GFA INTERNATIONAL

FLORIDA'S LEADING ENGINEERING SOURCE

Report of Geotechnical Exploration

Addie's Corner Entry Bridge and Lake Areas
8799 Immokalee Road
Naples, Collier County, Florida

October 26, 2016
GFA Project No.16-1655.00

For: Creekside West Inc.

October 26, 2016

Mr. Dan Waters
Creekside West, Inc.
2600 Golden Gate Parkway
Naples, Florida 34105
Office : 239-262-2600

Site: Addie's Corner Entry Bridge and Lake Areas
Bridge and Lake Areas
8799 Immokalee Road
Naples, Collier County, Florida
GFA Project No.16-1655.00

Dear Mr. Waters:

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 (16-1655.00), planned in conjunction with and authorized by you.

EXECUTIVE SUMMARY

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.

GFA understands this project will consist of the development of the Addie's Corner property. A Site Plan entitled "Pre-Design Survey Soil Boring Proposal Location and Access Exhibit" was provided by Peninsula Engineering with four proposed soil boring locations identified. We understand an entrance bridge will be constructed at the southwest end of the property and a lake constructed near the center of the property. We understand both shallow and deep foundations are being considered for the design of the bridge. For shallow foundation design, we understand maximum wall loads of up to 13 kips per lineal foot will be required. For a pile supported foundation an allowable compressive design capacity of 80 to 100 tons will be required. 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.

The following testing was completed for this study:

- Two (2) Standard Penetration Test (SPT) borings (B-1 and B-2) to depths of approximately 50 to 75 feet below ground surface (BGS) at the approximate bridge location.

- Two (2) Standard Penetration Test (SPT) borings (B-3 and B-4) to depths of approximately 20 feet below ground surface (BGS) with the proposed lake.

The subsurface soil conditions encountered at this site generally consists of very loose to very dense sand (SP), sand with silt (SP-SM), silty sand (SM), clayey silt (ML), weathered limestone (WLS), and limestone (LS) to the boring termination depths. Please refer to Appendix D - Record of Test Borings for a detailed account of each boring.

The subsurface soil conditions at the project site are generally favorable for the support of the proposed bridge structure on shallow or deep foundations. Recommendations for both options are presented in Section 4.0 of this report. Soil evaluation and preliminary recommendations relating to the lake borings, can be found in Section 3.0 of this report.

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 comments, or if we may further assist you as your plans proceed.

Respectfully Submitted,
GFA International, Inc.
Florida Certificate of Authorization Number 4930

Adam Dornacker, E.I.
Staff Engineer

DENNIS F. McCOY LICENSE NO. 54834 STATE OF FLORIDA PROFESSIONAL ENGINEER 10.26.16

Dennis F. McCoy, P.E.
Professional Engineer # 54834
State of Florida

Dennis F. McCoy
Digitally signed by Dennis F. McCoy
Date: 2017.03.10 10:05:12 -05'00'

Copies: 1, Addressee

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1.0 INTRODUCTION

1.1 Scope of Services

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 the proposed project. The following scope of service 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 proposed project.

4. Provide recommendations with respect to the excavation of lakes, utilities and site preparations.

1.2 Project Description

GFA understands this project will consist of the development of the Addie's Corner property. A Site Plan entitled "Pre-Design Survey Soil Boring Proposal Location and Access Exhibit" was provided by Peninsula Engineering with four proposed soil boring locations identified. We understand an entrance bridge will be constructed at the southwest end of the property and a lake constructed near the center of the property. We understand both shallow and deep foundations are being considered for the design of the bridge. For shallow foundation design, we understand maximum wall loads of up to 13 kips per lineal foot will be required. For a pile supported foundation an allowable compressive design capacity of 80 to 100 tons will be required. 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

2.1 Site Inspection

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 additional fee, if required.

2.2 Field Exploration

The following testing was completed for this study;

- Two (2) Standard Penetration Test (SPT) borings (B-1 and B-2) to depths of approximately 50 to 75 feet below ground surface (BGS) at the approximate bridge location.

- Two (2) Standard Penetration Test (SPT) borings (B-3 and B-4) to depths of approximately 20 feet below ground surface (BGS) with the proposed lake.

