LEGACY
ENGINEERING, INC

LEGACY ENGINEERING, INC
6424 BEACH BOULVARD
JACKSONVILLE, FL 32216

904-721-1100 OFFICE
904-722-1100 FAX

July 16, 2012

Mr. Shawn Starr
Dreambuilder Custom Homes, LLC
905 Mineral Creek Drive
Jacksonville, Florida 32225

RE: Report of Geotechnical Exploration
Proposed Kane Residence
2701 Ocean Drive South
Jacksonville Beach, Florida
Legacy Project No. 12-1067.1

Dear Shawn:

Legacy Engineering, Inc. has completed a geotechnical exploration for the subject site. The work was performed in general accordance with our proposal dated June 20, 2012. The exploration was performed to evaluate the general subsurface conditions within the site of the proposed residence. Recommendations for site preparation and earthwork as well as deep foundation recommendations for the proposed residence are included in this report.

PROJECT INFORMATION

Project information was provided to us by you in our telephone conversations and emails. We were provided with copies of the architectural plans prepared by Wakefield Beasley & Associates. We were also provided with a copy of the site survey which was prepared by Richard Miller & Associates. We understand that Mr. Lou Pontigo, P.E. will be the structural engineer for the project. Based on our discussions, we understand that the construction will include a three-level, pile supported structure. The home will be supported on auger-grouted pile. The home will be constructed primarily off-grade, with the garage being the only area constructed with a slab on grade. The home will be wood framed with a wood framed roof section.

Prior to performing the field work we visited the site to observe the existing site conditions. Based on our site observations the previously existing house structure that existed at the site had been demolished and removed, however, the existing pool at the east side of the site was still present. Based on our conversations with you it is our understanding that the existing pool will also be demolished and removed from the site prior to construction of the proposed residence.

The site is located at 2701 Ocean Drive South in Jacksonville Beach, Florida. The existing site is cleared, with some grass and weeds present. At the time of our drilling there was standing water present on the property at the edge of the right of way along Ocean Drive South. The existing site elevations appear to range from approximately EL 8 on the west side of the site to approximately EL 11 just west of the existing pool. The site slopes upward beginning just west of the existing pool. It is anticipated that approximately up to 3 feet of site fill will be utilized to achieve the desired site elevations. It should be noted that there are existing residential structures located to both the north and south of the existing lot.

As noted above, we understand that the construction will include a pile supported structure with a structural grade beam system. It is our understanding that the first floor will have an elevation of EL 17.1 (Based on NAVD). No specific requirements for pile load information have been provided as of yet. It is our understanding that the proposed scour elevation for this site has been established at EL 5.0.

GEOTECHNICAL EXPLORATION

The subsurface exploration was performed on June 28, 2012. During the exploration, two (2) standard penetration test (SPT) borings (ASTM D1586) were performed at the site of the proposed residence to depths of 50 feet below the existing ground surface. The soil borings were performed at the locations indicated on the attached Field Exploration Plan. The borings were performed utilizing the truck mounted drilling equipment.

Soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory for further evaluation. The soils were all visually classified by a geotechnical engineer using the Unified Soil Classification System (USCS) in general accordance with ASTM D2487. A Key to Soil Classification sheet is included in the attachments of this report.

A total of ten (10) samples were tested in the laboratory for percent moisture and fines content. The laboratory tests were performed on these selected samples to aid in the classification of the soils. The results of these tests are included in the attachments of this report as the Summary of Laboratory Test Data.

GEOTECHNICAL FINDINGS

The major subsurface soil stratifications encountered during this geotechnical exploration are outlined below. More detailed descriptions of the subsurface materials encountered are provided on the attached test boring records. When reviewing the boring records and the subsurface conditions outlined below, it should be understood that the subsurface conditions **will** vary across the site.

General Soil Profiles - The SPT borings performed in the proposed building areas typically encountered very loose to firm fine sands (SP) to approximate depths of 11 feet **below the ground surface level (bgsl)**. Below these depths, firm to dense fine sands (SP) containing some shell and shell fragments (10 to 15% shell content) were encountered to depths ranging from 21 to 26.5 feet **bgsl**. A layer of firm to very dense fine sands (SP) and/or slightly silty fine sands (SP-SM) was then encountered to depths of 31.5 feet **bgsl**. A layer of loose to very firm slightly silty (SP-SM) to silty (SM) fine sands containing few to some shell were then encountered to depths ranging from 36.5 to 37 feet **bgsl**. Dense to very dense fine sands (SP) containing some shell was then encountered at depths ranging from 41 (at boring B2) to 47 (at boring B1) feet **bgsl**. Boring B1 encountered a layer of loose fine sands (SP) with some silt and shell fragments from depths of 47 feet to the boring termination depths of 50 feet **bgsl**. Boring B2 encountered very dense fine sands (SP) at depths of 41 to 47 feet bgsl, underlain with very firm slightly silty fine sands (SP-SM) with shell fragments extending to the boring termination depth of 50 feet **bgsl**.

A copy of the Generalized Soil Profile (GSP) is also included in the attachments of this report. The GSP provides an overall general visual presentation of the existing subsurface soil conditions encountered at the boring locations.

Groundwater Levels - Groundwater was encountered at each of the boring locations at approximate depths ranging from of the existing ground surface to a depth of 1 foot **bgsl** following a period of at least 24 hours after drilling. It should be noted that periods of heavy rainfall had occurred prior to performing the drilling work at the site. The groundwater levels at this site should be expected to fluctuate due to seasonal climatic variations, changes in surface water runoff patterns across the site, construction activity, and other interrelated site-specific factors such as tidal influences.

