REPORT OF THE GEOTECHNICAL INVESTIGATION

PROPOSED CHIROPRACTIC OFFICE
312 – 7TH STREET WEST
PALMETTO, FLORIDA

April 4, 2014

Constantine Chiropractic Clinic
312 7th Street West
Palmetto, Florida 34221

Attention: Dr. Nicholas P. Constantine

RE: Report of the Geotechnical Investigation
Proposed Chiropractic Office
312 7th Street West
Palmetto, Florida
Our File: DES 147388

Dear Dr. Constantine:

Pursuant to your request and authorization, **DRIGGERS ENGINEERING SERVICES, INC.** has conducted an investigation of subsurface conditions at the subject site. Results of our field and laboratory studies are presented in the following sections of this report together with geotechnical recommendations for subgrade preparation, foundation design and pavement design.

FIELD INVESTIGATION PROGRAM

To investigate soil and groundwater conditions within the planned building area, two (2) Standard Penetration Test (SPT) borings were conducted in accordance with ASTM D-1586. The SPT borings were advanced to nominal depths of 25 feet below existing grade to obtain samples for visual examination and to provide penetration resistances indicative of the strength and bearing capability of the soils penetrated.

Within the pavement area, three (3) hand auger classification borings were advanced to nominal depths of 6 feet below grade. The purpose of the borings was to examine soil and groundwater conditions which could impact pavement design and performance.

The boring locations were staked in the field by our geotechnician utilizing the site plan provided for our use and with respect to the existing building and other site features. The boring locations illustrated on the attached Plate I are considered approximate since the boring locations were not surveyed. Logs of the exploratory borings are presented in the report attachments indicating visual and estimated Unified Soil Classification versus depth. A brief description of the methods of sampling and testing is also included in the report appendix.

LABORATORY TEST RESULTS

A limited classification testing program was implemented in the laboratory to establish the engineering characteristics of representative soil samples collected during the field investigation. The classification tests included Atterberg liquid limit and plastic limit determinations, grainsize or sieve analyses and an organic content test. The results of the tests are listed on the attached Summary of Laboratory Test Results sheet. Individual grainsize curves are also appended.

GENERALIZED SUBSURFACE CONDITIONS

The exploratory borings have identified an upper unit of fine sands with variable silt, clay and organic fines content to a depth of about 8 feet in the SPT borings. These near surface sands which contain some to minimal fines content comprise the SP and SP-SM Unified Soil Classifications. Beneath the upper sands, the borings sampled a thin unit of moderate to high plasticity clayey fine sands (SC soils) above high plasticity clays (CH soils). The clays, which contained seams and traces of limestone, continued to the completion depths of the SPT borings. Standard penetration testing indicates that the sandy soils are typically very loose to medium dense in relative density. The clays exhibited a stiff to hard consistency.

Note that some of the sands contained some to traces of organic fines. Visual examination of the recovered samples and results of laboratory testing suggest that the organic content is generally low. However, the sands between about 1.6 and 3.3 feet at boring location HA-1 had a slightly elevated organic content of 7.0 percent, by weight. However, since the organic materials consist of silt sized particles, we do not anticipate that detrimental settlements would occur due to further decomposition or compression of this sandy zone under the anticipated vehicular traffic loads.

Groundwater was measured within a depth range of 3.7 to 4.4 feet below existing grade at the time of our field studies. It is anticipated that groundwater levels may occur about a foot higher in response to more frequent rainfall common during a typical wet season.

GEOTECHNICAL EVALUATION

DEVELOPMENT CONCEPT - We understand that the existing single story building and pavements will be demolished. The proposed new structure will be a single story masonry building with perimeter bearing walls and interior columns. Based upon experience with similar construction, we anticipate that wall loads will probably be on the order of 2 to 3 kips per lineal foot with column loads ranging to 50 kips. We anticipate that the finished floor elevation will be established within about a foot of existing site grades. We also understand that concrete pavement will be constructed. If actual loads and site grades are significantly different, we should be contacted for review of our geotechnical recommendations.

FOUNDATION CONDITIONS - With proper subgrade preparation and structural fill placement and compaction, shallow foundations may be designed based upon an allowable soil bearing pressure of up to 2,000 pounds per square foot. Foundations proportioned in accordance with this allowable soil bearing pressure should experience total settlements of less than 3/4 inch with differential settlements on the order of 1/4 inch or less. The source of the settlement is compression of loose fine sands below the depth of improvement from the surficial compaction. Therefore, most of the settlement should be completed shortly following the application of the building pad fill and the structural dead loads.

STRUCTURE SUBGRADE PREPARATION - Existing surface vegetation, topsoil and root zones should be stripped. Existing foundations, slabs and pavements should also be removed from the proposed construction areas. The exposed subgrade should be carefully examined and probed for the presence of any highly organic soils or other deleterious materials which would warrant selective undercutting. The exposed subgrade should be uniformly compacted utilizing a vibratory compactor. Care should be used when operating compaction equipment close to existing structures to avoid transmission of vibrations that could cause settlement or disturb occupants. The compaction should consist of no less than eight (8) to ten (10) coverages throughout the foundation and slab-on-grade area so as to achieve a uniform density of no less than 95% of the Modified Proctor maximum dry density per ASTM D-1557. Appended are recommendations relative to proof-rolling and compaction of the subgrade soils and compaction of subsequent fill materials needed to establish design grades.

