6	5	6	25	62.50	1.20	75.0	87.4	27.5	0.012	0.0007
7	5	35	142	354.00	1.80	637.2	497.6	32.5	0.014	0.0001
8	5	54	214	535.00	2.10	1123.5	755.0	37.5	0.016	0.0001
9	5	61	242	605.00	2.10	1270.5	854.7	42.5	0.018	0.0001
10	5	89	357	893.33	2.10	1876.0	1263.3	47.5	0.020	0.0001
11	5	80	318	796.00	2.10	1671.6	1126.9	52.5	0.022	0.0001
12	5	89	357	893.33	2.10	1876.0	1266.0	57.5	0.025	0.0001
13	5	93	370	925.00	2.10	1942.5	1312.3	62.5	0.027	0.0001
14	5	100	400	1000.00	2.10	2100.0	1420.1	67.5	0.029	0.0001
15	5	52	206	515.00	2.10	1081.5	732.1	72.5	0.031	0.0002
16	5	40	158	395.00	1.80	711.0	558.2	77.5	0.033	0.0003
17	5	27	106	265.00	1.50	397.5	371.9	82.5	0.035	0.0005
18	5	11	44	110.00	1.35	148.5	153.8	87.5	0.037	0.0012
19	5	13	50	125.00	1.35	168.8	174.8	92.5	0.039	0.0011
20	5	71	284	710.00	2.10	1491.0	1014.6	97.5	0.041	0.0002
21	3.5	65	260	650.00	2.10	1365.0	929.7	101.8	0.043	0.0002
Total:	103.5	ft						Total Settlement/tsf	0.0057	ft/tsf

Settlement:

t = 0 years δ = **0.6** inches

Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.
6. Df = (3.5/2.5)xE + Izx[D-(3.5/2.5)xE]

CLIENT: Duval County	**JOB NO:** 9012-85238	**COMP BY:** J. Wen
PROJECT: Trail Ridge Landfill	**DATE CHK:** May 2 2013	**DATE:** 2/3/2012
DETAIL: Elastic Settlement at East Toe, CDM-1/10, B-7/10/19	**CHECK BY:** SC	**PAGE NO:** 1 of 6

Purpose: To estimate the amount of elastic settlement of sands under Landfill loading.

Problem: Model foundation settlement due to increase in load on foundation soils.

Reference: 1. Schmertmann, John "Static Cone To Compare Static Settlement Over Sands", Journal of the Soil Mechanics and Foundations Division, ASCE, May 1970.

2. Schmertmann, John; Hartman, John Paul; Brown, Philip, "Improved Strain Influence Factor Diagrams", Journal of the Soil Mechanics and Foundations Division, ASCE, August 1978.

3. USACE, "Engineering Design - Settlement Analysis", EM 1110-1-1904, September 30, 1990.

4. Skempton, A. W. "Standard Penetration Test Procedures and the Effects in Sands of Overburden Pressure, Relative Density, Particle Size, Aging, and Overconsolidation", Geotechnique, Volume 36, No. 3, 1986.

5. Das, "Fundmentals of Geotechnical Engineering", 2000.

6. Bowles, "Foundation Analysis and Design", 5th Edition, 1996.

7. Lunne, Robertson and Powell, "CPT in Geotechnical Practice", 1997.

Assumptions: - Vertical stress increases are based on Boussinesq stress distribution.

- Due to the large size of load comparing with the soil thickness, assume vertical strain is proportional to vertical stress (i.e. 1-D compressibility analyses)

- Stress is calculated by using Boussinesq stress influence factors under a trapezoidal load per Table C-1 in the USACE EM 1110-1-1904.

- Settlement is calculated by using constrained modulus based upon assumed poisson's ratio and Equivalent Modulus from Schmertmann Method.

- All split spoon sampling was carried out according to ASTM D1586.

- Only elastic settlement is considered here, consolidation settlement is ignored due to the minimum amount of clay presented.