GEOTECHNICAL RECOMMENDATIONS

Our recommendations for site preparation and foundation support are based on (1) our site observations, (2) the field and laboratory test data obtained, and (3) our understanding of the project information and structural conditions as presented in the report.

If the conditions referenced in our report are incorrect or should the location of the proposed residential structure be changed, please contact us so that we can review our recommendations. Also, the discovery of any site or subsurface conditions during construction, which deviate from the data obtained during this geotechnical exploration, should also be reported to us for our evaluation.

The recommendations presented in the subsequent sections of this report present design and construction techniques, which are appropriate for the proposed construction. We recommend that we be provided the opportunity to review the project specific foundation and earthwork specifications to verify that our recommendations have been properly interpreted and implemented. Recommendations for general site preparation and earthwork, deep foundations, and for the project pavement and hardscape areas are provided below.

Site Preparation and Earthwork Recommendations – Site preparation as outlined in this section should be performed to provide more uniform subgrade conditions and to reduce the potential for post-construction settlements of the proposed building, hardscape and pavement areas.

Clearing and Stripping – Following the demolition and removal of the existing pool structure and the associated decking, the clearing of the site including the surficial grasses and topsoil should be removed from within the proposed structure and hardscape areas plus a minimum of 5 feet beyond the limits of the building areas and 3 feet beyond the limits of the pavement/hardscape areas. These areas should be stripped and cleared of all surface vegetation, including grass, roots, debris, topsoil or other deleterious materials. During the grubbing operations, all roots with a diameter greater than 0.5-inch, stumps, or small roots encountered in a concentrated state, should be grubbed and completely removed. Based on our site observations and testing performed, it should be anticipated that few to little topsoil materials (i.e., topsoil and grasses) and/or surficial soils containing roots or deleterious materials will have to be removed from the proposed building and hardscape areas.

Compaction of Existing Soils, Structural Backfill and Fill Soils – After removal of the existing pool structure, the former pool area exposed soils should be compacted prior to any backfilling. Following the clearing and stripping the proposed construction areas, the existing very loose surficial soils (prior to any filling or backfilling) should also be compacted.

Due to the potential for damages due to vibrations, vibratory compaction with large (or heavy) vibratory rollers should **not** be used within 50 feet of any adjacent or existing structures. Since there are existing structures located to the north and south within 50 feet of the proposed structure, the larger vibratory

rollers **cannot** be utilized due to the potential damages due to vibration. However, if they are used, compaction operations could be performed with the use of the vibratory rollers in the static mode.

Due to the restrictions on the use of vibratory rollers, we are recommending that the existing soils, structural fill and backfill soils be compacted utilizing tracked equipment, or smaller vibratory compaction equipment including small vibratory rollers such as walk-behind drum rollers, vibratory sled/plate compactors and/or jumping jack type compacting equipment.

The compaction of the exposed soils in both the pool and site areas should continue until density values of at least 95 percent of the Modified Proctor maximum dry density (ASTM D 1557) have been achieved within the upper 12 inches of the existing soils.

After compaction of the existing soils is completed, any required structural backfill and fill soils should be placed in loose lifts and compacted with the same type of compaction equipment referenced above. Where track-mounted compaction equipment is used, the structural backfill/fill should be placed in loose, level lifts not exceeding 6 inches in thickness. Where lightweight, hand operated or walk-behind compaction equipment is used, any required structural backfill/fill should be placed in level lifts not exceeding 6 inches in thickness.

Structural Fill and Backfill - Structural fill/backfill is typically defined as non-plastic, inorganic, granular soil having less than 10 percent material passing the No. 200 mesh sieve and containing less than 4 percent organic material. Typically, the material should exhibit moisture contents within +/- 2 percent of the Modified Proctor optimum moisture content (ASTM D 1557) during the compaction operations. Compaction should continue until densities of at least 95 percent of the Modified Proctor maximum dry density (ASTM D 1557) have been achieved within each lift of the compacted structural fill.

If the existing and/or fill/backfill materials should become unstable and/or begin to yield and/or pump excessively during the compaction operations due to excessive moisture contents, all compaction operations should be stopped until the moisture content of the pumping soils is reduced to allow for further compaction, or the moist/pumping soils be replaced with dry structural fill materials.

Deep Foundation Design Recommendations – Due to the potential for scouring (loss of existing site soils) during large storm events, the proposed residential structure is to be supported on a deep foundation system (i.e., piling). The proposed scour elevation for this site has been established at EL 5. Since the proposed first floor slab will be at an approximate elevation of EL 17.1, the anticipated exposed pile length would be approximately 12 feet.

As noted above, the soil borings encountered various layers of firm to very dense fine sands and fine sands with shell and shell fragments which will provide excellent pile support. Based on the soil borings and the provided information, we are recommending that the deep foundation system be installed to a **minimum** elevation of EL –10. Based on the proposed site grades of approximately EL 12, the anticipated pile lengths would be approximately 22 feet long.

