Report of Geotechnical Exploration **Proposed Commercial Site** 1066 US Hwy 1

> May 7, 2015 GFA Project No.: 15-0422.00

Vero Beach, Indian River County, Florida



activities. The classifications and descriptions shown on the logs are generally based upon

visual characterizations of the recovered soil samples. All soil samples reviewed have been

depicted and classified in general accordance with the Unified Soil Classification System

modified as necessary to describe typical Florida conditions. See Appendix E: "Discussion of

The subsurface soil conditions encountered at this site generally consist of medium dense sand

(SP) with occasional loose layers to a depth of 8 feet, and then medium dense to very

dense/hard sand (SP) to the boring and probe termination depths. Very dark brown organically

stained sand with little/some silt (SP-SM,SM) layers ranging from 1 to 2 feet thick was

occasionally encountered with the top as shallow as 2 feet and the bottom as deep as 6 feet

below ground surface was encountered. Please refer to Appendix D - Record of Test Borings for

On the dates of our field exploration, the groundwater table was encountered at depths ranging

from approximately 5 to 6 feet below the existing ground surface. The groundwater table will

Brief ponding of stormwater may occur across the site after heavy rains.

necessary, please contact our office for additional guidance.

failures in structural design and are usually sudden and catastrophic.

and is limited by the structural flexibility.

Client: Roberts Equities, LLC

Elevation: Existing Grade

Water Level: 5 feet after 0 hours

Proposed Commercial Site

1066 US Hwy 1, Vero Beach, Indian River County, FL

luctuate seasonally depending upon local rainfall and other site specific and/or local influences.

No additional investigation was included in our scope of work in relation to the wet seasonal

high groundwater table or any existing well fields in the vicinity. Well fields may influence water table levels and cause significant fluctuations. If a more comprehensive water table analysis is

A foundation system for any structure must be designed to resist bearing capacity failures, have

settlements that are tolerable, and resist the environmental forces that the foundation may be

subjected to over the life of the structure. The soil bearing capacity is the soil's ability to support

loads without plunging into the soil profile. Bearing capacity failures are analogous to shear

The amount of settlement that a structure may tolerate is dependent on several factors

including: uniformity of settlement, time rate of settlement, structural dimensions and properties

of the materials. Generally, total or uniform settlement does not damage a structure but may

affect drainage and utility connections. These can generally tolerate movements of several

inches for building construction. In contrast, differential settlement affects a structure's frame

The subsurface soil conditions at the project site are generally favorable for the support of the

proposed structure on shallow foundations. An allowable bearing capacity of 2.500 psf may be

used for foundation design. Expected settlement of the structure is 1 inch or less total and less

GFA INTERNATIONAL

521 N.W. ENTERPRISE DRIVE, PORT ST. LUCIE, FLORIDA 34986 PHONE: (772) 924-3575 - FAX: (772) 924-3580

STANDARD PENETRATION TEST BORING (ASTM D-1586)

Proposed Commercial Site

GFA Project No. 15-0422.00

1066 US Hwy 1, Vero Beach, Florida

Soil Groups", for a detailed description of various soil groups.

a detailed account of each boring and sounding.

2.5 Hydrogeological Conditions

3.1 General

May 7, 2015 Roberts Equities, LLC Attention: Rick Bittner

Boca Raton, Florida 33434 Site: Proposed Commercial Site 1066 US Hwv 1 Vero Beach, Indian River County, Florida GFA Project # 15-0422.00

Dear Mr. Bittner:

GFA International, Inc. (GFA) has completed the subsurface exploration and geotechnical engineering evaluation for the above-referenced project in accordance with the geotechnical and engineering service agreement for this project. The scope of services was completed in accordance with our Geotechnical Engineering Proposal (15-0422.00) dated April 24, 2015, planned in conjunction with and authorized by you.