All foundation areas should also be carefully inspected and probed by a representative of the geotechnical consultant prior to the placement of reinforcement and concrete. The purpose of this examination would be to identify any localized subgrade soil conditions that may not have been evidenced by the exploratory borings that would warrant removal and replacement with select compacted backfill. Careful examination is recommended, especially in isolated column footing areas, to detect any zones of deleterious materials that may warrant removal and replacement with select compacted backfill. The appended specifications also provide recommendations for quality assurance inspection and compaction testing during subgrade and fill preparation for the project.

SLAB-ON-GRADE CONSTRUCTION - Slab-on-grade construction may be utilized with proper subgrade preparation and fill placement. Subgrade preparation naturally would involve removal of remnants from the existing construction as well as careful stripping of surface vegetation and other unsuitable materials followed by proofrolling of subgrade and effective compaction of fill lifts required to establish design grades. Also of importance is compaction of backfill soils in utility trenches and against stem walls prior to concrete placement.

PAVEMENT SUBGRADE PREPARATION - The borings conducted in the pavement areas indicate that subgrade soils consist of fine sands. Following removal of the existing structure and pavements, subgrade preparation within the pavement areas should also consist of removing any existing vegetation and any other deleterious materials.

To provide a stable working surface upon which to construct the new concrete pavement, we recommend a minimum 6-inch compacted thickness of a subgrade stabilized to a minimum limerock bearing ratio (LBR) of 40. The stabilized subgrade should be compacted to a minimum density of at least 98% of the Modified Proctor value per ASTM D-1557. Moisture contents within the subgrade or fill soils should be controlled to within ±2% of optimum as defined by the Modified Proctor moisture-density relationship. Appropriate moisture control is recommended in order to ensure both stability and density prior to placing the pavement structural element.

Limerock bearing ratio testing of the near surface sands was not conducted. However, based upon our experience, the fine sand deposits can have a Limerock Bearing Ratio (LBR) value in the range of 15 to 20. In order to improve the bearing characteristics of the subgrade sands, an admixture should be utilized. The nominal addition of some 25% to 30% by weight of shell, limerock, crushed concrete or even clayey sands should improve the bearing characteristics of the sands to an LBR of around 40.

PAVEMENT DESIGN CONSIDERATIONS - Although specific pavement thickness design must be based upon information relative to traffic frequency and vehicular wheel loads, a typical concrete pavement section commonly utilized for light vehicular traffic in small parking lots would consist of a minimum 4.0 inch Portland cement concrete pavement thickness. A minimum 28 day concrete compressive strength of 3,500 psi is suggested. This is intended as a preliminary guide and may require adjustment in the thickness of the pavement structure to accommodate specific area uses.

Construction or crack control joint spacing, in feet, should not exceed 2.5 times the slab thickness, in inches. For a nominal 4 inch slab thickness, joint spacing should not exceed about 10 feet. Construction joints should be keyed or doweled to help minimize the potential for movement or cracking at the joints.

DRIGGERS ENGINEERING SERVICES, INC. appreciates the opportunity to assist you on this project. Should you have any questions concerning the results of our geotechnical studies, please do not hesitate to contact this office at your convenience.

Respectfully submitted,
DRIGGERS ENGINEERING SERVICES, INC.

Nicholas T. Korecki

Nicholas T. Korecki, P.E.
Senior Geotechnical Engineer
FL Registration No. 45529

NICHOLAS T. KORECKI LICENSE No. 45529 4-4-14 STATE OF FLORIDA PROFESSIONAL ENGINEER

NTK-REP\147388

Copies submitted: Constantine Chiropractic Clinic (3)
King Engineering (Sarasota), Attn: Ms. Denise Greer, P.E. (1)

APPENDIX

RECOMMENDATIONS FOR SUBGRADE PREPARATION AND FOUNDATION DESIGN

PLATE I - BORING LOCATION PLAN

STANDARD PENETRATION TEST BORING LOGS

HAND AUGER BORING LOGS

SUMMARY OF LABORATORY TEST RESULTS

GRAINSIZE ANALYSES

METHOD OF TESTING

RECOMMENDATIONS FOR SUBGRADE PREPARATION AND FOUNDATION DESIGN

RECOMMENDATIONS FOR SUBGRADE PREPARATION AND FOUNDATION DESIGN

SUBGRADE PREPARATION

1. The entire building area and for a distance of at least 5 feet beyond the outside footing perimeter should be stripped of all surface vegetation, roots, pavements, slabs and other objectionable material. Exact depth of stripping should be determined by a representative of the soil engineer in the field. Excavations for removal of unsuitable material should be backfilled with compacted fill to match surrounding grade. Cut areas should be brought to grade.