Auger-Grouted Piles – Based on the results of our field and laboratory testing, it is our recommendation that the proposed structure can be supported on auger-grouted piles when installed to the minimum depths listed above. We have provided a table listing the recommended auger-grouted pile sizes and capacities based on our pile analysis. The table listed below lists the pile diameter, allowable pile capacity (tons), allowable pile uplift (tons) and the maximum lateral shear force which can be applied to the top of the pile to produce a 1-inch deflection. These capacity values are based on an assumed scour condition of El

5, which equals approximately 7 vertical feet of soil loss. The listed allowable pile capacities are based on factors of safety of 2 and 3 for the skin friction and end bearing components respectively. Please understand that the allowable pile capacity is a function of the structural strength and integrity of the pile and the strength of the supporting soils. The grout utilized to construct the auger-grouted pile should have a **minimum** 28-day compressive strength of 4,000 pounds per square inch (PSI).

Steel Reinforcement for Piles - Steel reinforcement should be installed in each of the auger-grouted piles to resist the pile shear and bending forces and to resist the tensile (uplift) forces in the piles. It is recommended that full-length steel reinforcement be placed in each pile to resist the uplift forces. We would recommend that the minimum size of the tension steel should be a No. 5 bar. The actual size of the full-length bar should be determined by the structural engineer. A cage consisting of steel reinforcement should be installed in each of the piles to resist the shear and bending forces in the piles. The number of bars, the size of the steel reinforcement and the length of the steel should be determined by the structural engineer.

Pile Group Effects - We would also recommend that the minimum pile spacing to pile diameter ratio (S/D) of 3.0 be utilized. If this minimum S/D ratio is utilized, we would anticipate that any capacity reductions due to the group effects of the individual piles which are installed in groups or in close proximity to each other should be small, and therefore should be considered as insignificant in the design of the piles.

PILE DESIGN RECOMMENDATIONS

Pile Diameter (in)	Allowable Capacity (tons)	Allowable Uplift (tons)	Max Lateral Shear Force (kips)
12	20	5	2.25
14	28	6.5	3.50
16	35	8	4.50

Notes – Capacities shown above are based on an assumed scour depth elevation of El 5.

Pile Settlement – If the piles are installed to the minimum depths and spacings as listed above, we are anticipating that at the design load of the pile that the measured pile settlement of any individual pile should be on the order of 0.5 inches or less. These settlement estimates are based on the use of (1) the field test data obtained during our field exploration, and (2) our past project experience and previous pile load test data with similar pile systems in similar soil conditions.

Construction and Installation of Auger-Grouted Piles - Auger-grouted piles are formed by rotating a continuous, hollow-flight auger to the desired pile tip elevation, and then slowly withdrawing the auger from the borehole while pumping a fluid "mortar like" grout mixture under pressure through the hollow auger. The auger tip should be equipped with cutting teeth that can penetrate the underlying soils to the proposed pile depths. The auger should be restrained within a framework or leads that will support the auger and keep the auger aligned while drilling. The auger power-unit should have adequate torque to turn or spin the auger to the proposed depth without stalling out or reaching refusal.

The pressure of the grout at the tip of the auger should be of sufficient pressure to fill the pile shaft/void created by the auger tip during the drilling and auger withdrawal process and to prevent "necking" or the reduction of the pile shaft area due to the lateral forces of the soils. The pressure of the grout should also

be of sufficient pressure such that the grout will flow outward along the perimeter of the pile shaft area as the auger is withdrawn. A pressure head within the grout column of at least 10 feet should be maintained at all times during the auger withdrawal and pumping process. Sudden drops in the grout pressure tend to indicate zones of soft or loose soils. If sudden drops in grout pressure are encountered, the grouting process should be continued at the soft/loose soil zone until the grout pressure is re-established. After the pile is grouted to the ground surface, a pile top form should be installed at the ground surface to prevent adjacent soils from contaminating the grout in the grout column. The steel reinforcement should then be installed through the top of the pile to the specified depths. Centralizers or spacers should be utilized to maintain the proper concrete coverage over the steel reinforcement.

Auger-grouted piles located within 6 pile diameters (center to center) should not be installed until the grout in the adjacent pile has reached its initial set. Initial set typically occurs within 8 to 12 hours for these types of grout. By allowing the grout to sufficiently harden before installing an adjacent pile helps to reduce the possibility of damaging the adjacent pile and/or the loss of grout from the adjacent pile during the augering/withdrawal process.

Quality Control Testing of Auger-Grouted Piles – Since the installation of the auger-grouted piles is very critical to the quality and integrity of the piles, we would recommend that a representative of our firm be present during the installation of the piles to monitor and verify that the piles are installed properly. The monitoring would include the following:

1. Verify that the piles are installed at the correct locations and to the specified depths.
2. Monitor the auger withdrawal rate/process and grouting operations to verify that a sufficient grout pressure head is maintained during the construction of the pile.
3. Record the volume of grout utilized to construct the pile.
4. Obtain samples of the grout utilized to construct the pile for compressive strength testing. Provide results of compressive strength tests at ages of 7 and 28 days of age.
5. Monitor the installation of the steel reinforcement and verify that the size, length and configuration of the steel conform to the project specifications.
6. Provide a written summary of the pile installation.

Pavement, Driveway and Hardscape Design and Construction Recommendations – A stable pavement subgrade is very important to the anticipated design life of a pavement and/or the pavement performance. The loose surficial soils encountered at this site are considered poor subgrade materials due to their low bearing capacity. Prior to constructing any pavement or hardscape areas that may receive any wheeled traffic, we would strongly recommend that the upper 12 inches of subgrade soils be stabilized to meet a minimum limerock bearing ratio (LBR) of 30. Increasing the stability of the subgrade soils will help to prolong the design life of the pavement section. The stabilized subgrade soils should be compacted to a minimum of 98 percent of the maximum laboratory density as determined by the Modified Proctor test (ASTM D1557).