The locations of the borings performed are illustrated in Appendix B: "Test Location Plan". The Standard Penetration Test (SPT) boring method was used as the investigative tool within the borings. SPT tests were performed in substantial accordance with ASTM Procedure D-1586, "Penetration Test and Split-Barrel Sampling of Soils". This test procedure consists of driving a 1.4-inch I.D. split-tube sampler into the soil profile using a 140-pound hammer falling 30 inches. The number of blows per foot, for the second and third 6-inch increment, is an indication of soil strength.

The soil samples recovered from the soil borings were visually classified and their stratification is illustrated in Appendix D: "Record of Test Borings". It should be noted that soil conditions might vary between the strata interfaces, which are shown. The soil boring data reflect information 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 landmarks. The boring depths were selected based on our knowledge of vicinity soils and to include the zone of soil likely to be stressed by the proposed construction.

2.3 Laboratory Analysis

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, only corrosion series testing was deemed necessary.

All laboratory tests were conducted in general accordance with ASTM or Florida Methods, as applicable. The test method number for each test and the number of tests completed are presented in the following table.

TEST DESCRIPTION	NUMBER OF TESTS	ASTM TEST METHOD
Soil Corrosiveness* (pH, Resistivity, Chloride, Sulfate)	2	FM 5-550, FM 5-551, FM 5-552, and FM 5-553

This test method covers the laboratory determination for the minimum resistivity of a soil. The principal use of this test method is to determine a soil's corrosivity and thereby identify the conditions under which the corrosion of metals in soil may be sharply accentuated. Soil corrosiveness testing was completed on soil samples taken from about 5 to 6 feet below the top of the canal bank (approximately one foot above the existing water table) in line with soil borings B-1 and B-2.

The soil samples obtained were considered non-marine structures and classified under the criteria for substructure environmental classifications. The results of these tests are summarized below:

Boring No.	Depth (ft.)	Soil Type	Soil Corrosion Test Results				Classification Concrete	Classification Steel
			pH	Chloride (ppm)	Sulfates (ppm)	Resistivity (ohm-cm)		
B-1	6	A-3	7.6	30	96	60	Extremely Aggressive	Extremely Aggressive
B-2	6	A-3	7.9	40	123	150	Extremely Aggressive	Extremely Aggressive

For design purposes we recommend using a classification of "Extremely Aggressive" for this project.

2.4 Geomorphic Conditions

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, logged during the drilling and sampling 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 southwest Florida conditions. See Appendix E: "Discussion of Soil Groups", for a detailed description of various soil groups.

The subsurface soil conditions encountered at this site generally consists of very loose to very dense sand (SP), sand with silt (SP-SM), silty sand (SM), clayey silt (ML), weathered limestone (WLS), and limestone (LS) to the boring termination depths. Please refer to Appendix D - Record of Test Borings for a detailed account of each boring.

2.5 Hydrogeological Conditions

On the dates of our field exploration, the groundwater table was encountered at depths approximately 6 feet below the existing ground surface at the bridge location and about 0.5 feet below the existing ground surface at the lake location. The groundwater table will fluctuate seasonally depending upon local rainfall and other site specific and/or local influences such as tidal events. Brief ponding of stormwater may occur across the site after heavy rains.

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 necessary, please contact our office for additional guidance.

3.0 ENGINEERING EVALUATION AND RECOMMENDATIONS (LAKE AREA)

3.1 Lake Borings (Borings B-3 and B-4)

Our experience with similar subsurface conditions and structural requirements indicates the soils excavated from the proposed lake expansion area can be used as structural fill for the construction of future roadways and residential areas at the subject site.

3.1.1 Fill Suitability Evaluation

Based on our visual classifications, it is our opinion some of the soils within the lake area to a depth about 8 feet is suitable for use as structural fill. GFA typically recommends structural fill materials contain less than 12 percent fines passing the No. 200 sieve. Generally, sands (SP), slightly silty sands (SP-SM), and slightly clayey sands (SP-SC) meet this requirement. If some near surface soils are found to contain more than 12 percent fines passing the No. 200 sieve (SM or SC), these soils can be used by blending these soils with the clean surficial sands and using proper moisture control and compaction techniques, to obtain specified field densities with vibratory equipment. The degree of compaction will be dependent upon the utilization of the fill (roadway, structural, etc.). Large rocks may occasionally be encountered in the surficial strata and will require crushing prior to use as structural fill. The amount of rock crushing should be determined during the excavation program. If large amounts of roots are encountered in any of the near surface soils, we recommend screening of these soils be completed to remove the roots prior to placement over the site.