EXECUTIVE SUMMARY

8903 Glades Road, #A-14

The purpose of our subsurface exploration was to classify the nature of the subsurface soils and general geomorphic conditions and evaluate their impact upon the proposed construction. This report contains the results of our subsurface exploration at the site and our engineering interpretations of these, with respect to the project characteristics described to us including providing recommendations for site preparation and the design of the foundation system.

Based on a site plan prepared by Thomas Engineering Group dated 12/10/2014 (reproduced in Appendix B - Test Location Plan) and conversations with the client, the project consists of demolishing and removing an existing structure and then constructing two one-story commercial structures. There will be a stormwater retention area at the southeast area of the property. We have not received any information regarding structural loads. For the foundation nmendations presented in this report we assumed the maximum column load will be 70 kips and the maximum wall loading will be 4 kips per linear foot. GFA estimates the site is at or near final grade.

The recommendations provided herein are based upon the above considerations. If the project description has been revised, please inform GFA International so that we may review our recommendations with respect to any modifications

A total of four (4) standard penetration test (SPT) borings to depths of approximately fifteen (15) feet below ground surface (BGS) were completed for this study.

521 NW Enterprise Drive • Port St. Lucie, Florida 34986 • (772) 924-3575 • (772) 924-3580 (fax) • www.teamgfa.com

GFA recommends the following compaction requirements for this project:

method (ASTM D-1556), or Hand Cone Penetrometer (HCP) tests.

be successful on projects with similar soil conditions.

three (3) tests per lift, whichever is greater.

with lean concrete.

The compaction percentages presented above are based upon the maximum dry density as

determined by a "modified proctor" test (ASTM D-1557). All density tests should be

performed to a depth of 2 feet below stripped surface and below bottom of footings. Al

density tests should be performed using the nuclear method (ASTM D-2922), the sand cone

Our recommendations for preparation of the site for use of shallow foundation systems are

presented below. This approach to improving and maintaining the site soils has been found to

1. Initial site preparation should consist of performing stripping (removing surface vegetation

utility lines should be removed or properly abandoned so as to not affect structures.

by the project geotechnical engineer prior to fill placement, in lieu of proof rolling.

near surface roots, and other deleterious matter) and clearing operations. This should be

done within, and to a distance of five (5) feet beyond, the perimeter of the proposed building

2. Following site stripping and prior the placement of any fill, areas of surficial sand (not

a steel drum vibratory roller with sufficient static weight and vibratory impact energy to

achieve the required compaction. Density tests should be performed on the proof rollection

surface at a frequency of not less than one test per 2,500 square feet, or a minimum of three

(3) tests, whichever is greater. Areas of exposed intact limestone shall be visually confirmed

3. Fill material may then be placed in the building pad as required. The fill material should be

inorganic (classified as SP, SW, GP, GW, SP-SM, SW-SM, GW-GP, GP-GM) containing no

more than 5 percent (by weight) organic materials. Fill materials with silt/clay-size soil fines in excess of 12% should not be used. Fill should be placed in lifts with a maximum

lift thickness not exceeding 12-inches. Each lift should be compacted and tested prior to the

placement of the next lift. Density tests should be performed within the fill at a frequency of

not less than one test per 2,500 square feet per lift in the building areas, or a minimum of

the limestone. The limestone shall be probed for voids and loose pockets of sand. Such

areas shall be cleaned to depth of 3 times the greatest horizontal dimension and backfilled

4. For any footings bearing on a limestone formation, the bottom of all footing excavation shall be examined by the engineer / geologist or his representative to determine the condition of

ootprint (including exterior isolated columns). Foundations and any below grade remains of

any structures that are within the footprint of the new construction should be removed, and

1066 US Hwy 1, Vero Beach, Florida

Building Pad Fill

3.2 Site Preparation

Proof Roll...