2. The foundation and slab areas should be hand probed to check for soils with excessive organic content, debris, high plasticity clays or other unsuitable material that will require overexcavation and replacement with compacted structural fill. Removal of unsuitable material should extend beyond the outside footing or structure perimeter at least 5 feet. Backfilling should follow the recommendations listed below.

3. The exposed subgrade should be uniformly compacted using a vibratory roller having a maximum drum width of 36 inches. A qualified engineer or technician should be present during initial compaction operations to check proper compactor performance and compaction procedures. The compaction should be performed at a speed equivalent to a slow walking pace. Care should be used when operating the compactor within about 75 feet of existing structures to avoid transmission of vibrations that could cause settlement or disturb occupants.

4. Subgrade compaction should consist of no less than ten (10) complete coverages in a criss-crossed pattern. In addition, compaction should achieve a minimum density of no less than 95% of the Modified Proctor maximum dry density established in ASTM D-1557.

5. Density tests should be used to control compaction. At least one (1) density test should be performed for every 2,000 $ft.^2$ at a depth of 6 inches below the stripped, compacted grade elevations. No fewer than two (2) tests should be planned.

6. The bottom of footing excavations shall be compacted using a hand-guided vibratory or impact compactor with a minimum width of 16 inches. Compaction should consist of no less than ten (10) complete coverages to effect a density of at least 95% of the Modified Proctor maximum dry density. Density tests should also be performed in the bottom of the footings.

FILL PLACEMENT

1. Fill required to develop proposed grade should be inorganic, clean to slightly silty fine sands, free of unsuitable debris. Soils with a Unified Soil Classification of SP to SP-SM would certainly be considered suitable.

2. The fill should be placed in lift thicknesses not exceeding 9 inches with each lift compacted to a density of no less than 95% of the Modified Proctor maximum dry density. Thinner lifts may be required depending upon compactor size and performance. Moisture content within the fill soil should be controlled to within $\pm$2% of optimum as established in ASTM D-1557 to help ensure development of both density and stability during compaction operations. No fewer than six (6) to eight (8) coverages should be made on each lift using the above specified vibratory roller.

3. Density tests should also be used to control fill placement. At least one (1) density test should be performed for each 2,500 ft.^{2} per fill lift. No fewer than two (2) tests should be planned per fill lift.

FOUNDATION DESIGN

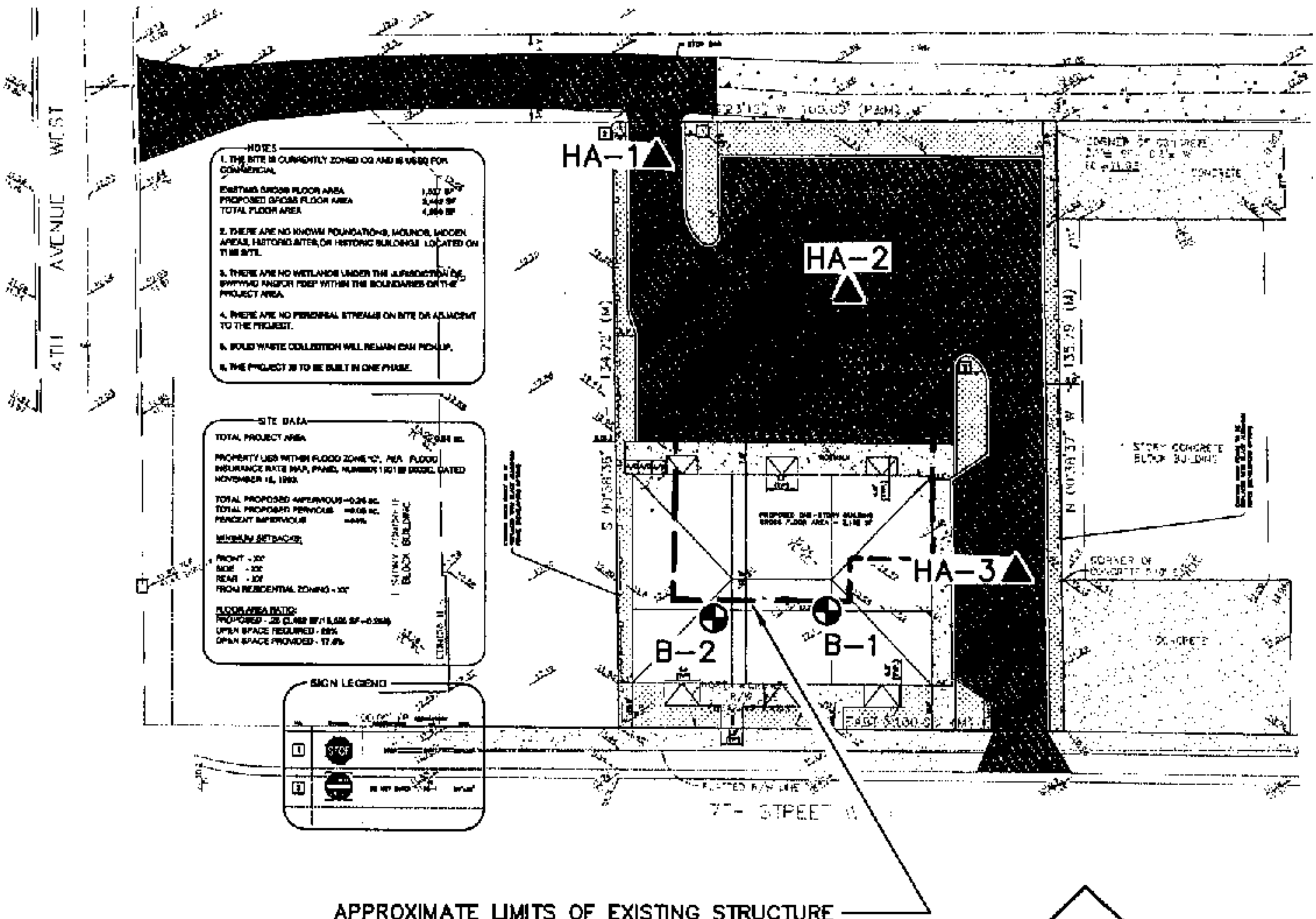
1. Shallow foundations may be designed based on an allowable bearing pressure of up to 2,000 pounds per square foot based upon dead plus live plus wind load requirements.