As evidenced in the borings, possible structural sand fill material extends generally to depths of about 8 feet below the existing grade. Some of these overburden soils mixed with shell or crushed rock may also be suitable for use as roadway stabilized subbase material. Additional laboratory testing would be necessary to verify the suitability of the soils for this purpose. This testing would consist of Limerock Bearing Ratio tests of bulk samples that could be obtained during excavation.

The weathered limestone may be suitable for use as structural fill, after stockpiling so that the material can drain. Depending on the silt and clay content, a sheepsfoot roller may be required to compact these soils to the required density. If it is desired to further evaluate utilizing this materials as structural fill, we recommend GFA be contacted to provide recommendations for supplemental work required to use the soils in this manner.

3.1.2 Rock Excavation Recommendations

Based on our experience with rock formations in the site vicinity and the data obtained during this geotechnical exploration, we recommend you conduct test excavations to determine whether specialized heavy earthwork equipment will be needed to facilitate the excavation

process of the weathered to hard limestone encountered in the borings (ranging from 8 to 20 feet below the existing ground surface). We recommend you conduct several test excavations to confirm your excavation plan.

If blasting is performed, we recommend vibration monitoring of any nearby structures be performed. We also recommend pre-blasting condition surveys be performed for these structures to document the pre-existing conditions.

4.0 ENGINEERING EVALUATION AND RECOMMENDATIONS (BRIDGE)

4.1 General

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 failures in structural design and are usually sudden and catastrophic.

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 and is limited by the structural flexibility.

The subsurface soil conditions at the project site are generally favorable for the support of the proposed bridge structure on shallow or deep foundations. Recommendations for both options are presented below.

4.2 Site Preparation

GFA recommends the following compaction requirements for this project:

- Proof Roll ..... 95% of a Modified Proctor
- Building Pad Fill..... 95% of a Modified Proctor
- Footings ..... 95% of a Modified Proctor

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 12" below the tested surface unless noted otherwise. All density tests should be performed using the nuclear method (ASTM D-6938) or the sand cone method (ASTM D-1556).

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 be successful on projects with similar soil conditions.

1. Initial site preparation should consist of performing stripping and clearing operations. This should be done within, and to a distance of five (5) feet beyond, the perimeter of the proposed building footprint (including exterior isolated columns).

2. Following site stripping and prior the placement of any fill, areas of surficial sand (not exposed limestone) should be compacted ("proof rolled") and tested. We recommend using 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 rolled surface at a frequency of not less than one test per 2,500 square feet, or a minimum of four (4) tests, whichever is greater. Areas of exposed intact limestone shall be visually confirmed by the project geotechnical engineer prior to fill placement, in lieu of proof rolling.

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-GM, GP-GM) containing not more than 5 percent (by weight) organic materials. **Fill materials with silt-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 four (4) tests per lift, whichever is greater.

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 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 with lean concrete.

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 tests 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 fifty (50) lineal feet of wall footings.

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. A representative of GFA International can monitor the vibration disturbance of adjacent structures. A proposal for vibration monitoring during compaction operations can be supplied upon request.

4.3 Design of Footings (Shallow)

Footings may be designed using an allowable soil bearing pressure of 2,000 psf. Shallow foundations should be embedded a minimum of 18 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 regardless of contact pressure.

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. For maximum wall loads of 13 kips, settlements have been projected to be less than 1-inch total and ½-inch differential.

4.4 Driven Concrete Pile Foundation System

Based upon the subsurface soil conditions encountered in the test borings, a summary of driven pre-stressed concrete pile capacities is presented in the table below:

SUMMARY OF DRIVEN PILE CAPACITIES			
Pile Size (inches square)	Allowable Compression Capacity (tons)	Allowable Tension Capacity (tons)	Pile Embedment Depth (feet) (1)
18	60 - 80	2 - 4	18 - 22 (2)
18	100	4 - 6	35 - 40 (3)

(1) Embedment depth is based upon the ground surface elevation of our borings at the time of this field exploration program.
(2) We estimate pre-drilling to a depth of 10 feet (BGS) will be necessary for piles terminating in this limestone layer.
(3) We estimate pre-drilling to a depth of 25 feet (BGS) will be necessary for piles terminating in this limestone layer.

Depending on the final pile embedment depth pre-drilling may be required to penetrate the upper limestone layers located from about 6 to 10 feet and 17 to 25 feet bgs.

