Geotechnical Engineering
Since 1976
Drilling Services
Materials Testing

December 18, 2015

File #15-234

Report of Preliminary Geotechnical Exploration
Escambia County Jail Site
Escambia County, Florida

FOR: Mr. Cooper Saunders
Senior Project Coordinator
Escambia County
3363 West Park Place
Pensacola, Florida 32541

TABLE OF CONTENTS

1.0 INTRODUCTION

This report forwards the results of our preliminary geotechnical exploration for the proposed **Escambia County Jail Site** in Escambia County, Florida. The purpose of this preliminary geotechnical exploration was to determine the general subsurface conditions in the proposed building and stormwater pond areas and use this information to provide general comments, evaluate concerns, and make preliminary recommendations for the consideration of future development. Our exploration consisted of eight requested Standard Penetration Test borings, classification of the samples obtained in the field, laboratory testing of selected soil samples, and analysis by our engineering staff.

2.0 SITE AND PROJECT CONDITIONS

The site is located northeast of the intersection of St. Mary Avenue and North Pace Boulevard in Pensacola, Florida. We understand that the project includes a new building to be located in an existing grassy open area west of the existing jail and a stormwater pond located south of the proposed building in an existing asphalt parking lot area. We understand that the proposed building is in the preliminary planning stages and could be up to 75 feet tall. If this information changes or is incorrect, our office should be notified, and changes to our preliminary recommendations may be needed.

3.0 SUBSURFACE EXPLORATION

Our preliminary exploration consisted of eight Standard Penetration Test (SPT) borings drilled 26 and 76 feet below grade at the time of drilling. The SPT consists of driving a 2-inch diameter split spoon sampler into the ground using a 140-pound hammer dropped 30 inches. The number of blows required to drive the sampler one foot after seating it six inches is referred to as the blow count or “N” value and is a measure of the relative density of soils. “N” values can be found in **Figure #2** adjacent to the soil descriptions. The borings were drilled in general accordance with ASTM D1586 using a truck mounted drill rig. The building borings (B-1 to B-4) were advanced between sampling using solid stem flight auger in the upper 16 feet of the borings and the “mud” jetting technique with a Bentonite drilling mud was used between SPT samples to the final boring depth thereafter. The stormwater pond borings were advanced between sampling using solid stem flight auger. Five SPT and/or hand auger/probe samples were taken in the top 11 feet, and the borings were SPT sampled at five-foot intervals thereafter. The hand auger and probing was performed in some borings due to utility concerns. Each sample was removed from the sampler, classified in the field by the driller, and packaged for visual classification by our engineering staff and for laboratory testing.

4.0 SUBSURFACE CONDITIONS

Boring locations are shown in the attached **Figure #1** and should be considered approximate. The borings were located in the field using the provided boring location plans, existing property lines and site features, and estimating right angles. The subsurface conditions encountered in the borings are shown in **Figure #2**, and descriptions of the soils encountered are accompanied by their Unified Classification symbol (SP, SM, etc.) based on a visual examination unless accompanied by laboratory results. Boundaries between soil layers and soil depths should be considered approximate, since the actual transition between soil layers may be gradual. The following is a generalized summary of the subsurface conditions encountered in the test

borings. A detailed description of the subsurface conditions encountered in the borings can be found on **Figure #2.**

4.1 Building Area Soil Conditions Summary

The building borings (B-1 to B-4) generally encountered 3-6 inches of surficial brown/dark brown and orange loose and very loose slightly silty and silty sand with some gravel and roots underlain by generally tan and orange loose and very loose slightly silty sand and silty sand soils to a depth of 11-19 feet. Thereafter, the borings continued with layers of mostly orange, tan, and white medium dense sand, slightly silty sand, or silty sand to a depth of 27-54 feet where the soils become dense to very dense to the final boring depth of 79 feet. Some thin layers of white sandy clay were encountered in the samples at 50-60 feet in borings B-2 and B-3 and a 3.5 foot thick layer of very stiff clay was encountered in boring B-4 at 65.5 feet.