2. We recommend a footing embedment of no less than 16 inches below finished grade, but excessive embedment should be avoided to take advantage of the compaction process and maintain the footing as high as possible within the compacted structural fill.

3. Slab-on-grade construction may be utilized. To maintain slab support, care should be taken so that all excavations made for foundations and utilities are backfilled with suitable fill compacted in thin lifts with a small compactor. Before backfill is placed, all water and loose debris should be removed from these excavations.

4. A column foundation width of no less than 30 inches is also recommended and wall footings should be no less than 16 inches wide.

PLATE I - BORING LOCATION PLAN



LEGEND:

▲ HAND AUGER BORING LOCATION

⊕ STANDARD PENETRATION TEST BORING LOCATION

0 20 40 80

SCALE IN FEET

PROJECT NUMBER: DES 147388 DATE: 3/31/14

SHEET TITLE	PREPARED BY
BORING LOCATION PLAN	DRIGGERS ENGINEERING SERVICES, INCORPORATED
PROJECT NAME	SHEET NO.
PROPOSED CHIROPRACTIC OFFICE 312 7th STREET WEST PALMETTO, FLORIDA	PLATE 1

DRIGGERS ENGINEERING SERVICES INCORPORATED

Project No. DES 147388 **BORING NO.** B-1

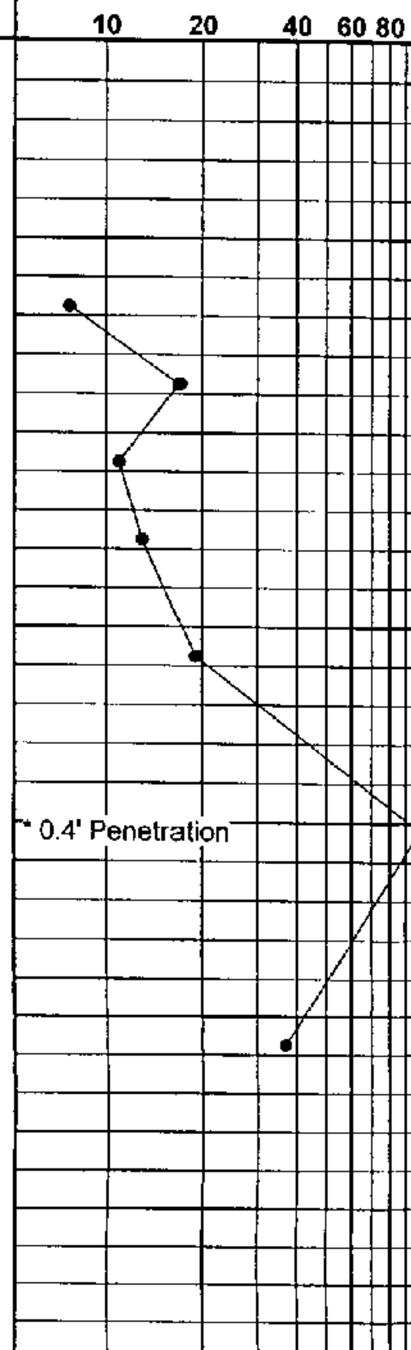
Project Proposed Chiropractic Office, 312 7th Street West, Palmetto, Florida

Location See Plate I **Foreman** B.D.