It should be noted that our recommendations for pile embedment depths are based solely on soil related considerations and have not taken into account any storm surge or possible scour effects. Evaluation of potential scour is outside of GFA's scope of expertise.

All site work and fill placement operations should be completed prior to the installation of piles to avoid adverse impacts such as damage to the piles and/or negative skin friction resulting in increased pile settlement. It is recommended that a minimum center-to-center pile spacing of 3 times the nominal pile diameter (e.g., 30 inch minimum spacing for 10 inch piles) be maintained.

In accordance with section 1810.3.3.1.2 of the Florida Building Code (2010 Edition) the proposed pile shall be load tested to verify the load carrying capacity of the selected pile. GFA recommends that Dynamic Load Testing using a Pile Driving Analyzer (PDA) be utilized for this site. Multiple piles can be tested in one day using PDA.

Prior to beginning the test pile program, the proposed pile and hammer specifications should be provided to GFA for review. GFA's review will include Wave Analysis to determine the suitability of the proposed hammer and preliminary driving criteria.

GFA should be retained to monitor the installation of the driven pile foundation system for this project. GFA's pile installation monitoring services will consist of monitoring the installation of each pile, documenting the number of hammer blows required to drive each pile for each linear foot, and evaluation of the pile driving records by a geotechnical engineer. Driving criteria will be established based on the PDA results. Each pile shall be driven until the established driving criteria have been achieved.

Piles should be driven with a hammer having a minimum energy proportionate to the size of the pile being driven. All pile driving operations should be performed in accordance with industry standards, applicable building codes, and the guidelines published by the Deep Foundations Institute (DFI).

Using pile driving equipment at this site may disturb adjacent structures. We recommend that you monitor nearby structures before and during pile driving operations. A representative of GFA International can monitor the vibration disturbance of adjacent structures. A proposal for vibration monitoring pile driving operations can be supplied upon request.

4.5 Soil Properties

The soil design parameters presented in the table below have been estimated based upon the results of the SPT tests, visual classification of the samples obtained and our past experience with similar soils.

TABLE OF SOIL PROPERTIES
Boring B-2

Depth (feet)	Description	Unit Weight (lb/ft^3)		Angle of Internal Friction (degrees)	Modulus of Subgrade Reaction (lb/in^3)	Earth Pressure Coefficient		
		Wet Unit Weight	Sub-merged			Passive (Kp)	Active (Ka)	At-Rest (Ko)
0 – 4	Medium Dense Sand (SP)	105	42	30	150	3.00	0.33	0.50
4 – 10	Very Dense Limestone (LS)	115	52	36	300	3.85	0.26	0.59
10 – 16	Loose Weathered Limestone (WLS)	105	42	30	120	3.00	0.33	0.50
16 – 22	Very Dense Limestone (LS)	115	52	36	300	3.85	0.26	0.59
22 – 28	Very Loose Weathered Limestone (WLS)	100	38	30	120	3.00	0.33	0.50
28 - 32	Loose Silty Sand (SM)	100	38	28	100	2.77	0.36	0.53
32 – 45'	Soft Limestone (LS)	110	48	34	200	3.54	0.28	0.56
45 - 75	Clayey Silt (ML)	95	32	28	90	2.77	0.36	0.53

4.6 Lateral Loads

For the 18-inch concrete, square, pre-cast piles we have estimated the deflection and moment for the free head and fixed head conditions at selected lateral loads. The information presented assumes an axial load is applied at the top of a fully embedded pile, and the lateral load is applied at the pile top. We recommend the designers use an appropriate factor of safety.

Axial Load = 160 kips, Lateral Load=10.2 kips, Pile Tip Depth = 20 feet BGS.

Ultimate Lateral Capacity Analysis*				
Applied Lateral Load (kips)	**18-inch Diameter Lateral Deflection (inches)**		**18-inch Diameter Maximum Moment (kip-feet)**	
	Fixed Head	**Free Head**	**Fixed Head**	**Free Head**
10.2	0.10	0.30	55.9	80.8

*Based on pre-drilling upper **10 feet** and backfilling with lean concrete (or similar). We recommend the designers use an appropriate factor of safety.

Axial Load=160 kips, Lateral Load = 10.2 kips, Pile Tip Depth = 38 feet BGS.