Anticipated Subsurface Conditions [1]

Layer	Depth, ft	SPT N-Value	Layer Thickness, ft	Depth to Mid-layer (ft)	Elevation
1	5	13	5	2.5	116
2	10	16	5	7.5	111
3	15	17	5	12.5	106
4	20	27	5	17.5	101
5	25	23	5	22.5	96
6	30	25	5	27.5	91
7	35	47	5	32.5	86
8	40	50	5	37.5	81
9	45	55	5	42.5	76
10	50	77	5	47.5	71
11	55	79	5	52.5	66
12	60	81	5	57.5	61
13	65	82	5	62.5	56
14	70	84	5	67.5	51
15	75	42	5	72.5	46
16	80	35	5	77.5	41
17	85	29	5	82.5	36
18	90	20	5	87.5	31
19	95	15	5	92.5	26
20	100	36	5	97.5	21
21	103.5	32	3.5	101.75	17.5

103.5

Note:

1. Design SPT N-values are from average of CDM-1, CDM-10, B-7, B-10, B-19

2. All depths are in ft below the landfill bottom.

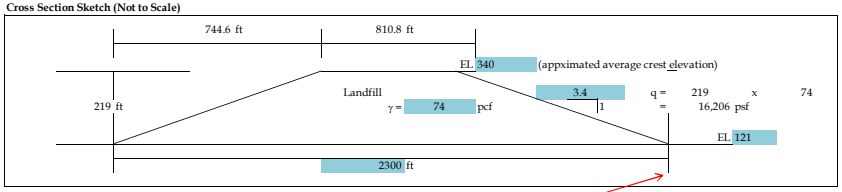
3. Soil below EL 17.5 is assumed incompressible.

Soil Type:	Sand	(See Reference Page)
Depth of Water Table (d) ft.	0	
Depth of Foundation (D) ft.	0	
Length of Foundation (L) ft.	10,000	(long term evaluation; Phases 1, 2 and 3 are also included)
Width of Foundation (B) ft.	2,300	
L/B	4.35	
Z/B	2.74	
Compressible Layer Thickness (H) ft.	103.5	
Existing overburden pressure (tsf)	0.00	(At Foundation Level)
Additional Loading (tsf)	8.10	
Foundation Load (psf)	16,206	(see next sheet for surcharge load calculation)

Boussinesq Vertical Stress Due to Trapezoidal Loading (EM 1110-1-1904, Table C-1)

$$Iz = \frac{1}{\pi a}[a(\alpha + \beta + \alpha') + b(\alpha + \alpha') + x(\alpha - \alpha')]$$

Cross Section Sketch (Not to Scale)



a= 744.6 **b= 405.4** **at toe of Landfill, x= 1150**

Calculations for Each Sub-layer:

Layer #	Depth to Mid-layer (z), ft	β1	β2	β	α	α'	*Iz*
1	5	-1.564	1.568	0.004	0.001	1.564	0.002
2	7.5	-1.561	1.566	0.005	0.002	1.561	0.003
3	12.5	-1.554	1.563	0.009	0.003	1.554	0.005
4	17.5	-1.547	1.560	0.012	0.004	1.547	0.007
5	22.5	-1.541	1.556	0.016	0.005	1.541	0.010
6	27.5	-1.534	1.553	0.019	0.006	1.534	0.012
7	32.5	-1.527	1.550	0.023	0.007	1.527	0.014
8	37.5	-1.520	1.547	0.026	0.008	1.520	0.016
9	42.5	-1.514	1.543	0.030	0.009	1.514	0.018
10	47.5	-1.507	1.540	0.033	0.010	1.507	0.020
11	52.5	-1.500	1.537	0.037	0.011	1.500	0.022
12	57.5	-1.494	1.534	0.040	0.012	1.494	0.025
13	62.5	-1.487	1.531	0.044	0.013	1.487	0.027
14	67.5	-1.480	1.527	0.047	0.014	1.480	0.029
15	72.5	-1.474	1.524	0.050	0.015	1.474	0.031
16	77.5	-1.467	1.521	0.054	0.016	1.467	0.033
17	82.5	-1.460	1.518	0.057	0.017	1.460	0.035
18	87.5	-1.454	1.515	0.061	0.018	1.454	0.037
19	92.5	-1.447	1.511	0.064	0.019	1.447	0.039
20	97.5	-1.441	1.508	0.068	0.020	1.441	0.041
21	101.75	-1.435	1.505	0.070	0.021	1.435	0.043

Soil Type:		
Soil	***q_c/N***	***Descrpition***
Silt Sand to Sandy Silt	3	Combination of silts, sandy silts, slightly cohesive sand-silts.
Sand to Silty Sand	4	Silty sands
Sand	5	Clean to slightly silty sands.