It is anticipated that concrete pavement will be utilized for the driveway/parking areas. We would recommend that a minimum concrete thickness of 5 inches be utilized for the concrete pavement section. Adequate jointing (frequency and location of the joints) of the concrete pavement section should also be incorporated into the pavement design. The maximum joint spacing in feet should not exceed two and a half times (2.5x) the concrete thickness in inches. The concrete pavement/hardscape slab sections should be as "square" as possible and irregular shaped concrete slabs or odd joint angles should be avoided. The concrete utilized for the driveway areas should have a minimum 28-day compressive strength of 3000

PSI. Traffic and/or wheeled loads should not be permitted on the concrete areas until the compressive strength of the concrete obtains at least 70 percent of the design strength.

Quality Control Testing – We would recommend that Legacy be retained to perform the construction materials testing and observations required for this project and to verify that our recommendations have been satisfied. Due to our familiarity with the project, we believe that we would be the most qualified to address problems that may arise during construction.

A representative number of field in-place density tests (i.e., compaction tests) should be made in the existing surficial soils, in each lift of compacted fill material and in any backfilled soils in the proposed building and/or pool areas. In-place density tests should also be made in the subgrade materials for the proposed pavement areas.

The density tests are considered necessary to verify that satisfactory compaction operations have been performed. We recommend density testing be performed at (1) one location for each 2,500 square feet (SF) of building area for the existing soils and for each lift of compacted fill (minimum of 3 tests per lift), (2) at least one test for each lift of backfilled soils for any trench areas, and (3) at least one test for each 2,500 SF of compacted subgrade for pavement and hardscape areas.

CLOSURE

This report has been prepared for the exclusive use of the client, for specific application to the proposed construction. Our services have been rendered using generally accepted standards of geotechnical engineering practice in the State of Florida. No other warranty is expressed or implied. Our firm is not responsible for the interpretations, conclusions, opinions, or recommendations of others based on the data contained herein. We note that the assessment of environmental conditions for the presence of pollutants in the soil, or groundwater at the site was beyond the scope of the exploration. Our scope of services does not address geological conditions such as sinkholes or soil conditions existing below the depth of the soil borings.

We appreciate the opportunity to be of service as your geotechnical consultant on this phase of the project. If you have any questions regarding this report, or if we may be of further service, please contact us.

Respectfully submitted,
LEGACY ENGINEERING, INC.

JOHN ELLSWORTH ELLIS II LICENSE No. 45202 STATE OF FLORIDA PROFESSIONAL ENGINEER

7/16/2

John E. Ellis, II, P.E.
Licensed, Florida No. 45202

JEE/dfh
w/attachments
cc: client
Mr. Lou Pontigo, P.E.

ATTACHMENTS

SITE LOCATION PLAN

FIELD EXPLORATION PLAN (FEP)