Ultimate Lateral Capacity Analysis*				
Applied Lateral Load (kips)	**18-inch Diameter Lateral Deflection (inches)**		**18-inch Diameter Maximum Moment (kip-feet)**	
	Fixed Head	**Free Head**	**Fixed Head**	**Free Head**
10.2	0.20	0.50	62.6	55.3

*Based on pre-drilling upper **25 feet** and backfilling with lean concrete (or similar). We recommend the designers use an appropriate factor of safety.

If additional information is required when the actual lateral loads are known, we should be contacted for guidance. We note that the deflection under a given lateral load can be expected to decrease significantly if the pile top is below ground surface.

5.0 REPORT LIMITATIONS

This consulting report has been prepared for the exclusive use of the current project owners and other members of the design team for the Addie's Corner Project in Naples, Collier 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. GFA is not responsible for damage caused by soil improvement and/or construction activity vibrations related to this project. GFA is also not responsible for damage concerning drainage or moisture related issues for the proposed or nearby structures.

6.0 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 and the description represents our interpretation of the subsurface conditions at the designated 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 methodology (ASTM D-1586) used in performing our borings and for determining penetration resistance is specific to the sampling tools utilized and does not reflect the ease or difficulty to advance other tools or materials.

Appendix A - Vicinity Map

VICINITY MAP

Tree Farm/ Addies Corner

Immokalee Road
Naples, Collier County, Florida
GFA International Project No.: 16-1655

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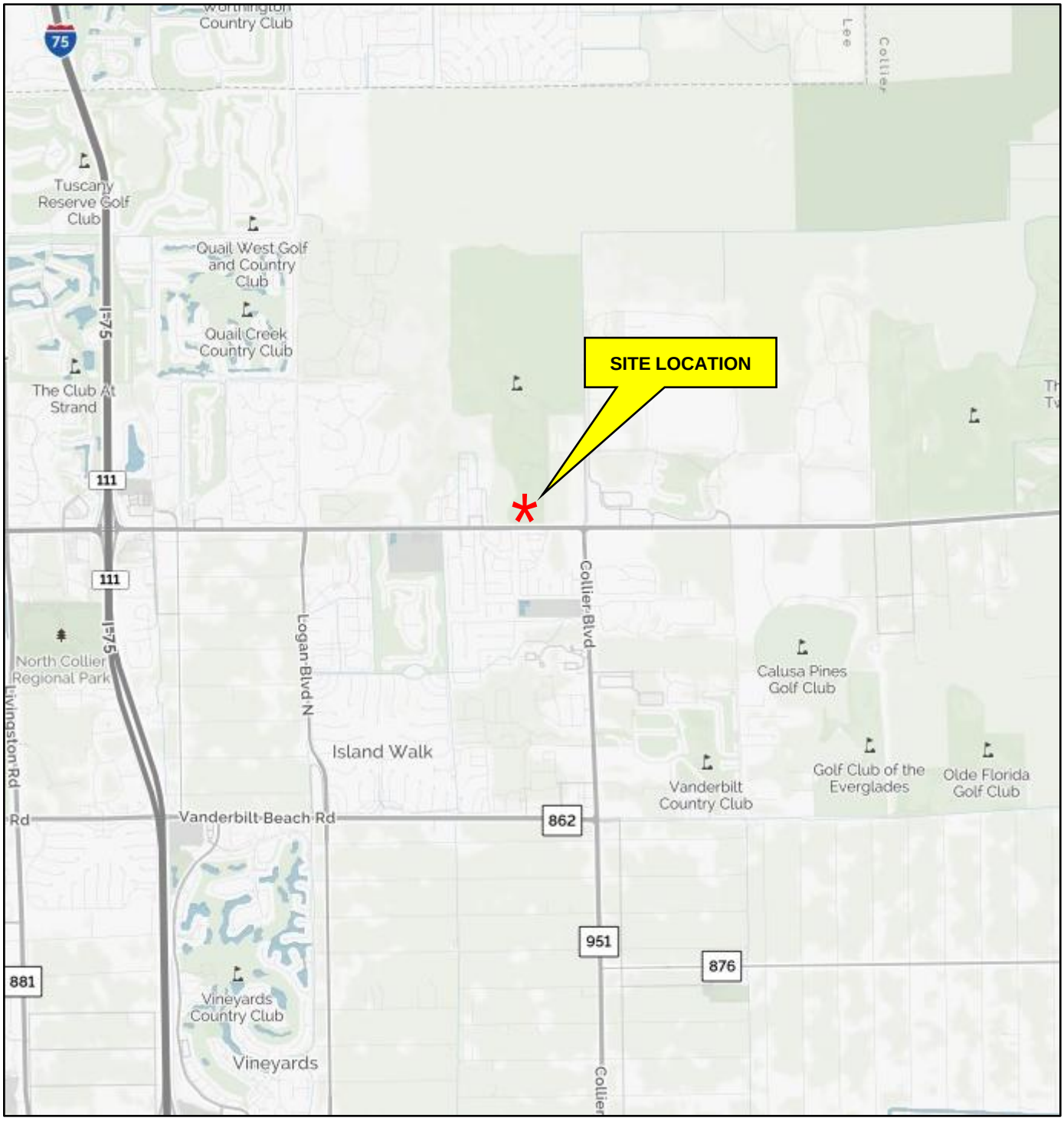

