



UNIVERSAL ENGINEERING SCIENCES

**GEOTECHNICAL EXPLORATION
PROPOSED RESIDENTIAL DEVELOPMENT
SW CORNER OF BORDER ROAD AND JACARANDA BOULEVARD
VENICE, SARASOTA COUNTY; FL**

**UES PROJECT NO.:1130.1800455.0000
UES REPORT NO.: 1313746**

Prepared For:

D.R. Horton
10541 Six Mile Cypress Parkway
Fort Myers, FL 33966

Prepared By:

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December 7, 2018



UNIVERSAL ENGINEERING SCIENCES

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December 6, 2018

D.R. Horton
10541 Six Mile Cypress Parkway
Fort Myers, FL 33966

Attn: Mr. Danny Garcia

Reference: **GEOTECHNICAL EXPLORATION**
Proposed Residential Development
SW Corner of Border Road and Jacaranda Boulevard
Venice, Sarasota County, FL
UES Project No.: 1130.1800455.0000
UES Report No.: 1313746

Dear Mr. Garcia:

Universal Engineering Sciences, Inc. (UES) has completed the subsurface exploration for the above referenced project. The scope of our exploration was planned in conjunction with and authorized by you.

This report contains the results of our exploration, an engineering interpretation of these results with respect to the project characteristics described to us, and recommendations to aid in foundation design, and site preparation.

We appreciate the opportunity to have worked with you on this project and look forward to a continued association. Please do not hesitate to contact us if you should have any questions, or if we may further assist you as your plans proceed.

Respectfully submitted,

UNIVERSAL ENGINEERING SCIENCES, INC.

Certificate of Authorization Number 549



Yudelsy Alvarez
Project Engineer

RG/YA:



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1.0 INTRODUCTION

1.1 GENERAL

In this report, we present the results of the subsurface exploration of the proposed residential development. A general location plan of the project appears in Appendix A: Site Location Plan. We have divided this report into the following sections:

- SCOPE OF SERVICES - Defines what we did
- FINDINGS - Describes what we encountered
- RECOMMENDATIONS - Describes what we encourage you to do
- LIMITATIONS - Describes the restrictions inherent in this report
- APPENDICES - Presents support materials referenced in this report.

2.0 SCOPE OF SERVICES

2.1 PROJECT DESCRIPTION

The project consists of the construction of a residential development (181 lots) with associated pavement and lake areas. The property is a wooded land located at the southwest corner of Border Road and Jacaranda Boulevard in Venice, FL. A site plan showing the development layout and the soil boring locations was provided to us.

Structural details were not provided to UES at this time. We have assumed maximum wall and column loads of 3 Kips per lineal foot, and 30 Kips, respectively.

Our recommendations are based upon the above considerations. If any of this information is incorrect or if you anticipate any changes, inform Universal Engineering Sciences so that we may review our recommendations.

2.2 PURPOSE

The purposes of this exploration were:

- To explore the general subsurface conditions at the site;
- To interpret and review the subsurface conditions with respect to the proposed construction; and
- To provide geotechnical engineering recommendations for foundation design, and site preparation.

Recommendations concerning other soil related considerations were beyond the scope of our exploration. This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. Our work did not address the potential for surface expression of deep geological conditions, such as sinkhole development related to karst activity. The recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards. Universal Engineering Sciences would be pleased to



perform these services, if you desire.

2.3 FIELD EXPLORATION

The subsurface conditions were explored by drilling and sampling thirteen (13) Standard Penetration Test (SPT) borings across the lot to a depth of 10 feet below existing grades.

We performed the Standard Penetration Test using our truck mounted drill rig utilizing mud rotary procedures according to the procedures of ASTM D-1586, with continuous sampling performed above a depth of 10 feet, to detect slight variations in the soil profile at shallow depths, and then at five-foot intervals thereafter. The basic procedure for the Standard Penetration Test is as follows: A standard split-barrel sampler is driven into the soil by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler 1-foot, after seating 6 inches, is designated the penetration resistance, or N-value; this value is an index to soil strength and consistency.

The boring locations were located by our drill crew based on the site plan and existing site conditions. The test boring locations are shown on the attached Boring Location Plan in Appendix A as B-1 through B-13.

3.0 FINDINGS

3.1 SURFACE CONDITIONS

A Universal Engineering Sciences representative performed a visual site observation of the subject property to gain a "hands-on" familiarity of the project area. At the time of our exploration, the site was relatively level and wooded with existing lakes.

3.2 SOIL SURVEY-PUBLISHED INFORMATION

The "Soil Survey of Sarasota County, Florida", published by the published by the United States Department of Agriculture (USDA) - Soil Conservation Service (SCS), was reviewed for general near-surface soil information prior to development within the general project vicinity. The USDA, SCS primary soil mapping groups within the proposed project area, and some characteristics and properties are summarized below. The location of these groups can be observed on the SCS Soil Survey Map provided in Appendix A.

EauGallie and Myakka (Soil Group No. 10): Under natural conditions, this soil group consists of fine sands from the surface to a depth of about 48 inches, sandy loam from 48 to 66 inches, and loamy fine sand from 66 to 80 inches below grade. Based on the soil survey, the water table is from 6 to 18 inches below grade.

Felda (soil Group No. 12): This soil group consists of fine sands from the surface to a depth of about 22 inches, sandy loam from 22 to 60 inches, and loamy sand from 60 to 80 inches below grade. Based on the soil survey, the water table is at the ground surface.