KEY TO SOIL CLASSIFICATION

TEST BORING RECORDS

GENERALIZED SOIL PROFILE

SUMMARY OF LABORATORY TEST RESULTS

FIELD AND LABORATORY PROCEDURES

SITE LOCATION PLAN

Reference

Plan Created Using Google Earth

Field Exploration Plan

2701 Ocean Drive South

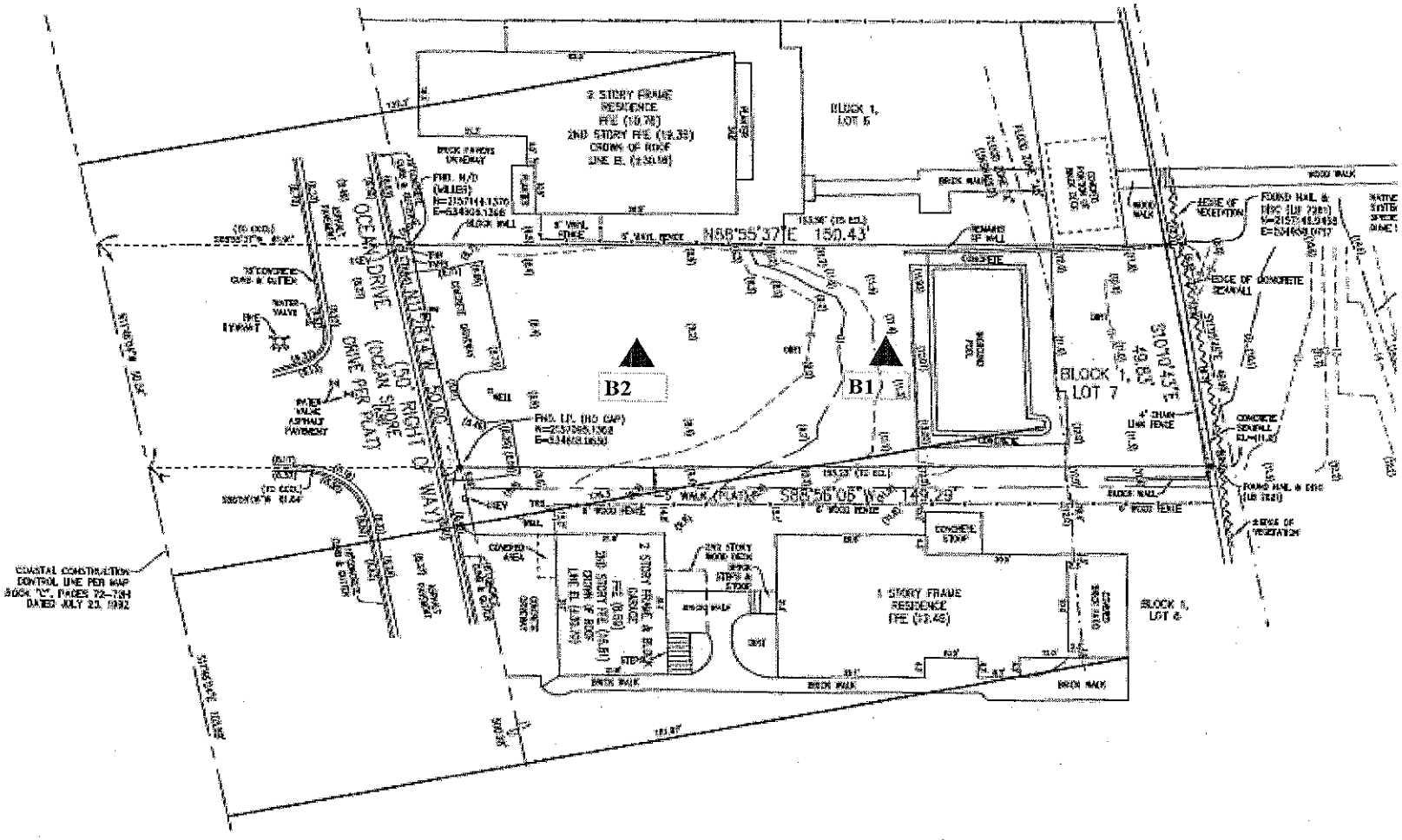
Jacksonville Beach, Florida

L E G A C Y

Engineering, Inc.

Geotechnical & Materials Engineering & Testing

Date: 06/28/2012	Proj. No.: 12-1067	Figure 1



FIELD EXPLORATION PLAN

▲ Approximate Boring Locations

N
W E
S

Reference

Plan Provided by Client

Field Exploration Plan **2701 Ocean Drive South** Jacksonville Beach, Florida		
L E G A C Y **Engineering, Inc.** *Geotechnical & Materials Engineering & Testing*		
Date: 06/28/2012	Proj. No.: 12-1067	Figure 1

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KEY TO SOIL CLASSIFICATION

CORRELATION OF PENETRATION WITH RELATIVE DENSITY & CONSISTENCY

SANDS AND GRAVEL	
BLOW COUNT	RELATIVE DENSITY
0-4	VERY LOOSE
5-10	LOOSE
11-20	FIRM
21-30	VERY FIRM
31-50	DENSE
OVER 50	VERY DENSE

SILTS AND CLAYS	
BLOW COUNT	CONSISTENCY
0-2	VERY SOFT
3-4	SOFT
5-8	FIRM
9-15	STIFF
16-30	VERY STIFF
31-50	HARD
OVER 50	VERY HARD

PARTICLE SIZE IDENTIFICATION (UNIFIED CLASSIFICATION SYSTEM)

CATEGORY	*DIMENSIONS*
Boulders	Diameter exceeds 12 inches
Cobbles	3 to 12 inches
Gravel	Coarse – 0.75 to 3 inches in diameter Fine – 4.76 mm to 0.75 inch diameter
Sand	Coarse – 2.0 mm to 4.76 mm diameter Medium – 0.42 mm to 2.0 mm diameter Fine – 0.074 mm to 0.42 mm diameter
Silt and Clay	Less than 0.074 mm (invisible to the naked eye)

MODIFIERS

These modifiers provide our estimate of the amount of minor constituent (sand, silt, or clay size particles) in the soil sample

PERCENTAGE OF MINOR CONSTITUENT	*MODIFIERS*
5 % to 12 %	Slightly Silty, Slightly Clayey, Slightly Sandy
12% to 30%	Silty, Clayey, Sandy
30% to 50%	Very Silty, Very Clayey, Very Sandy

APPROXIMATE CONTENT OF OTHER COMPONENTS (SHELL, GRAVEL, ETC.)	*MODIFIERS*	*APPROXIMATE CONTENT OF ORGANIC COMPONENTS*
0% to 5%	TRACE	1 to 2%
5% to 12%	FEW	2% to 4%
12% to 30%	SOME	4% to 8%
30% to 50%	MANY	>8%

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TEST BORING RECORD

JOB NO. 12-1067

Project 2701 Ocean Drive South
Boring Location See Field Exploration Plan
Ground Elevation 11.0 **Datum** NAVD
Groundwater Depth 1.0 Feet
Length of Casing Set 5 Feet **Casing Size** 4-inch

BORING NO. B1
Sheet 1 **of** 3
Boring Begun 6-28-2012
Boring Completed 6-28-2012
Driller D. Francis
Engineer J. Ellis, II, P.E.