Appendix B - Test Location Plan

TEST LOCATION PLAN

Tree Farm/ Addies Corner
Bridge Area
Immokalee Road
Naples, Collier County, Florida
GFA International Project No.: 16-1655

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*Scale is an approximation and may not be accurate.

TEST LOCATION PLAN

Tree Farm/ Addies Corner

Lake Area

Immokalee Road

Naples, Collier County, Florida

GFA International Project No.: 16-1655

*Scale is an approximation and may not be accurate.

Appendix C - Notes Related to Borings

NOTES RELATED TO
RECORDS OF TEST BORING AND
GENERALIZED SUBSURFACE PROFILE

1. Groundwater level was encountered and recorded (if shown) following the completion of the soil test boring on the date indicated. Fluctuations in groundwater levels are common; consult report text for a discussion.

2. The boring location was identified in the field by offsetting from existing reference marks and using a cloth tape and survey wheel.

3. The borehole was backfilled to site grade following boring completion, and patched with asphalt cold patch mix when pavement was encountered.

4. The Record of Test Boring represents our interpretation of field conditions based on engineering examination of the soil samples.

5. The Record of Test Boring is subject to the limitations, conclusions and recommendations presented in the Report text.

6. "Field Test Data" shown on the Record of Test Boring indicated as 11/6 refers to the Standard Penetration Test (SPT) and means 11 hammer blows drove the sampler 6 inches. SPT uses a 140-pound hammer falling 30 inches.

7. The N-value from the SPT is the sum of the hammer blows required to drive the sampler the second and third 6-inch increments.

8. The soil/rock strata interfaces shown on the Records of Test Boring are approximate and may vary from those shown. The soil/rock conditions shown on the Records of Test Boring refer to conditions at the specific location tested; soil/rock conditions may vary between test locations.

9. Relative density for sands/gravels and consistency for silts/clays are described as follows:

SPT	CPT	SANDS/GRAVELS	SPT	CPT	SILTS/CLAYS
BLOWS/FOOT	KG/CM^2	RELATIVE DENSITY	BLOWS/FOOT	KG/CM^2	CONSISTENCY
0-4	0-16	Very loose	0-1	0-3	Very soft
5-10	17-40	Loose	2-4	4-9	Soft
11-30	41-120	Medium Dense	5-8	10-17	Firm
31-50	over 120	Dense	9-15	18-31	Stiff
over 50		Very Dense	16-30	32-60	Very stiff
			31-50	over 60	Hard

10. Grain size descriptions are as follows:

NAME	SIZE LIMITS
Boulder	12 Inches or more
Cobbles	3 to 12 Inches
Coarse Gravel	¾ to 3 Inches
Fine Gravel	No. 4 sieve to ¾ inch
Coarse Sand	No. 10 to No. 4 sieve
Medium Sand	No. 40 to No. 10 sieve
Fine Sand	No. 200 to No. 40 sieve
Fines	Smaller than No. 200 sieve

11. Definition of Descriptive Terms of Fines:

PROPORTION	ADJECTIVE
Up to 10%	with a trace
10 to 30%	with some

11. Definitions related to adjectives used in soil/rock descriptions:

PROPORTION	ADJECTIVE	APPROXIMATE ROOT DIAMETER	ADJECTIVE
Up to 10%	with a trace	Less than 1/32"	Fine roots
10 to 30%	with some	1/32" to ¼"	Small roots
30 to 50%	with	¼" to 1"	Medium roots
		Greater than 1"	Large roots

Appendix D - Record of Test Borings

GFA International, Inc
5851 Country Lakes Drive
Fort Myers, Florida 33905
239-489-2443 P
239-489-3438 F