Proposed Commercial Site 066 US Hwy 1, Vero Beach, Florida

GFA Project No. 15-0422.00 The subsurface soil conditions encountered at this site generally consist of medium dense sand (SP) with occasional loose layers to a depth of 8 feet, and then medium dense to very dense/hard sand (SP) to the boring and probe termination depths. Very dark brown organical stained sand with little/some silt (SP-SM,SM) layers ranging from 1 to 2 feet thick was occasionally encountered with the top as shallow as 2 feet and the bottom as deep as 6 feet below ground surface was encountered. Please refer to Appendix D - Record of Test Borings for a detailed account of each boring and sounding.

The subsurface soil conditions at the project site are generally favorable for the support of the proposed structures on shallow foundations. An allowable bearing capacity of 2,500 psf may be used for foundation design.

The subgrade soils should be improved with compaction from the stripped grade prior to constructing the foundation pads. The top 2 feet below stripped grade should be compacted to a minimum of 95% density prior to placing fill to achieve final grade. Fill (including stemwall backfill) should be placed in 12-inch lifts and compacted to achieve a minimum 95% density... After excavation for footings, the subgrade to a depth of 2 feet below bottom of footings should be compacted to achieve a minimum 95% density.

We appreciate the opportunity to be of service to you on this project and look forward to a continued association. Please do not hesitate to contact us if you have any questions or



Copies: 2, Addresses

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Proposed Commercial Site

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Proposed Commercial Site 1066 US Hwy 1, Vero Beach, Florida

Proposed Commercial Site 1066 US Hwy 1, Vero Beach, Florida GFA Project No. 15-0422.00 Page 4 of 9

1.0 INTRODUCTION

The objective of our geotechnical services was to collect subsurface data for the subject project, summarize the test results, and discuss any apparent site conditions that may have geotechnical significance for building construction. The following scope of services is provided within this report:

- 1. Prepare records of the soil boring logs depicting the subsurface soil conditions encountered during our field exploration.
- 2. Conduct a review of each soil sample obtained during our field exploration for classification and additional testing if necessary.
- 3. Analyze the existing soil conditions found during our exploration with respect to foundation support for the proposed structure.
- 4. Provide recommendations with respect to foundation support of the structure, including allowable soil-bearing capacity, bearing elevations, and foundation design parameters.
- 5. Provide criteria and site preparation procedures to prepare the site for the proposed

construction. 1.2 Project Description

1.1 Scope of Services

Based on a site plan prepared by Thomas Engineering Group dated 12/10/2014 (reproduced in Appendix B - Test Location Plan) and conversations with the client, the project consists of demolishing and removing an existing structure and then constructing two one-story commercial structures. There will be a stormwater retention area at the southeast area of the property. We have not received any information regarding structural loads. For the foundation recommendations presented in this report we assumed the maximum column load will be 70 kips and the maximum wall loading will be 4 kips per linear foot. GFA estimates the site is at or

The recommendations provided herein are based upon the above considerations. If the project description has been revised, please inform GFA International so that we may review our recommendations with respect to any modifications.

2.0 OBSERVATIONS

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STANDARD PENETRATION TEST BORING (ASTM D-1586)

Project No.: 15-0422.00

5/5/2015

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Drill Rig: Simco-24

Lab No.:

Drilling Fluid commenced at depth of 10 feet Field Party: WN/JB

Description

SM Dark brown organically stained fine sand,

Soring Terminated at 15 feet

some silt (weakly cemented 5 - 13½ SP Brown fine sand, some shell

13½ - 15 SP Gray fine sand, little shell

2.1 Site Inspection

Client:

Project:

Elevation: Existing Grade

Water Level: 6 feet after 0 hours

Roberts Equities, LLC

Proposed Commercial Site

1066 US Hwy 1, Vero Beach, Indian River County, FL

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near final grade.

The project site was generally flat and paved except for the ease side which was grassy with trees. The grade at the site was estimated to be 1 foot above the adjacent road at the time of drilling. A one-story structure occupied the site. Structures were adjacent to the property.