ELEV. (FT)	DEPTH (FT)	MATERIAL DESCRIPTION	SOIL SYMBOL	SAMPLE NO.	STANDARD PENETRATION TEST BLOWS / 6-INCH	BLOW COUNT
11	0	VERY LOOSE Gray Brown Fine SAND (SP) Fines Content = 0.6%		1	1 1 1=12"	2
9	2	VERY LOOSE Dark Brown Fine SAND (SP) with Trace of Silt		2	1 1 1 2	2
7	4	VERY LOOSE to FIRM Brown Fine SAND (SP) with Trace of Silt		3	2 2 2 6	4
	7	Fines Content = 3.2%		4	3 4 4 6	8
	8				6 7	
	9			5	9 10	16
	10					
0	11	VERY FIRM to FIRM Gray Fine SAND (SP) with Some Shell (10 to 15% Shell Content)				
	12					
	13					
	14			6	3 13 10	23
	15					

REMARKS:

BORING & SAMPLING: ASTM D1586/CORE DRILLING: ASTM D2113

Ground Water Table

BLOW COUNT IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

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TEST BORING RECORD

JOB NO. 12-1067

BORING NO. B1

Project 2701 Ocean Drive South

Sheet 2 **of** 3

ELEV. (FT)	DEPTH (FT)	MATERIAL DESCRIPTION	SOIL SYMBOL	SAMPLE NO.	STANDARD PENETRATION TEST: BLOWS / 6-INCH	STANDARD PENETRATION TEST: BLOW COUNT
	16	FIRM Gray Fine SAND (SP) with Some Shell (10 to 15% Shell Content)				
	17					
	18					
	19			7	6 6 9	15
	20					
	21					
	22					
	23	Fines Content = 3.7%				
	24			8	9 9 16	25
	25					
	26					
-15.5	27	FIRM Gray Slightly Silty Fine SAND (SP-SM)				
	28					
	29			9	8 9 10	19
	30					
	31					
-20.5	32	LOOSE Gray Silty Fine SAND (SM) with Few to Some Shell				

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Geotechnical & Materials Engineering and Testing

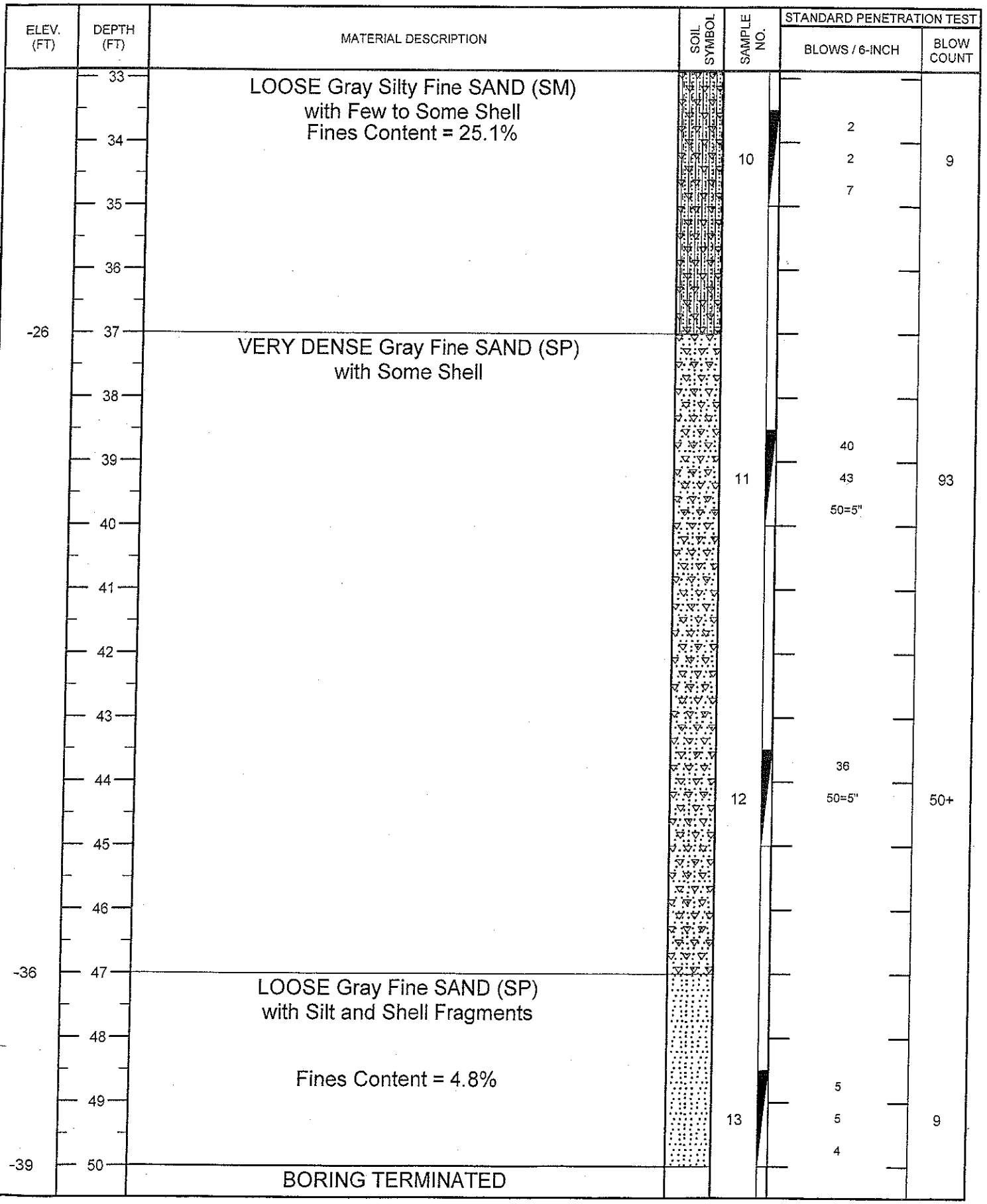
TEST BORING RECORD

JOB NO. 12-1067

BORING NO. B1

Project 2701 Ocean Drive South

Sheet 3 of 3



LEGACY ENGINEERING, INC.