4.2 Stormwater Pond Area Soil Conditions Summary

The stormwater pond borings (B-5 to B-8) encountered predominately orange and tan very loose or loose slightly silty sand to a depth of 6.5-12 feet underlain by orange and red very loose to dense silty sand extending to a depth of 14-21 feet followed by orange and white medium dense sand or slightly silty sand to the final boring depth of 26 feet. Boring B-6 encountered layers of purple, gray, and tan slightly clayey silty sand from 18-21 feet.

4.3 Groundwater Conditions Summary

Because of the drilling method used and the substantial depth of the groundwater, an accurate determination of groundwater levels was difficult at the time of drilling. We attempted to record stabilized groundwater levels at various times after drilling by leaving the boreholes open, but most of the borings collapsed. We were able to record a stabilized groundwater level at the time of drilling in boring B-4 at 37 feet below existing grade. We also evaluated the groundwater levels based on visual inspection of the samples, the results of the boring logs, and our experience in this area. Groundwater was generally recorded/estimated at roughly 37 feet below grade. Note that the borings were drilled during a moderately low rainfall period and seasonal high groundwater levels could be several feet higher.

5.0 LABORATORY TEST RESULTS

Laboratory testing for this project consisted of three falling head permeability tests and corresponding grainsize analysis tests run on the Shelby tube samples obtained from a borehole adjacent to boring B-8. Additional wash #200 and moisture content tests were also run on selected split spoon samples. The results of the laboratory tests are shown on the logs of boring (**Figure #2**) adjacent to the samples tested. The results of the falling head permeability tests are summarized in the following **Table #1**. The results of the grainsize analysis tests are attached as **Figure #3**. Note that the two lower samples had lower than normal unit weights and higher than normal conductivity rates which indicates that the samples were disturbed.

Table #1: Permeability Test Results Summary

Boring	Sample Depth (ft)	Sample Description	Dry Unit Weight (pcf)	Saturated Vertical Hydraulic Conductivity (K_{vs}) (ft/day)	Percent Fines
B-8	5.5-6.5	Orange/Tan Slightly Silty Sand with some roots	101.6	13.4	11.5
B-8	17-18	Orange Sand	92.9	163.7	3.1
B-8	22-23	Orange/White Sand	92.0	116.9	3.7

6.0 DISCUSSION AND PRELIMINARY RECOMMENDATIONS

6.1 Basis of Preliminary Recommendations

Preliminary recommendations rendered herein are based on assumed and/or available information available at the time of this report, the subsurface conditions encountered in the test borings, commonly accepted Geotechnical Engineering principles and practices, and our experience with similar soil/groundwater conditions. Should the project information differ from the information used in this report, our office should be notified and retained so that this preliminary report can be modified as needed.

Regardless of the care exercised in performing a preliminary Geotechnical Exploration, the possibility always exists that soil and/or groundwater conditions between the test borings will differ from those encountered at the specific boring locations. In addition, construction operations may alter the soil conditions. Therefore, it is recommended that a representative from Larry M. Jacobs & Associates, Inc. (LMJ) be involved throughout the design and construction phases addressed in this report, and the final foundation design should take into consideration the specific project details including but not limited to structural loading and grading. The spacing of borings for our preliminary exploration was well over the normal spacing for structures (100 feet), and additional borings will be needed to provide for a competent design of any structures.

6.2 General Comments and Concerns

The building site is suited for shallow or deep foundations. Shallow foundations (footings) will require significant compactive improvement of the soil to increase bearing capacity and decrease settlement of the structure(s). The site will be suitable for moderate bearing values and best suited for shallow foundations with light to moderate building loads. Deep foundations (piles) could be used if the building is heavily loaded. Piles are preliminarily estimated to bear 60 feet below existing grade.

The pond area borings encountered moderately well draining soils to a depth of 6.5-12 feet over slow draining soils extending to a depth of 14-21 feet underlain with well draining soils to the final boring depth of 26 feet. Shallow, long, and narrow ponds and swales would have moderate outflow capacities. A large pond would require a sand chimney extending to a depth of 20-25 feet.