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Proposed Commercial Site

2.2 Field Exploration

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2.3 Laboratory Analysis

additional fee, if required.

2.4 Geomorphic Conditions

1066 US Hwy 1, Vero Beach, Florida

A total of four (4) standard penetration test (SPT) borings to depths of approximately fifteen (15)

feet below ground surface (BGS) were completed for this study. The locations of the borings

performed are illustrated in Appendix B: "Test Location Plan". The Standard Penetration Tes

SPT) method was used as the investigative tools within the borings. SPT tests were performed

in substantial accordance with ASTM Procedure D-1586, "Penetration Test and Split-Barrel

Sampling of Soils". The SPT test procedure consists of driving a 1.4-inch I.D. split-tube sampler

nto the soil profile using a 140-pound hammer falling 30 inches. The number of blows per foot,

The soil samples recovered from the soil borings were visually classified and their stratification

might vary between the strata interfaces, which are shown. The soil boring data reflect

nformation from a specific test location only. Site specific survey staking for the test locations

was not provided for our field exploration. The indicated depth and location of each test was

approximated based upon existing grade and estimated distances and relationships to obvious

Soil samples recovered from our field exploration were returned to our laboratory where they were visually examined in general accordance with ASTM D-2488. Samples were evaluated to

obtain an accurate understanding of the soil properties and site geomorphic conditions. After a

thorough visual examination of the recovered site soils, no laboratory testing was deemed

necessary. Bag samples of the soil encountered during our field exploration will be held in our

laboratory for your inspection for 30 days and then discarded unless we are notified otherwise in

The recovered samples were not examined, either visually or analytically, for chemical

composition or environmental hazards. GFA would be pleased to perform these services for an

The geology of the site as mapped on the USDA Soil Survey website consists of Immokalee fine

sand (4) at the east side of the property, and Urban land (22) for the remainder of the property.

These are sandy soils and organic soils are not indicated. However, Urban land (22) is areas that have been covered (buildings, parking lots, etc.), the natural soil cannot be observed,

and the soils have been generally altered by grading, shaping, and covered with fill and

therefore the soils can be variable. It should be noted that the Soil Survey generally extends to a

maximum depth of 80 inches (approximately 6% feet) below ground surface and is not indicative

Boring logs derived from our field exploration are presented in Appendix D: "Record of Test

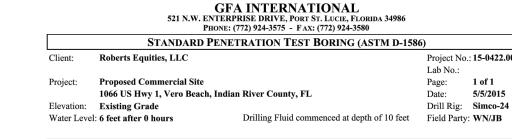
Borings". The boring logs depict the observed soils in graphic detail. The Standard Penetration Test borings indicate the penetration resistance, or N-values, during the drilling and sampling

landmarks. The boring depths were confined to the zone of soil likely to be stressed by the

is illustrated in Appendix D: "Record of Test Borings". It should be noted that soil conditions

for the second and third 6-inch increment, is an indication of soil strength.

proposed construction and knowledge of vicinity soils.



SPT - 2 N27.62156° W80.38867 TEST LOCATION: Laboratory Tests epth Blows/ N Sample Layer: Passing Moisture Organic No. 200 Content Content USCS Description SP-SM Dark brown organically stained fine sand, little silt (weakly cemented) Brown fine sand SP Brown fine sand and shell SP Gray fine sand, trace shell Boring Terminated at 15 fee

Geotechnical Repor

5. For footings placed on structural fill or compacted native granular soils, the bottom of all footings shall be tested for compaction and examined by the engineer / geologist or his representative to determine if the soil is free of organic and/or deleterious material. Density ests should be performed at a frequency of not less than one (1) density test per each isolated column footing and one (1) test per each seventy five (75) lineal feet of wall footings. If compaction cannot be attained due to persistent wetness or the water table near ne bottom of the footing excavation, or due to silty/clayey soil 'pumping' during compaction