Completion Depth 26.5' **Date** 3/30/14 **Depth To Water** 4.0' **Time** **Date** 3/30/14

DEPTH, FT	SOIL DESCRIPTION	BLOWS ON SAMPLER PER 6" OR PEN. STR.
	SURF. EL.:	
0	Dark gray Fine SAND with finely divided organic material and roots (SP)	
	Gray Fine SAND with trace of roots (SP)	
	Grayish-brown Fine SAND (SP)	
	Reddish-brown Fine SAND (SP)	
5	Brown Fine SAND (SP)	
	Loose light grayish-brown slightly silty Fine SAND (SP-SM)	2/3/3
	Medium dense grayish-brown clayey Fine SAND (SC)	9/10/7
10	Stiff green CLAY (CH)	4/4/7
	Stiff to very stiff green sandy CLAY (CH)	4/6/7
15		6/8/11
20	Hard green sandy CLAY with trace of cream colored LIMESTONE (CL)	50*
	Hard light brown dolomitic CLAY (CL)	
25		16/18/19
30		

STANDARD PENETRATION TEST BLOWS/FT. ON 2" O.D. SAMPLER-140 LB. HAMMER, 30" DROP



Remarks Borehole Grouted

Casing Length

DRIGGERS ENGINEERING SERVICES INCORPORATED

Project No. DES 147388 **BORING NO. B-2**

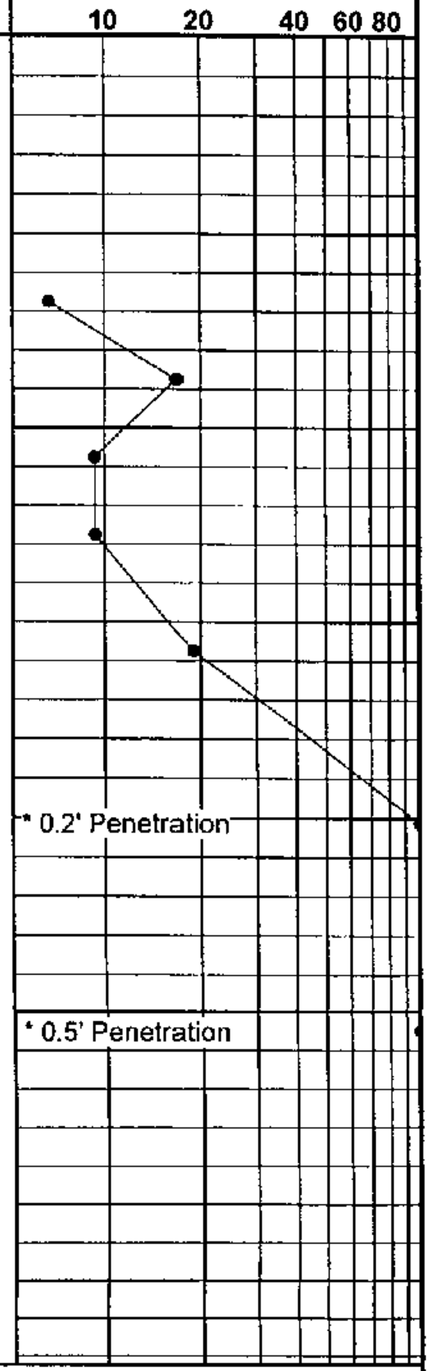
Project Proposed Chiropractic Office, 312 7th Street West, Palmetto, Florida

Location See Plate I **Foreman** B.D.

Completion Depth 26.0' **Date** 3/30/14 **Depth To Water** 4.4' **Time** **Date** 3/30/14

DEPTH, FT	SOIL DESCRIPTION (SURF. EL:)	BLOWS ON SAMPLER PER 6" OR PEN. STR.
0	Dark brown Fine SAND with roots (SP)	
	Gray Fine SAND (SP)	
	Dark reddish-brown slightly silty Fine SAND with trace of finely divided organic material (SP-SM)	
5	Brown Fine SAND (SP)	
	Very loose light brown Fine SAND (SP)	1/2/2
	Medium dense gray clayey Fine SAND (SC)	4/8/9
10	Stiff green sandy CLAY (CH)	4/5/4
		2/4/5
15	Very stiff green CLAY (CH)	6/7/12
	Cream colored LIMESTONE	
20		50*
	Hard light brown dolomitic CLAY (CL)	
25		46/50*
30		

STANDARD PENETRATION TEST BLOWS/FT. ON 2" O.D. SAMPLER-140 LB. HAMMER, 30" DROP



Remarks Borehole Grouted

Casing Length

HAND AUGER BORING LOGS

DRIGGERS ENGINEERING SERVICES INCORPORATED

HAND AUGER BORING LOG

PROJECT: Proposed Chiropractic Office 312 7th Street West Palmetto, Florida Project No.: DES 147388	**CLIENT:** Constantine Chiropractic Clinic		
	WATER TABLE: 3.7'		**DATE:** 3/30/14
TECHNICIAN: R.K./B.D./J.R.	**DATE:** 3/30/14	**COMPLETION DEPTH:** 6.0'	
LOCATION: See Plate I	**TEST NUMBER:** HA-1		