6.3 Preliminary Foundation Recommendations

The upper 12+ feet of the borings encountered loose and very loose conditions. For a relatively light to moderately loaded building up to 2-4 stories with probably primarily load bearing walls, a shallow foundation design (footings) would be practical. The upper loose soils could be compacted with a large vibratory roller run at or below the bottom of footing elevation to increase the allowable bearing capacity and reduce potential settlements. Based on the conditions encountered in the preliminary borings, an allowable net bearing capacity of **2,000-2,500 psf** can be assumed for a preliminary evaluation of foundation alternatives.

If the proposed building is to be built to near the maximum allowable height of 75 feet, then shallow footing design may not be practical due to the greater building loadings. In this case, a pile supported foundation would be recommended. The to date borings encountered conditions suitable for pile design and installation with expected pile lengths on the order of 60 feet below existing grades. Auger Cast-in-Place (ACIP) piles are typically the most economical in this application due to the required pile length, the soil conditions encountered in the borings, and can be installed with little noise and vibration. Allowable individual pile loads of **80-100 tons** can be used for a preliminary evaluation of foundation alternatives.

After specific design information such as structural loading and grading is firmed up, additional borings and laboratory testing would be needed for determining the design allowable net bearing capacity and required compaction efforts, or to make design recommendations for pile foundations. We anticipate an approximate spacing of roughly 100 feet between borings.

6.4 Preliminary Stormwater Pond Recommendations

We understand that a stormwater pond is planned along the south end of the site. Borings B-4 to B-8 were drilled near the planned pond location, and these borings generally encountered moderately well draining soils to a depth of 6.5-12 feet below existing grade. The preliminary estimated vertical hydraulic conductivity rate for this upper layer is roughly 12 feet/day. The upper soils were underlain by poorly draining silty sand soils. These silty sand soils are expected to have a low permeability rate of less than 1 foot/day and will restrict downward flow of the water from shallow ponds. These conditions are suitable for long, shallow, narrow ponds or swales.

At 14-21 feet below existing grade extending to the final boring depth of 26 feet, the borings encountered high permeability sand and slightly silty sand soils which are expected to have a preliminary estimated vertical conductivity rate of 40 feet/day, which is the maximum design rate allowed by the Water Management District. Due to the seasonal high groundwater levels being estimated near ±35 feet below grade, these conditions are suitable for increased stormwater disposal from a large pond using a sand chimney. The chimney would be expected to extend to on the order of 20-25 feet below existing grade. Additional borings and laboratory permeability testing on undisturbed samples would be needed for stormwater pond permitting and design, depending upon the actual configuration, location and size of the pond(s).

6.5 Environmental Concerns Discussion

Laboratory chemical testing for the soil samples or groundwater was not included as part of this preliminary scope, but the boring samples did not appear to have any observable environmental indicators (petroleum smell, debris in the borings, etc.). As with all significant developments, we recommend performing a Phase 1 Environmental Site Analysis (ESA). LMJ provides this service and would be please to offer a proposal if desired.

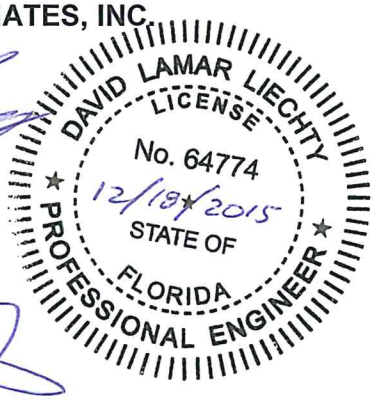
6.6 Preliminary Seismic Discussion

In general, the site's seismic potential is low. Based on International Building Code (IBC) maps, the maximum considered earthquake ground motion for a 0.2 and 1 second spectral response are 0.1g (S_s) and 0.05g (S_1), respectively. Based on the 2006 International Building Code Table 1613.5.2 and our experience in this area, the soils at the site can be classified as "Class D".

We hope that this report provides sufficient information for your current requirements. If you have any questions or comments, please do not hesitate to call.

Sincerely,

LARRY M. JACOBS & ASSOCIATES, INC.