GFA recommends undercutting below bottom of footing and replacement with No. 57 stone,

ompacted and tamped into the excavation and inspected and verified by a representative

or rock/sand fill for subgrade that cannot be compacted. The rock/sand fill should be

6. The contractor should take into account the final contours and grades as established by the plan when executing his backfilling and compaction operations. Using vibratory compaction equipment at this site may disturb adjacent structures. We recommend that you monitor nearby structures before and during proof-compaction operations.

from GFA, and tested with hand cone penetrometers, probe rods, or density tests

3.3 Design of Footings

1066 US Hwy 1, Vero Beach, Florida

Footings may be designed using an allowable soil bearing pressure of 2,500 psf. Shallow foundations should be embedded a minimum of 12 inches below final grade. This embedment shall be measured from the lowest adjacent grade. Isolated column footings should be at least 24 inches in width and continuous strip footings should have a width of at least 18 inches

A representative of GFA International can monitor the vibration disturbance of adiacent

structures. A proposal for vibration monitoring during compaction operations can be supplied

Once site preparation has been performed in accordance with the recommendations described in this report, the soil should readily support the proposed structure resting on a shallow foundation system. Settlements have been projected to be less than 1-inch total and 1/2-inch differential. All footings and columns should be structurally separated from the floor slab, as they will be loaded differently and at different times, unless a monolithic mat foundation is

The ground floor slabs may be supported directly on the existing grade or on granular fill following the foundation site preparation and fill placement procedures outlined in this report. For purposes of design, a coefficient of subgrade modulus 150 pounds per cubic inch may be used. The ground floor slab should be structurally separated from all walls and columns to allow for differential vertical movement unless a monolithic foundation is used.

Excessive moisture vapor transmission through floor slabs-on-grade can result in damage to floor coverings as well as cause other deleterious affects. An appropriate moisture vapor retarder should be placed beneath the floor slab to reduce moisture vapor from entering the building through the slab. The retarder should be installed in general accordance with This consulting report has been prepared for the exclusive use of the current project owners and other members of the design team for the Proposed Commercial Site located at 1066 US Hwy

1, Vero Beach, Indian River County, Florida. This report has been prepared in accordance with generally accepted local geotechnical engineering practices; no other warranty is expressed or implied. The evaluation submitted in this report, is based in part upon the data collected during a field exploration, however, the nature and extent of variations throughout the subsurface profile may not become evident until the time of construction. If variations then appear evident, it may be necessary to reevaluate information and professional opinions as provided in this report. In the event changes are made in the nature, design, or locations of the proposed structure, the evaluation and opinions contained in this report shall not be considered valid unless the changes are reviewed and conclusions modified or verified in writing by GFA International.

applicable ASTM procedures including sealing around pipe penetrations and at the edges of

4.0 REPORT LIMITATIONS

Geotechnical Repo

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5.0 BASIS FOR RECOMMENDATIONS

The analysis and recommendations submitted in this report are based on the data obtained from the tests performed at the locations indicated on the attached figure in Appendix B. This report does not reflect any variations, which may occur between borings. While the borings are representative of the subsurface conditions at their respective locations and for their vertical reaches, local variations characteristic of the subsurface soils of the region are anticipated and may be encountered. The delineation between soil types shown on the soil logs is approximate boring locations on the particular date drilled.

Any third party reliance of our geotechnical report or parts thereof is strictly prohibited without the expressed written consent of GFA International. The applicable SPT methodology (ASTM D-1586), CPT methodology (ASTM D-3441), and Auger Boring methodology (ASTM D-1452) used in performing our borings and sounding, and for determining penetration and cone resistance is specific to the sampling tools utilized and does not reflect the ease or difficulty to advance other tools or materials.

Project No.: 15-0422.00

Drill Rig: Simco-24

5/5/2015

Lab No.