ELEV. (FT)	DESCRIPTION	DEPTH (FT)	SYMBOL	REMARKS
	Dark gray Fine SAND with roots (SP)	0		
	Gray Fine SAND with trace of roots (SP)	1		
	Dark reddish-brown organic Fine SAND (SP-SM/Pt)	2		
		3		
	Light brown Fine SAND (SP)	4		
		5		
		6		
		7		

DRIGGERS ENGINEERING SERVICES INCORPORATED

HAND AUGER BORING LOG

PROJECT: Proposed Chiropractic Office, 312 7th Street West, Palmetto, Florida, Project No.: DES 147388	**CLIENT:** Constantine Chiropractic Clinic
	WATER TABLE: 4.1' — **DATE:** 3/30/14
TECHNICIAN: R.K./B.D./J.R.	**DATE:** 3/30/14 — **COMPLETION DEPTH:** 6.0'
LOCATION: See Plate I	**TEST NUMBER:** HA-2

ELEV. (FT)	DESCRIPTION	DEPTH (FT)	SYMBOL	REMARKS
	1-1/2" Asphalt Pavement	0		
	3-1/2" Light Brown Fine SAND with Roadway Base Material (SP)			
	Dark gray Fine SAND with trace of finely divided organic material (SP)	1		
	Gray Fine SAND (SP)			
	Grayish-brown Fine SAND (SP)	2		
	Dark brown Fine SAND with trace of finely divided organic material (SP)			
	Brown Fine SAND (SP)	3		
	Light brown Fine SAND (SP)	4		
		5		
		6		
		7		

DRIGGERS ENGINEERING SERVICES INCORPORATED

HAND AUGER BORING LOG

PROJECT: Proposed Chiropractic Office 312 7th Street West Palmetto, Florida Project No.: DES 147388	**CLIENT:** Constantine Chiropractic Clinic		
	WATER TABLE: 3.9'		**DATE:** 3/30/14
TECHNICIAN: R.K./B.D./J.R.	**DATE:** 3/30/14	**COMPLETION DEPTH:** 6.0'	
LOCATION: See Plate I	**TEST NUMBER:** HA-3		

ELEV. (FT)	DESCRIPTION	DEPTH (FT)	SYMBOL	REMARKS
	1-1/4" Asphalt Pavement	0		
	2-3/4" Grayish-Brown Fine SAND with Roadway Base Material (SP)			
	Dark gray Fine SAND with finely divided organic material (SP)			
	Grayish-brown Fine SAND (SP)	1		
		2		
	Dark reddish-brown Fine SAND with trace of finely divided organic material (SP)			
		3		
	Dark brown Fine SAND with trace of finely divided organic material (SP)			
		4		
	Light brown Fine SAND (SP)			
		5		
		6		
		7		

SUMMARY OF LABORATORY TEST RESULTS

SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	DEPTH (ft)	DESCRIPTION	W %	γ_d (pcf)	G_s	ATTERBERG LIMITS			P.P. (tsf)	U.C.	CON.	G.S.	ORG. (%)	pH	Cl. (ppm)	SO_4 (ppm)	RES. (ohm-cm)
						LL	PL	PI									
B-1	3.1-6.0	Brown Fine SAND										*					
B-1	8.0-9.5	Grayish-brown clayey Fine SAND	22.7			50	17					** 26.6					
B-2	6.0-7.5	Light brown Fine SAND										*					
B-2	8.0-9.5	Dark gray clayey Fine SAND	19.7			26	19					** 15.6					
HA-1	1.6-3.3	Dark reddish-brown organic Fine SAND											7.0				

W % = Water Content
γ_d (pcf) = Dry Density
G_s = Specific Gravity
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
P.P. (tsf) = Pocket Penetrometer
U.C. = Unconfined Compression

Con. = Consolidation Test
G.S. (+1) = Grainsize Analysis (Hydrometer)
ORG. (%) = Organic Content
Cl. (ppm) = Total Chloride
SO_4 (ppm) = Total Sulfate
RES. (ohm-cm) = Lab Resistivity
* = See Test Curves
** = Percent Passing No. 200 Sieve