From "CPT in Geotechnical Practice", by Lunne, Robertson and Powell.

Where: q_c = Average Dutch Cone Resistance
N = SPT N value

Strain Condition:		
Strain	***Es/qc***	***Descrpition***
Axisymmetric	2.5	L/B = 1
Plane	3.5	L/B > 10

SPT N-value (bpf)	D/E
≤ 10	1.2
11 ≤ N ≤ 20	1.35
21 ≤ N ≤ 30	1.5
31 ≤ N ≤ 40	1.8
41 ≤ N	2.1

Recommended D/E ratio based upon poisson's ratio suggested from:
1: Das, Fundmentals of Geotechnical Engineering
2. Bowles, Foundation Analysis and Design

CLIENT: Duval County
PROJECT: Trail Ridge Landfill
DETAIL: Elastic Settlement at East Toe, CDM-1/10, B-7/10/19

JOB NO: 9012-85238
DATE CHK: May 2 2013
CHECK BY: SC

COMP BY: J. Wen
DATE: 2/3/2012
PAGE NO: 6 of 6

Layer	Delta Z (ft)	Average SPT N-value [1]	Corrected qc (tsf) [2]	Schmertmann's Es (tsf) [3]	D/Es Ratio [2]	Constrained Modulus D (tsf) [2]	Factored Df under Slopes and Toe Df (tsf) [6]	Depth to Mid Layer (ft)	I [4]	(Iz/Df)*Delta Z [5]
1	5	13	53	133.33	1.35	180.0	186.7	2.5	0.002	0.0001
2	5	16	65	161.54	1.35	218.1	226.1	7.5	0.003	0.0001
3	5	17	66	165.38	1.35	223.3	231.5	12.5	0.005	0.0001
4	5	27	107	266.67	1.50	400.0	373.5	17.5	0.007	0.0001
5	5	23	91	226.92	1.50	340.4	317.9	22.5	0.010	0.0002
6	5	25	101	253.33	1.50	380.0	355.0	27.5	0.012	0.0002
7	5	47	187	466.67	2.10	980.0	657.9	32.5	0.014	0.0001
8	5	50	199	496.50	2.10	1042.7	700.7	37.5	0.016	0.0001
9	5	55	220	549.44	2.10	1153.8	776.2	42.5	0.018	0.0001
10	5	77	306	765.45	2.10	1607.5	1082.5	47.5	0.020	0.0001
11	5	79	314	785.83	2.10	1650.3	1112.5	52.5	0.022	0.0001
12	5	81	322	805.00	2.10	1690.5	1140.8	57.5	0.025	0.0001
13	5	82	327	817.50	2.10	1716.8	1159.7	62.5	0.027	0.0001
14	5	84	336	840.00	2.10	1764.0	1192.9	67.5	0.029	0.0001
15	5	42	167	417.50	2.10	876.8	593.5	72.5	0.031	0.0003
16	5	35	141	352.50	1.80	634.5	498.2	77.5	0.033	0.0003
17	5	29	116	290.00	1.50	435.0	407.0	82.5	0.035	0.0004
18	5	20	78	195.00	1.35	263.3	272.6	87.5	0.037	0.0007
19	5	15	59	147.50	1.35	199.1	206.2	92.5	0.039	0.0010
20	5	36	144	360.00	1.80	648.0	510.0	97.5	0.041	0.0004
21	3.5	32	127	316.67	1.80	570.0	448.8	101.8	0.043	0.0003
Total:	103.5	ft							Total Settlement/tsf	0.0049 ft/tsf

Settlement:

t = 0 years δ = **0.5** inches

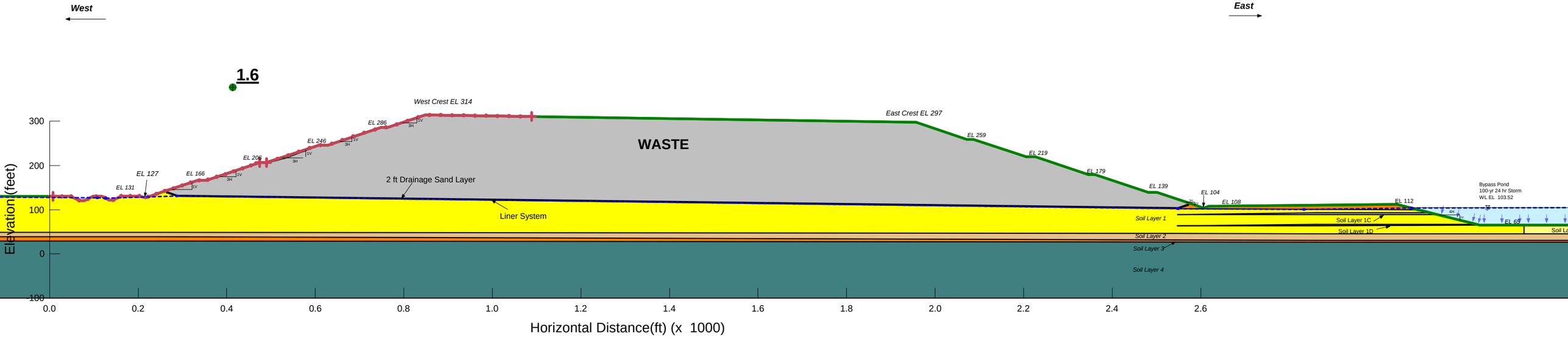
Notes:

1. Refer to boring information for average N values (not corrected).
2. Refer to reference page for values.
3. Schmertmann SPT-correlations modified by Ladd, Es = average equivalent modulus over depth z for foundation type.
4. I obtained from stress influence diagram.
5. Represents the settlement attributed to each layer assuming C_1 equals 1.
6. Df = (3.5/2.5)xE + Izx[D-(3.5/2.5)xE]