Geotechnical & Materials Engineering and Testing

TEST BORING RECORD

JOB NO. 12-1067

Project 2701 Ocean Drive South
Boring Location See Field Exploration Plan
Ground Elevation 8.2 **Datum** NAVD
Groundwater Depth 0.0 Feet (Ground surface)
Length of Casing Set 5 Feet **Casing Size** 4-inch

BORING NO. B2
Sheet 1 **of** 3
Boring Begun 6-28-2012
Boring Completed 6-28-2012
Driller D. Francis
Engineer J. Ellis, II, P.E.

ELEV. (FT)	DEPTH (FT)	MATERIAL DESCRIPTION	SOIL SYMBOL	SAMPLE NO.	STANDARD PENETRATION TEST BLOWS / 6-INCH	BLOW COUNT
8.2	0	VERY LOOSE Gray Brown Fine SAND (SP)		1	2 2 2	4
	1					
	2				2 1 1	
5.2	3	VERY LOOSE Dark Gray Fine SAND (SP) Fines Content = 0.9%		2	2 3	3
4.2	4	LOOSE to FIRM Dark Brown Fine SAND (SP) with Trace of Silt Fines Content = 4.7%		3	4 5 3	8
	5					
	6				3 3	
	7			4	7 10 11	17
0.2	8	FIRM Brown Fine SAND (SP)			3 6 6 7	
	9			5		12
	10					
-2.8	11	DENSE to FIRM Gray Fine SAND (SP) with Some Shell (10 to 15% Shell Content)				
	12					
	13	Fines Content = 4.1%				
	14			6	19 17 18	35
	15					

REMARKS:

BORING & SAMPLING: ASTM D1586/CORE DRILLING: ASTM D2113

Ground Water Table

BLOW COUNT IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

LEGACY
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Geotechnical & Materials Engineering and Testing

TEST BORING RECORD

JOB NO. 12-1067

BORING NO. B2

Project 2701 Ocean Drive South

Sheet 2 of 3

ELEV. (FT)	DEPTH (FT)	MATERIAL DESCRIPTION	SOIL SYMBOL	SAMPLE NO.	STANDARD PENETRATION TEST BLOWS / 6-INCH	STANDARD PENETRATION TEST BLOW COUNT
	16	DENSE to FIRM Gray Fine SAND (SP) with Some Shell (10 to 15% Shell Content)				
	17					
	18					
	19			7	6 10 9	19
	20					
-12.8	21	VERY DENSE Gray Fine SAND (SP) with No Shell				
	22					
	23					
	24			8	23 28 28	56
	25					
	26					
-18.3	27	FIRM Gray Slightly Silty Fine SAND (SP-SM)				
	28					
	29	Fines Content = 9.2%		9	4 5 6	11
	30					
	31					
-23.3	32	VERY FIRM Gray Slightly Silty Fine SAND (SM) with Few to Some Shell				