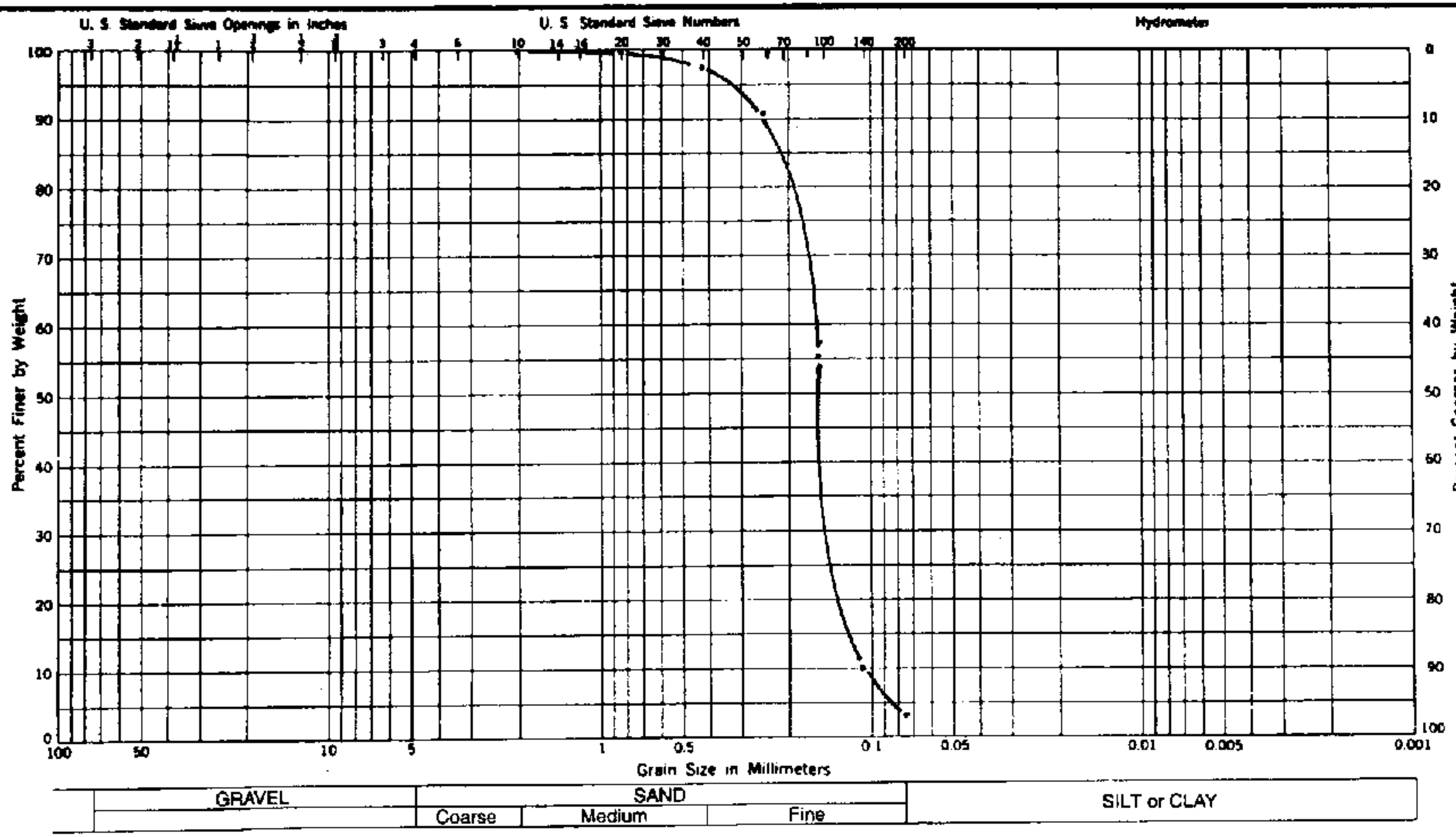
CLIENT: Constantine Chiropractic Clinic

PROJECT: Proposed Chiropractic Office,
312 7th Street West, Palmetto, Florida

FILE: DES 147388

GRAINSIZE ANALYSES

DRIGGERS ENGINEERING SERVICES, INC.