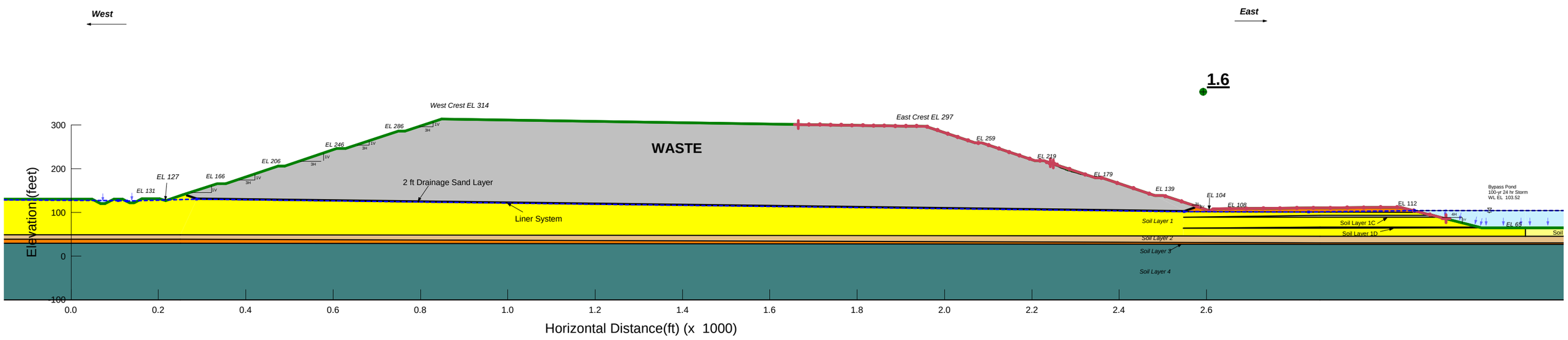
Attachment E

Slope Stability Analyses

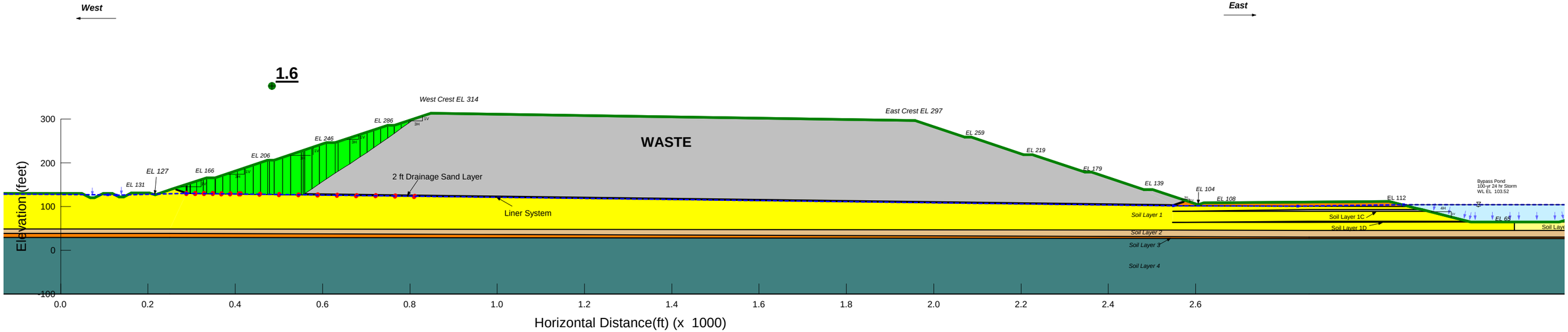
Trail Ridge Landfill Expansion
Slope Stability Analyses - North Section



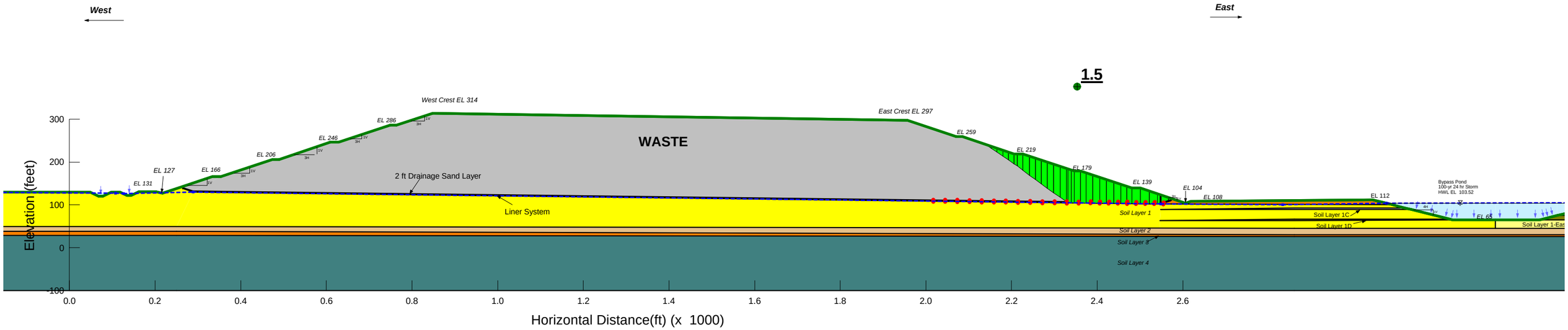
Trail Ridge Landfill Expansion
Slope Stability Analyses - North Section



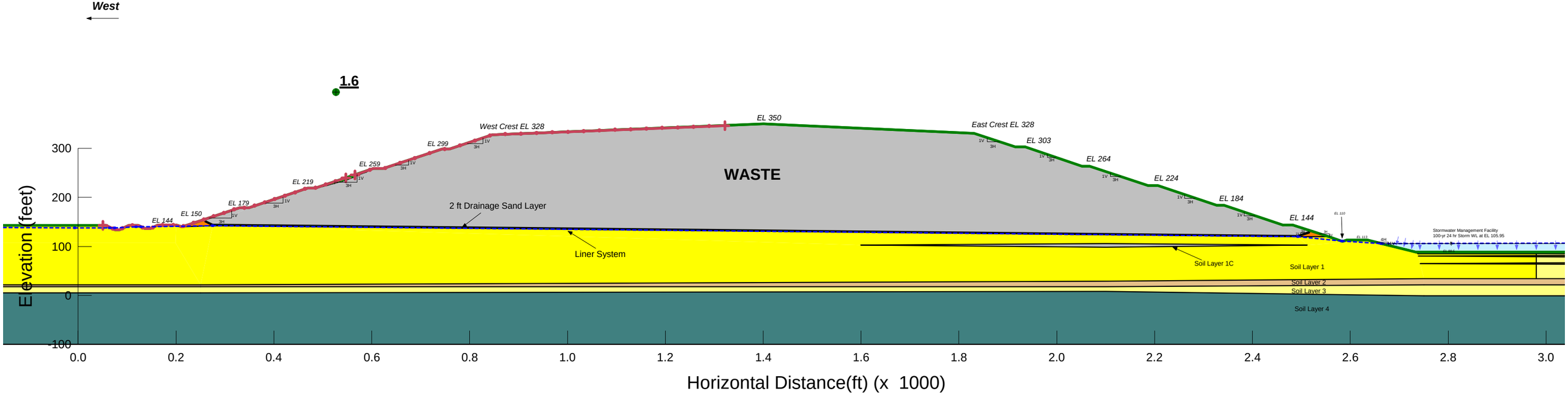
Trail Ridge Landfill Expansion
Slope Stability Analyses - North Section