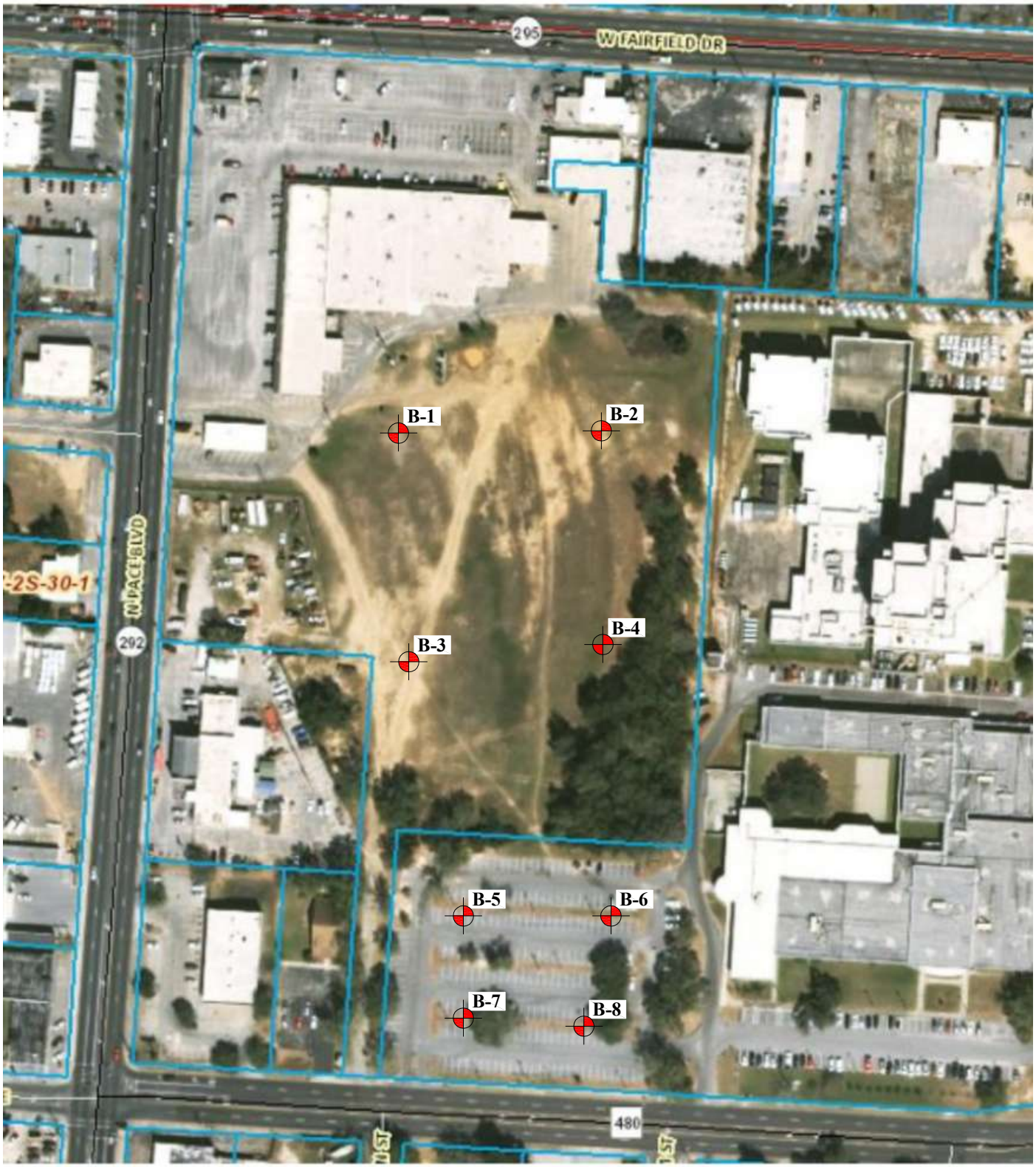


David L. Liechty, PE
Project Engineer
Florida Reg. #64774

Larry M. Jacobs, PE
Principal Geotechnical Engineer
Florida Reg. #19690

Attachments

BORING LOCATION PLAN



STANDARD PENETRATION TEST BORING
ALL BORING LOCATIONS ARE APPROXIMATE

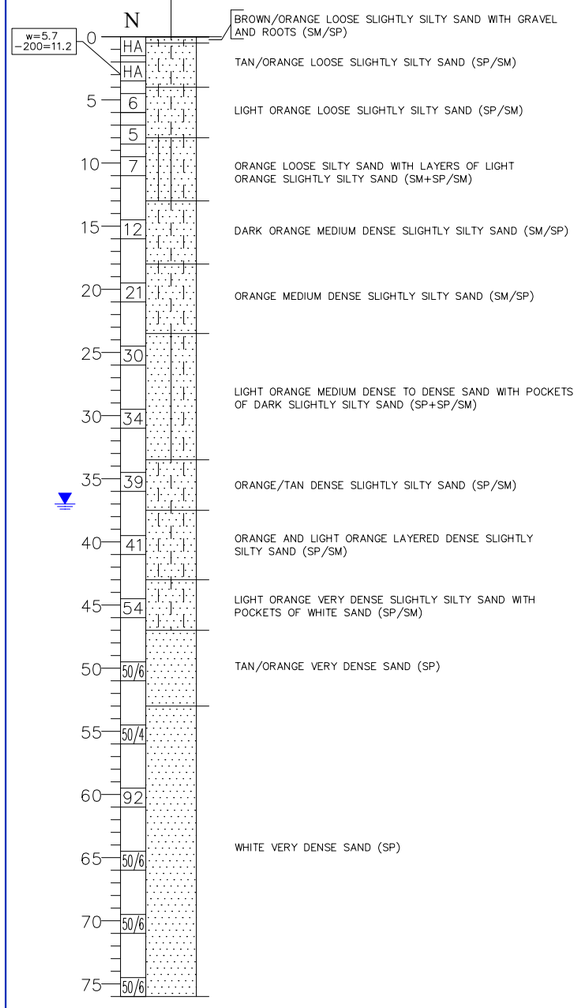
Project #: 15-232	**Scale: NTS**
Date: 12/18/2015	**Checked By: DLL**
Project: **Escambia County Jail Site**	
Location: **Escambia County, Florida**	