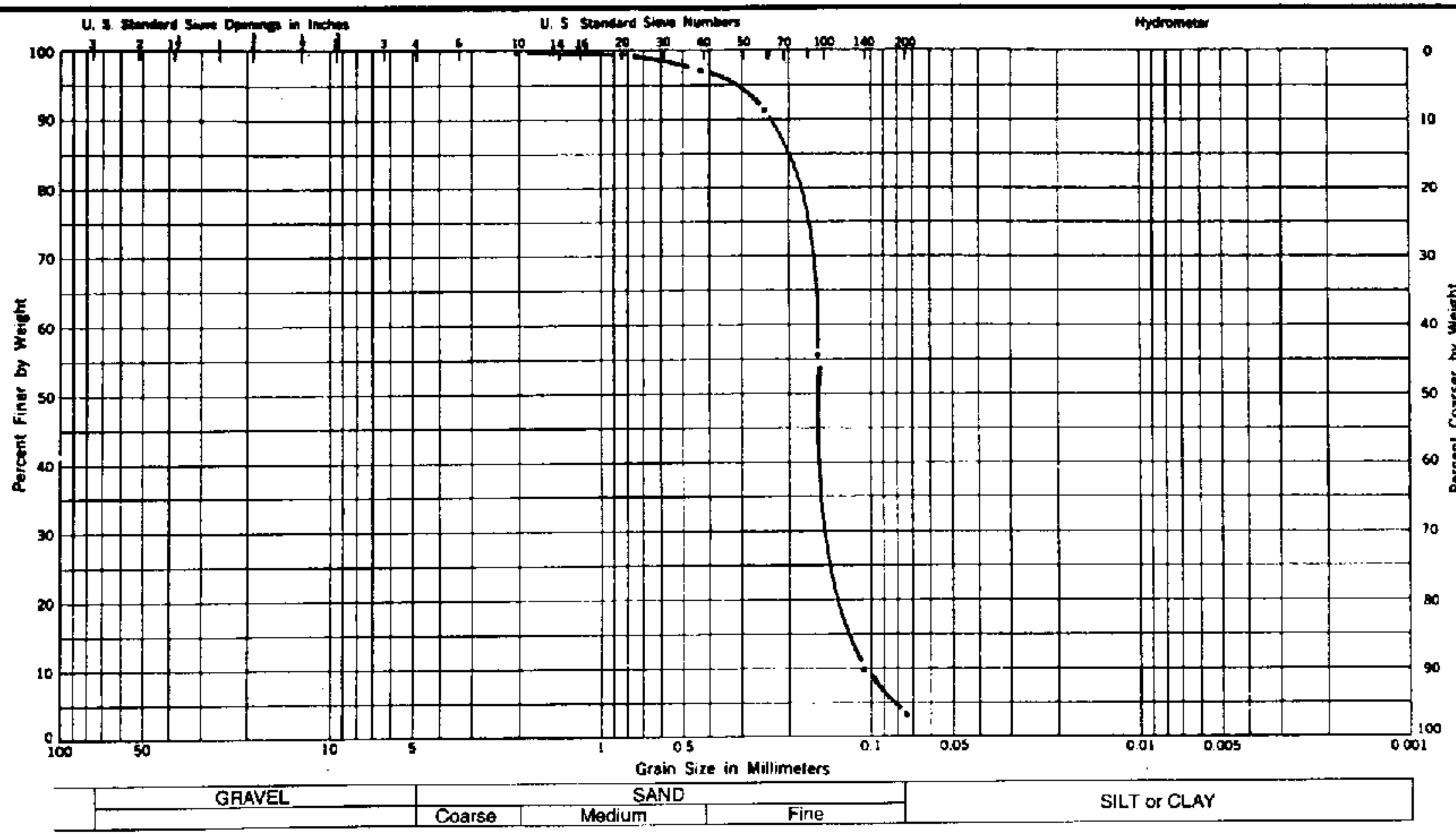
Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-1	3.1' - 6.0'					Brown Fine SAND

CLIENT: Constantine Chiropractic Clinic

PROJECT: Proposed Chiropractic Office,
312 7th Street West, Palmetto, Florida

FILE: DES 147388

DRIGGERS ENGINEERING SERVICES, INC.



Number	Depth	Natural Moisture	L. L.	P. L.	P. I.	Classification
B-2	6.0' - 7.5'					Light brown Fine SAND

CLIENT: Constantine Chiropractic Clinic

PROJECT: Proposed Chiropractic Office,
312 7th Street West, Palmetto, Florida

FILE: DES 147388

METHOD OF TESTING

STANDARD PENETRATION TEST
AND
SOIL CLASSIFICATION

STANDARD PENETRATION TEST (ASTM D-1586)

In the Standard Penetration Test borings, a rotary drilling rig is used to advance the borehole to the desired test depth. A viscous drilling fluid is circulated through the drill rods and bit to stabilize the borehole and to assist in removal of soil and rock cuttings up and out of the borehole.

Upon reaching the desired test depth, the 2 inch O.D. split-barrel sampler or "split-spoon", as it is sometimes called, is attached to an N-size drill rod and lowered to the bottom of the borehole. A 140 pound hammer, attached to the drill string at the ground surface, is then used to drive the sampler into the formation. The hammer is successively raised and dropped for a distance of 30 inches using a rope and "cathead" assembly. The number of blows is recorded for each 6 inch interval of penetration or until virtual refusal is achieved. In the above manner, the samples are ideally advanced a total of 18 inches. The sum of the blows required to effect the final 12 inches of penetration is called the blowcount, penetration resistance or "N" value of the particular material at the sample depth.

After penetration, the rods and sampler are retracted to the ground surface where the core sample is removed, sealed in a glass jar and transported to the laboratory for verification of field classification and storage.

SOIL SYMBOLS AND CLASSIFICATION

Soil and rock samples secured in the field sampling operation were visually classified as to texture, color and consistency. The Unified Soil Classification was assigned to each soil stratum per ASTM D-2487. Soil classifications are presented descriptively and symbolically for ease of interpretation. The stratum identification lines represent the approximate boundary between soil types. In many cases, this transition may be gradual.

Consistency of the soil as to relative density or undrained shear strength, unless otherwise noted, is based upon Standard Penetration resistance values of "N" values and industry-accepted standards. "N" values, or blowcounts, are presented in both tabular and graphical form on each respective boring log at each sample interval. The graphical plot of blowcount versus depth is for illustration purposes only and does not warrant continuity in soil consistency or linear variation between sample intervals.

The borings represent subsurface conditions at respective boring locations and sample intervals only. Variations in subsurface conditions may occur between boring locations. Groundwater depths shown represent water depths at the dates and time shown only. The absence of water table information does not necessarily imply that groundwater was not encountered.