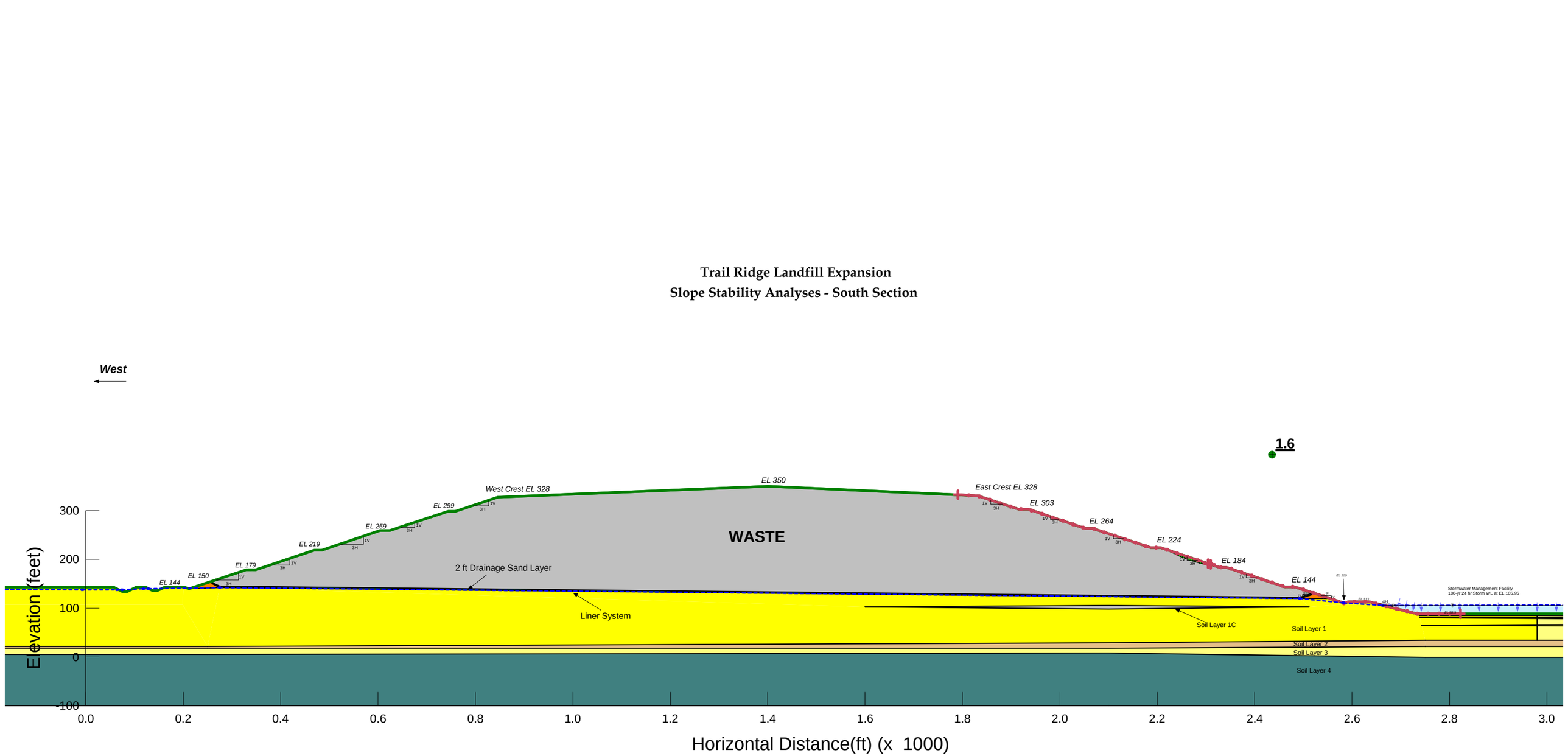
Trail Ridge Landfill Expansion
Slope Stability Analyses - North Section