Geotechnical Engineering
Drilling Services
Materials Testing

Figure #2a

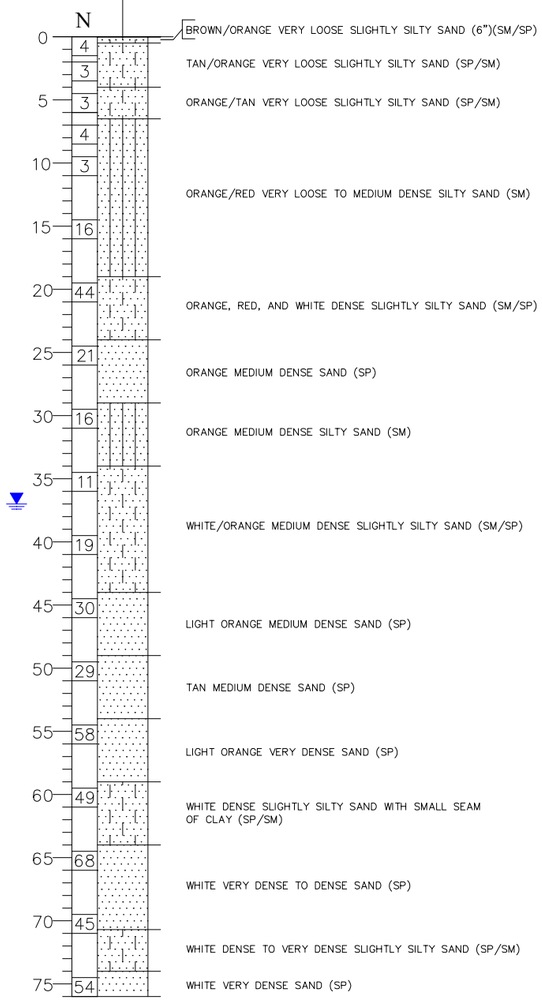
BORING LOGS

B-1
12-07-15

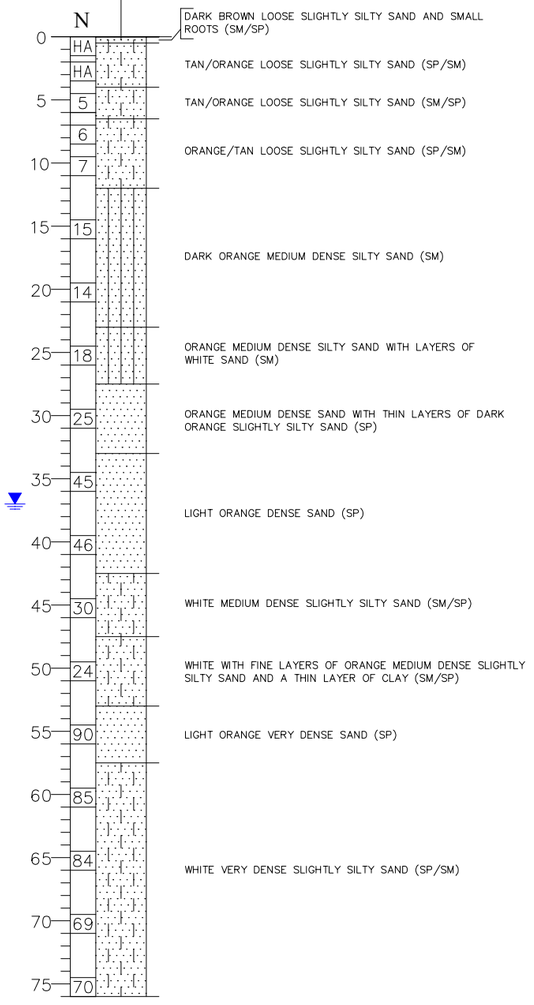


DEPTH (IN)	PROBE (IN)
0	3
6	2
12	2
18	4
24	3
30	3
36	3
42	5

B-2
12-08-15

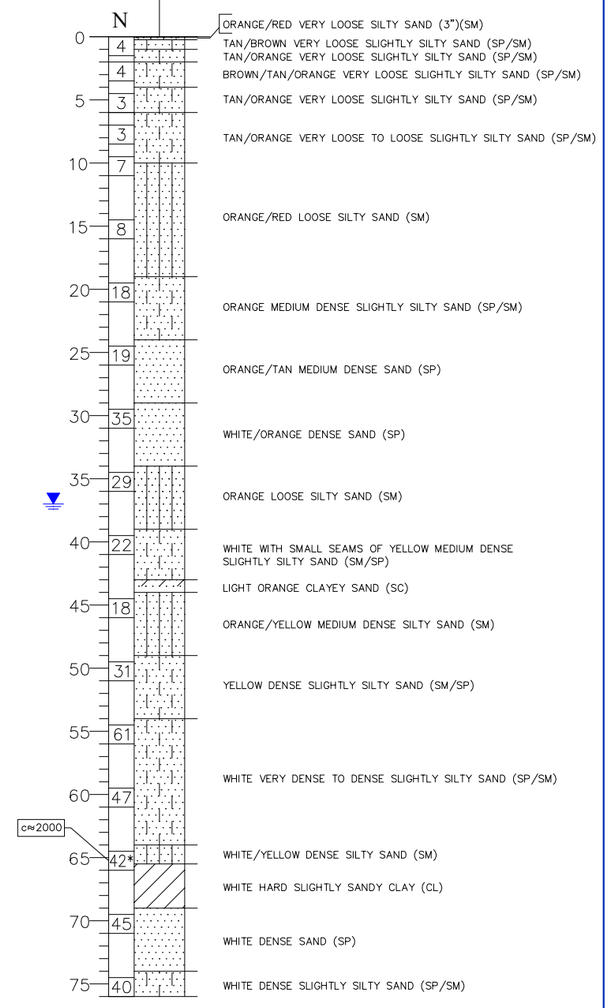


B-3
12-08-15



DEPTH (IN)	PROBE (IN)
0	3
6	3
12	3
18	3
24	3
30	2
36	3
42	2

B-4
12-07-15



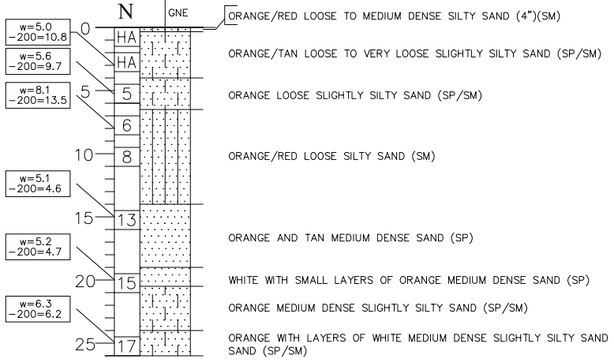
*HAMMER BLOWS:
65 FT SAMPLE: 18/28/14

Project #: 15-234	**Scale: NTS**
Date: 12/16/2015	**Checked By: DLL**
Project: Escambia County Jail Site	
Location: Escambia County, Florida	