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TEST BORING RECORD

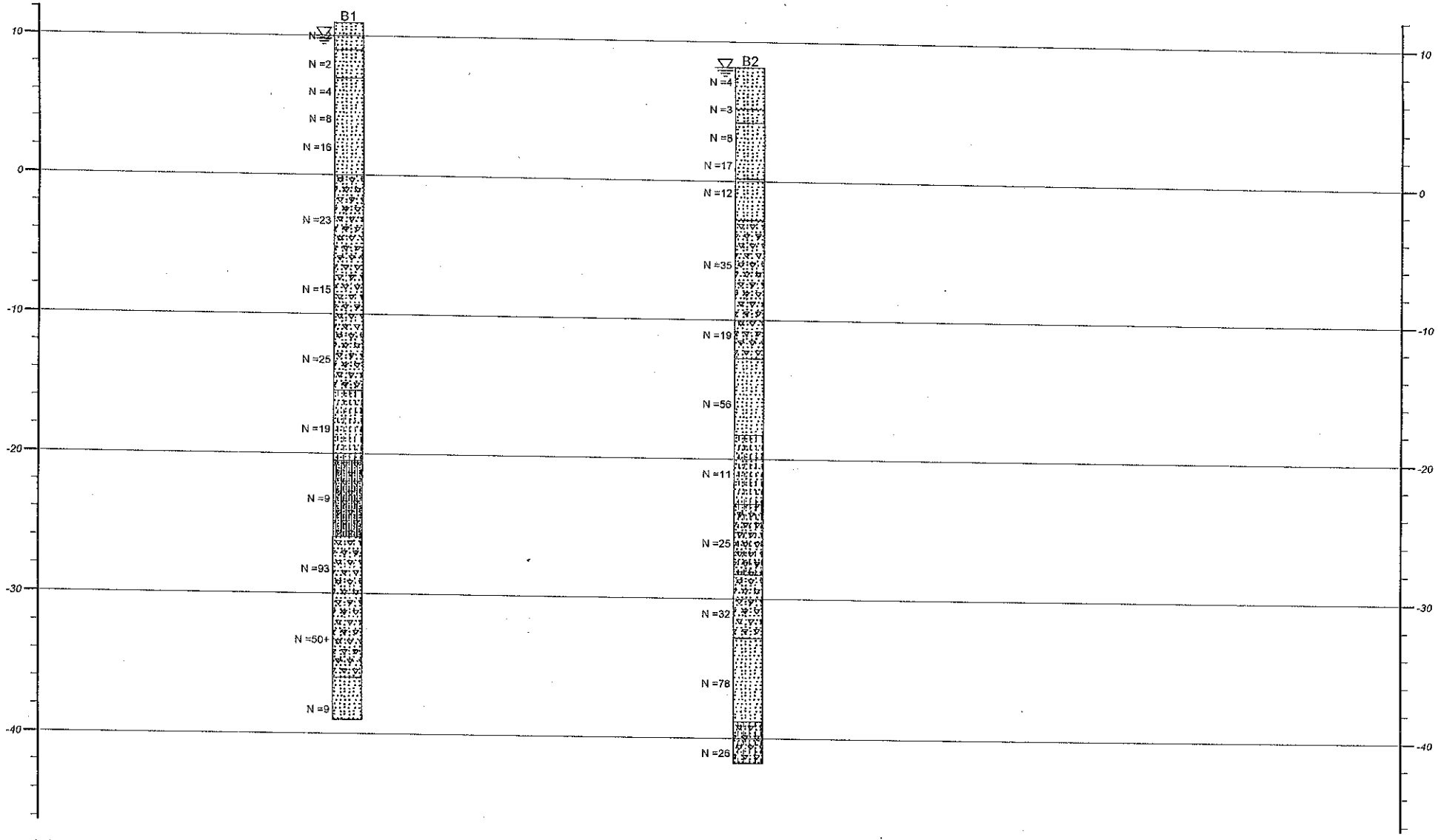
JOB NO. 12-1067

BORING NO. B2

Project 2701 Ocean Drive South

Sheet 3 **of** 3

ELEV. (FT)	DEPTH (FT)	MATERIAL DESCRIPTION	SOIL SYMBOL	SAMPLE NO.	STANDARD PENETRATION TEST BLOWS / 6-INCH	STANDARD PENETRATION TEST BLOW COUNT
	33	VERY FIRM Gray Slightly Silty Fine SAND (SM) with Few to Some Shell		10	2 7 18	25
	34					
	35					
	36					
-28.3						
	37	DENSE Gray Fine SAND (SP) with Some Shell		11	17 8 24	32
	38					
	39					
	40					
-32.8	41	VERY DENSE Gray Fine SAND (SP)		12	25 38 40	78
	42					
	43					
	44					
	45					
	46					
-38.8	47	VERY FIRM Gray Slightly Silty Fine SAND (SP) with Shell Fragments Fines Content = 9.5		13	6 8 18	26
	48					
	49					
-41.8	50	BORING TERMINATED				



Strata symbols

- Fine SAND
- Fine Sand with Shell
- Slightly Silty Fine SAND
- Silty Fine SAND with Shell
- Slightly Silty Fine Sand with Shell

Ground Water Depth

Legacy Engineering, Inc.

GENERALIZED SOIL PROFILE

HORIZONTAL SCALE: 1"=(proportional)'	DRAWN BY/APPROVED BY	DATE DRAWN
VERTICAL SCALE: 1"=10'	JEEII/JEEII	7/13/2012

2701 Ocean Drive South

PROJECT NO. 12-1067

FIGURE NUMBER 1

L E G A C Y
ENGINEERING, INC

SUMMARY OF LABORATORY TEST DATA

2701 Ocean Drive South - Jacksonville Beach
Dreambuilder Custom Homes, LLC
Legacy Project No. 12-1067

Boring No. / Sample No.	Depth (feet)	w[a] (%)	Fines[b] (%)
B 1/1	0-2.0	24.9	0.6
B 1/5	8.0-10	23.3	3.2
B 1/8	23.5-25	23.2	3.7
B 1/10	33.5-35	50.2	25.1
B 1/13	48.5-50	26.7	4.8
B 2/2	2.75-4.0	25.6	0.9
B 2/3	4.0-6.0	24.4	4.7
B 2/6	13.5-15	22.0	4.1
B 2/9	28.5-30	32.6	9.2
B 2/13	48.5-50	26.4	9.5

w[a] - Natural Moisture Content
Fines[b] - Percent Fines Content

FIELD AND LABORATORY TEST PROCEDURES

Penetration Borings

The penetration borings were made in general accordance with ASTM D 1586-67, "Penetration Test and Split-Barrel Sampling of Soils". Each boring was advanced to the water table by augering and, after encountering the groundwater table, further advanced with a rotary drilling technique that uses a circulating bentonite fluid for borehole flushing and stability. At two-foot intervals within the upper 10 feet and at five-foot intervals thereafter, the drilling tools were removed from the borehole and a split-barrel sampler inserted to the borehole bottom. The sampler was then driven 18 inches into the material using a 140-pound SPT hammer falling, on the average, 30 inches per hammer blow. The number of hammer blows for the final 12 inches of penetration is termed the "penetration resistance, blow count, or N-value". This value is an index to several in-place geotechnical properties of the material tested, such as relative density and Young's Modulus.

After driving the sampler 18 inches (or less, if in hard rock or rock-like material) at each test interval, the sampler was retrieved from the borehole and a representative sample of the material within the split-barrel was placed in a watertight container and sealed. After completing the drilling operations, the samples for each boring were transported to our laboratory where our Geotechnical Engineer examined them in order to verify the driller's field classifications. The samples will be kept in our laboratory for a period of two months after submittal of formal written report, unless otherwise directed by the Client.

Moisture Content

The moisture content of the sample tested was determined in general accordance with ASTM D 2216. The moisture content is the actual moisture content of the sample as sampled in the field during the performance of the soil boring.

Fines Content

The percent fines of material passing the No. 200 mesh sieve of the sample tested was determined in general accordance with ASTM D 1140. The percent fines are the soil particles in the silt and clay size range.