BORING NUMBER B-1

CLIENT Creekside West Inc.
PROJECT NAME Addies Corner
PROJECT NUMBER 16-1655
PROJECT LOCATION Immokalee Road , Naples, FL
DATE STARTED 9/20/16 **COMPLETED** 9/28/16
GROUND ELEVATION
DRILLING CONTRACTOR GFA International
GROUND WATER LEVEL:
DRILLING METHOD SPT Borings
▽ **ENCOUNTERED AT (ft):** 6
DRILLED BY GC
NOTES

DEPTH (ft)	MAIN SOIL COMPONENT	OTHER COMPONENTS	BLOW COUNTS (N VALUE)
0	SAND (SP) Medium Dense	Brown with gravel	5-6-8-50/1"
		No recovery	50/0"
	Hard Limestone (LS) Very Dense		50/0"
5			
	SAND with Silt (SP-SM) Medium Dense	Dark Brown with tree roots	4-19-16-10 (35)
			6-8-7-20 (15)
10	Weathered Limestone (WLS) Loose	Gray with silty sand	
			4-3-3-3 (6)
15			
	Hard Limestone (LS) Very Dense	No recovery	50/0"
20			
			2-50/0"
25	Weathered Limestone (WLS) Loose	Gray with silty sand	
			4-3-1-2 (4)
30	Soft Limestone (LS) Medium Dense	Gray with sand	
			14-8-9-6 (17)
35	Hard Limestone (LS) Very Dense	Gray with sand	
			10-28-23-19 (51)
40			

RECOVERY % (RQD)

N-VALUE CURVE

0 10 20 30 40 50

MAIN BORING LOG 16-1655 ADDIES CORNER.GPJ MASTER BORING LOG.GDT 10/12/16

(Continued Next Page)

GFA International, Inc
5851 Country Lakes Drive
Fort Myers, Florida 33905
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239-489-3438 F

BORING NUMBER B-1

CLIENT Creekside West Inc. **PROJECT NAME** Addies Corner

PROJECT NUMBER 16-1655 **PROJECT LOCATION** Immokalee Road , Naples, FL

DEPTH (ft)	SPT	GRAPHIC LOG	MAIN SOIL COMPONENT	OTHER COMPONENTS	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	N-VALUE CURVE
40				Gray with sand *(continued)*			
45			Hard Limestone (LS) Very Dense		50/1"		
50			Weathered Limestone (WLS) Loose	Gray with silty sand	5-3-3-3 (6)		
				Bottom of hole at 50.0 feet.			

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BORING NUMBER B-2

CLIENT Creekside West Inc.
PROJECT NAME Addies Corner
PROJECT NUMBER 16-1655
PROJECT LOCATION Immokalee Road , Naples, FL
DATE STARTED 9/29/16 **COMPLETED** 9/30/16
GROUND ELEVATION
DRILLING CONTRACTOR GFA International
GROUND WATER LEVEL:
DRILLING METHOD SPT Borings
▽ **ENCOUNTERED AT (ft):** 6
DRILLED BY GC
NOTES

DEPTH (ft)	MAIN SOIL COMPONENT	OTHER COMPONENTS	BLOW COUNTS (N VALUE)
0	SAND (SP) Medium Dense	Brown with gravel	4-4-7-5 (11)
			3-4-6-50/3"
5	Hard Limestone (LS) Very Dense	No recovery	50/0"
			50/0"
10			50/0"
15	Weathered Limestone (WLS) Loose	Gray with silty sand	4-4-6-4 (10)
20	Hard Limestone (LS) Very Dense	No recovery	50/0"
25	Weathered Limestone (WLS) Loose	Gray with silty sand	2-1-1-3 (2)
30	Silty SAND (SM) Very Loose	Gray with gravel	3-1-1-1 (2)
35	Soft Limestone (LS) Medium Dense	Gray with silty sand	13-7-6-8 (13)
40			4-6-12-15 (18)

RECOVERY % (RQD)

N-VALUE CURVE

0 10 20 30 40 50

MAIN BORING LOG 16-1655 ADDIES CORNER.GPJ MASTER BORING LOG.GDT 10/12/16

(Continued Next Page)