Geotechnical Engineering
Drilling Services
Materials Testing

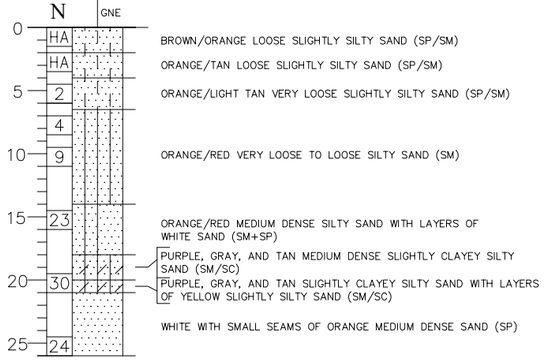
BORING LOGS

B-5
12-04-15



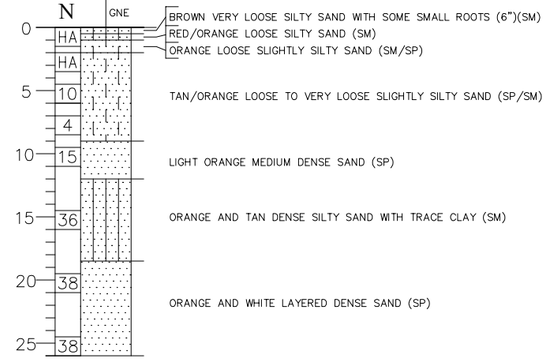
DEPTH (IN)	PROBE (IN)
0	2
6	1
12	1
18	3
24	6
30	6
36	12

B-6
12-09-15



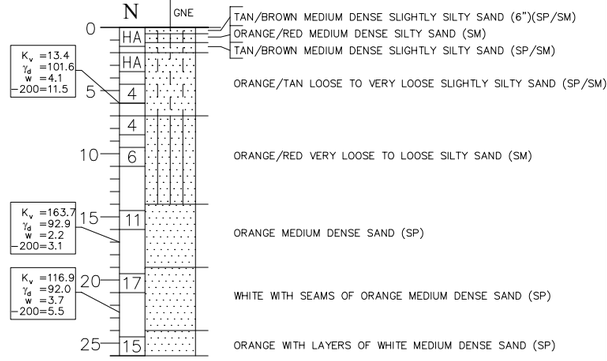
DEPTH (IN)	PROBE (IN)
0	2
6	2
12	2
18	3
24	3
30	4
36	3
42	4

B-7
12-04-15



DEPTH (IN)	PROBE (IN)
0	6
6	3
12	3
18	3
24	4
30	3
36	2
42	1

B-8
12-09-15



DEPTH (IN)	PROBE (IN)
0	1
6	2
12	1
18	2
24	2
30	3
36	4
42	4

NOTE: SHELBY TUBE SAMPLES WERE TAKEN IN A BOREHOLE ADJACENT TO THE BORING AT 4–6.1 FT, 16–18 FT, AND 21–23 FT.