Page:

Drilling Fluid commenced at depth of 10 feet Field Party: WN/JB

May 7, 2015

....95% of a Modified Proctor

...95% of a Modified Proctor

....95% of a Modified Procto

	STANDARD P	ENETRATION TEST BORING (ASTM D-158	6)	
Client:	Roberts Equities, LLC	Project No.: 15-0422.00		
			Lab No.:	
Project:	Proposed Commercial Site		Page:	1 of 1
	1066 US Hwy 1, Vero Beach,	Indian River County, FL	Date:	5/5/2015
Elevation:	Existing Grade		Drill Rig:	Simco-24
Water Level	: 5¾ feet after 0 hours	Drilling Fluid commenced at depth of 10 feet	Field Party	WN/JB

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EST	LOCATION: SPT - 3 N27.62092° W80.38798°			Lal	boratory '	Tests	Tro	om T	0.01.770	***	SPT - 4 N27.62126° W80.38832°			T -1	oratory '	-t T-			
epth	Blows/	N	Sample	Layer:	USCS	Description	Passing	Moisture	Organic			OCATIO			N27.62126°	W 80.38832°			_
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DISCUSSION OF SOIL GROUPS

COARSE GRAINED SOILS

GW and SW GROUPS. These groups comprise well-graded gravelly and sandy soils having little or no plastic fines (less than percent passing the No. 200 sieve). The presence of the fines must not noticeably change the strength characteristics of the coarse-grained friction and must not interface with it's free-draining

GP and SP GROUPS. Poorly graded gravels and sands containing little of no plastic fines (less than 5 percent passing the No. 200 sieve) are classed in GP and SP groups. The materials may be called uniform gravels, uniform sands or non-uniform mixtures of very coarse materials and very fine sand, with intermediate sizes lacking (sometimes called skip-graded, gap graded or stepgraded). This last group often results from borrow pit excavation in which gravel and sand layers are mixed.

GM and SM GROUPS. In general, the GM and SM groups comprise gravels or sands with fines (more than 12 percent the No. 200 sieve) having low or no plasticity. The plasticity index and liquid limit of soils in the group should plot below the "A" line on the plasticity chart. The gradation of the material is not considered significant and both well and poorly graded materials are included.

GC and SC GROUPS. In general, the GC and SC groups comprise gravelly or sandy soils with fines (more than 12 percent passing the No, 200 sieve) which have a fairly high plasticity. The liquid limit and plasticity index should plat above the "A" line on the plasticity chart.

FINE GRAINED SOILS

ML and MH GROUPS. In these groups, the symbol M has been used to designate predominantly silty material. The symbols L and H represent low and high liquid limits, respectively, and an arbitrary dividing line between the two set at a liquid limit of 50. The soils in the ML and MH groups are sandy silts, clayey silts or inorganic silts with relatively low plasticity. Also included are loose type

CL and CH GROUPS. In these groups the symbol C stands for clay, with L and H denoting low or high liquid limits, with the dividing line again set at a liquid of 50. The soils are primarily organic clays. Low plasticity clays are classified as CL and are usually lean clays, sandy clays or silty clays. The medium and high plasticity clays are classified as CH. These include the fat clays, gumbo clays and some volcanic clays.

OL and OH GROUPS. The soil in the OL and OH groups are characterized by the presence of organic odor or color, hence the symbol O. Organic silts and clays are classified in these groups. The materials have a plasticity range that corresponds with the ML and MH groups.

HIGHLY ORGANIC SOILS

The highly organic soils are usually very soft and compressible and have undesirable construction characteristics. Particles of leaves, grasses, branches, or other fibrous vegetable matter are common components of these soils. They are not subdivided and are classified into one group with the symbol PT. Peat humus and swamp soils with a highly organic texture are typical soils of the

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ENGINEER CERTIFICATION ☐ JOSEPH W. SCHULKE FL. REG. NO. 47048 ☐ JODAH B. BITTLE FL. REG. NO. 57396 ■WILLIAM P. STODDARD FL. REG. NO. 57605 SHEET

PROJECT NO. 16-096