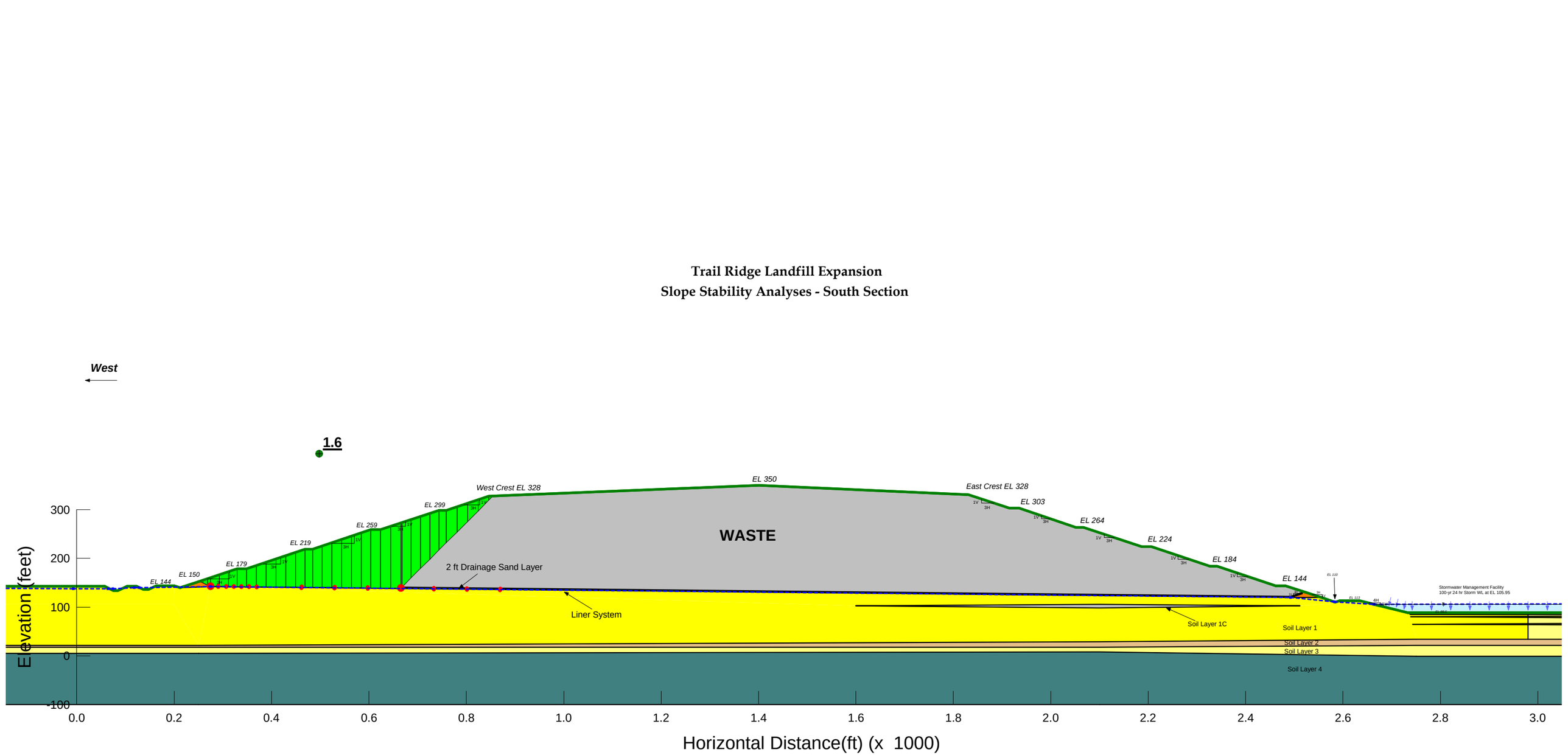
Trail Ridge Landfill Expansion
Slope Stability Analyses - South Section



Trail Ridge Landfill Expansion
Slope Stability Analyses - South Section



Trail Ridge Landfill Expansion
Slope Stability Analyses - South Section



Trail Ridge Landfill Expansion
Slope Stability Analyses - South Section