Project #: 15-234 **Scale: NTS**

Date: 12/16/2015 **Checked By: DLL**

Project: **Escambia County Jail Site**

Location: **Escambia County, Florida**

Geotechnical Engineering
Drilling Services
Materials Testing

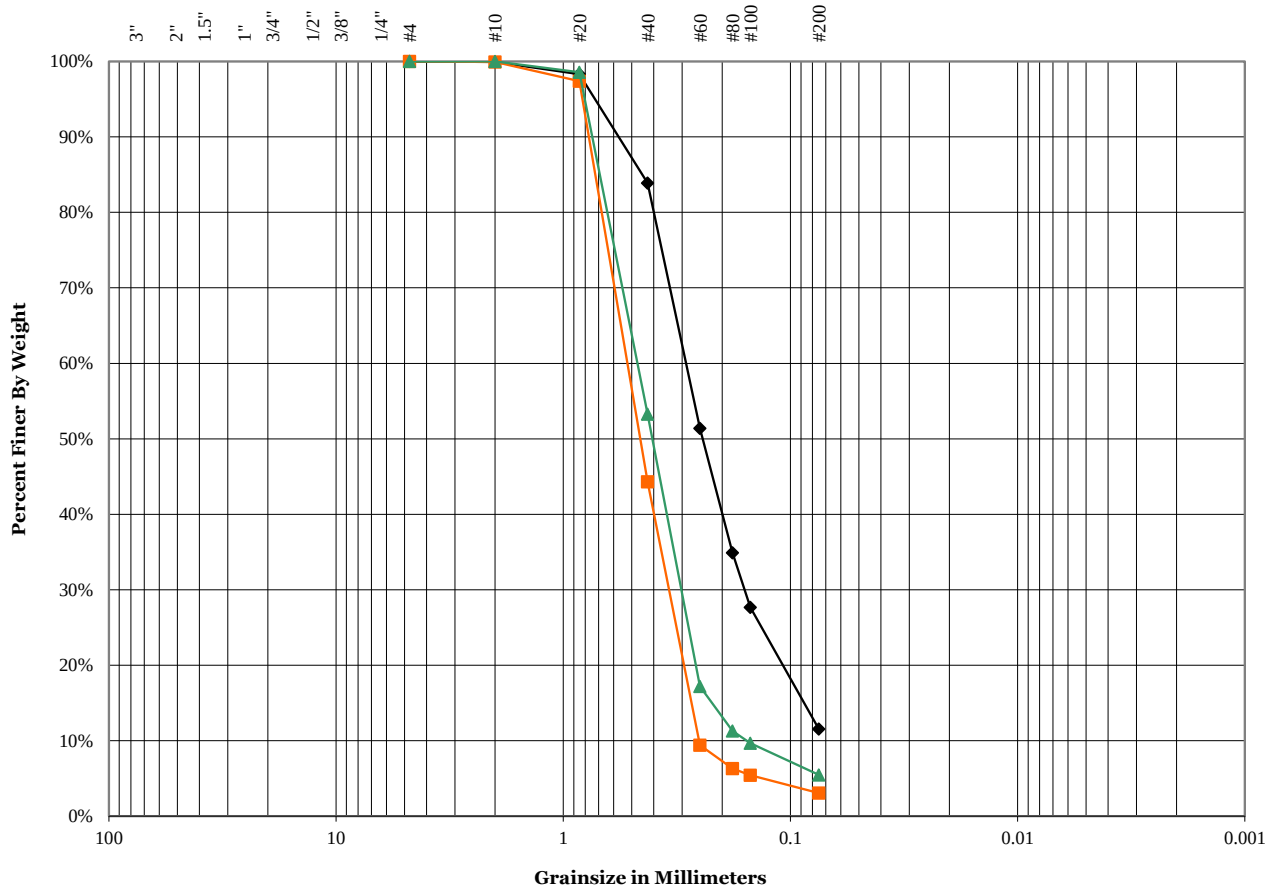
Geotechnical Engineering
Since 1976
Drilling Services
Materials Testing

Client: Escambia County Public Works
Project: Escambia County Jail Site
Location: Escambia County, Florida

Figure #: 3
Project #: 15-234
Date: 12/16/15
Engineer: DLL

Grainsize Analysis - ASTM C136/AASHTO T27

Sample #	Depth (ft)	Soil Description
◆ B-2/UD	5.5-6.5	Orange/Brown Slightly Silty Sand w/ Some Long Roots
■ B-8/UD	17-18	Red/Orange/Tan/Gray Sand
▲ B-8/UD	22-23	Red/Orange/White/Tan Sand



GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

328 E Gadsden St. ▼ Pensacola, Florida 32501 ▼ 850-434-0846 ▼ Fax 850-433-7027 ▼ www.lmj-a.com