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BORING NUMBER B-2

CLIENT Creekside West Inc. **PROJECT NAME** Addies Corner

PROJECT NUMBER 16-1655 **PROJECT LOCATION** Immokalee Road , Naples, FL

DEPTH (ft)	SPT	GRAPHIC LOG	MAIN SOIL COMPONENT	OTHER COMPONENTS	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	N-VALUE CURVE
40			Hard Limestone (LS) Very Dense	Gray with sand			
45					50/0"		
50			Weathered Limestone (WLS) Loose	Gray with silty sand	3-2-2-3 (4)		
55			Clayey SILT (ML) Soft	Green	1-2-2-2 (4)		
60					1-2-2-2 (4)		
65					1-2-2-3 (4)		
70					2-2-2-3 (4)		
75					2-3-3-4 (6)		
				Bottom of hole at 75.0 feet.			

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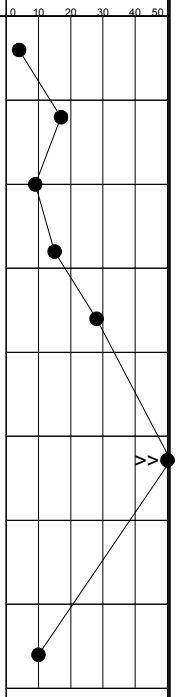
BORING NUMBER B-3

CLIENT Creekside West Inc.
PROJECT NAME Addies Corner
PROJECT NUMBER 16-1655
PROJECT LOCATION Immokalee Road , Naples, FL
DATE STARTED 10/4/16 **COMPLETED** 10/4/16
GROUND ELEVATION
DRILLING CONTRACTOR GFA International
GROUND WATER LEVEL:
DRILLING METHOD SPT Borings
▽ **ENCOUNTERED AT (ft):** 0.5
DRILLED BY GC
NOTES Boring location moved to approx. 30 feet east of staked location

DEPTH (ft)	MAIN SOIL COMPONENT	OTHER COMPONENTS	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)
0	SAND (SP) Loose	Brown	1-2-2-3 (4)	
	Silty SAND (SM) Medium Dense	Gray with some roots and gravel	4-8-9-6 (17)	
5			6-5-4-4 (9)	
			5-6-9-12 (15)	
	Weathered Limestone (WLS) Medium Dense	Gray with silty sand	8-18-10-8 (28)	
10				
			50/5"	
	Hard Limestone (LS) Very Dense	Gray		
15				
	Weathered Limestone (WLS) Medium Dense	Gray with silty sand	7-5-5-2 (10)	
20		Bottom of hole at 20.0 feet.		

N-VALUE CURVE



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BORING NUMBER B-4

CLIENT Creekside West Inc.
PROJECT NAME Addies Corner
PROJECT NUMBER 16-1655
PROJECT LOCATION Immokalee Road , Naples, FL
DATE STARTED 10/4/16 **COMPLETED** 10/4/16
GROUND ELEVATION
DRILLING CONTRACTOR GFA International
GROUND WATER LEVEL:
DRILLING METHOD SPT Borings
▽ **ENCOUNTERED AT (ft):** 0.3
DRILLED BY GC
NOTES

DEPTH (ft)	MAIN SOIL COMPONENT	OTHER COMPONENTS	BLOW COUNTS (N VALUE)
0	SAND (SP) Loose	Brown	1-1-2-2 (3)
			1-2-50/3"
	Hard Limestone (LS) Very Dense	No recovery probable boulder	
5	Silty SAND (SM) Medium Dense	Gray with some roots and gravel	4-6-10-10 (16)
			6-10-50/5"
		Gray	50/0"
10	Hard Limestone (LS) Very Dense		
			50/3"
15			
	Weathered Limestone (WLS) Loose	Gray with silty sand	
20			5-4-4-4 (8)
		Bottom of hole at 20.0 feet.	

RECOVERY % (RQD)

● N-VALUE CURVE

0 10 20 30 40 50

MAIN BORING LOG 16-1655 ADDIES CORNER.GPJ MASTER BORING LOG.GDT 10/12/16

Appendix E - Discussion of Soil Groups

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 5 percent passing the No. 200 sieve). The presence of the fines must not noticeably change the strength characteristics of the coarse-grained fraction and must not interface with it's free-draining characteristics.

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 material and very fine sands, with intermediate sizes lacking (sometimes called skip-graded, gap-graded or step-graded). 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 passing 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 plot 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 is 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 loess type soils and rock flours.

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 limit of 50. The soils are primarily inorganic 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 group.