Holopaw (Soil Group No. 22): This soil group consists of fine sands from the surface to a depth of about 50 inches, sandy loam from 50 to 66 inches, and loamy fine sand from 66 to 80 inches below grade. Based on the soil survey, the water table is at the ground surface.



Pineda (soil Group No. 31): This soil group consists of fine sands from the surface to a depth of about 36 inches, sandy clay loam from 36 to 63 inches, and fine sand from 63 to 80 inches below grade. Based on the soil survey, the water table is from the surface to 12 inches below grade.

Pople (Soil Group No. 36): Under natural conditions, this soil group consists of fine sands from the surface to a depth of about 28 inches, fine sandy loam from 28 to 56 inches, and fine sand from 56 to 80 inches. Based on the soil survey, the water table is from 0 to 12 inches below grade.

3.3 SUBSURFACE CONDITIONS

The boring locations and detailed subsurface conditions are illustrated in Appendix A: Boring Location Plan and Boring Logs. The classifications and descriptions shown on the logs are generally based upon visual characterizations of the recovered soil samples. Also, see Appendix A: Soils Classification Chart, for further explanation of the symbols and placement of data on the Boring Logs. The following table summarizes the soil conditions encountered.

TABLE 1 General Soil Profile		
Typical depth (ft)		Soil Descriptions
From	To	
0	2	Loose fine sand with roots [SP]
2	4	Medium dense fine sand, fine sand with silt and clay, and clayey sand with trace roots [SP, SP-SM, SP-SC, SC]
4	6	Medium dense to dense fine sand, and fine sand with silt, clay, and shell [SP, SP-SM, SP-SC]
6	8	Medium dense to dense fine sand with shell [SP]
8	10*	Medium dense fine sand with shell [SP]
* Termination Depth of Deepest Boring		
[] Bracketed Text Indicates: Unified Soil Classification		

Variations in the depth, thickness and consistency of the aforementioned soil strata occurred at the individual test boring locations. We encountered groundwater at depths ranging from 4 to 4.1 feet below existing grade at the time of our investigation. The variations in the measured water levels are attributed to the variation in the ground surface elevation at this site as well as the soil type encountered.

A notable feature is the presence of dense sand layers encountered in the borings from approximately 4 to 8 feet below grade. This soil may vary across the site in depth and consistency, and may be difficult to excavate.



Shallow clayey soils were encountered in the soil borings. These soils may be moisture sensitive and difficult to compact if encountered during construction.

4.0 RECOMMENDATIONS

4.1 GENERAL

The following recommendations are made based upon a review of the attached soil test data, our understanding of the proposed construction, and experience with similar projects and subsurface conditions. If the assumed structural loadings, building locations, building sizes, or grading plans change or are different from those discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes.

Additionally, if subsurface conditions are encountered during construction which was not encountered in the borings, report those conditions immediately to us for observation and recommendations.

In this section of the report, we present our detailed recommendations for groundwater control, building foundations, and site preparation.

4.2 GROUNDWATER CONSIDERATIONS

The groundwater table will fluctuate seasonally depending upon local rainfall and tidal fluctuation. Temporary dewatering may be required for deeper excavations, such as large foundation elements, elevator pits and utility trenches. Surface drainage and dewatering measures may be required during site preparation procedures such as proof-compacting of the existing soils, and fill placement particularly if construction proceeds during the wet season. Further, we recommend that the groundwater table be maintained 18 to 24 inches below earthwork and compaction surfaces.

We recommend sufficient quantities of fill be placed in the building and pavement areas to mitigate the effect of groundwater on shallow excavations, such as foundations. Further, we recommend the bottom of the base course used in pavement construction be maintained at least 18 inches above the seasonal high water levels.

Temporary dewatering may be required during site preparation, especially if construction proceeds during the wet season or periods of heavy rainfall. Temporary dewatering may also be required for deeper excavations, such as utility trenches, the backfilling of the drainfield area and other excavations. We recommend that the contract documents provide for determining the groundwater level just prior to construction and for any dewatering measures which might be required. We recommend that the groundwater table be maintained at least 24 inches below all earthwork and compaction surfaces.

4.3 BUILDING FOUNDATIONS

We believe the proposed structure can be supported on conventional shallow foundation provided the site is properly prepared and the foundation loading conditions do not exceed the values outlined earlier in this report. The following parameters may be used for foundation design.



4.3.1 Bearing Pressure

The maximum allowable net soil bearing pressure for shallow foundations should not exceed 2,500 pounds per square foot (psf). Net bearing pressure is defined as the soil bearing pressure at the base of the foundation in excess of the natural overburden pressure. The foundations should be designed based upon the maximum load that could be imposed by all loading conditions.

4.3.2 Foundation Size

The minimum widths recommended for any isolated column footing and continuous wall footing is 24 inches and 18 inches, respectively. Even though the maximum allowable soil bearing pressure may not be achieved, this width recommendation should control the size of the foundations.

4.3.3 Bearing Depth

The exterior foundations should bear at a depth of at least 18 inches below the exterior final grades. We recommend stormwater and surface water be diverted away from the building exteriors, both during and after construction to reduce the possibility of erosion beneath the exterior footings.

4.3.4 Bearing Material

The foundations may bear on either the compacted suitable natural soils or compacted structural fill as recommended in the site preparation of this report. The bearing level soils, after compaction should have compaction to at least 95 percent of the maximum dry density of the bearing soils as determined by ASTM D-1557 (Modified Proctor), to the depth described subsequently in the Site Preparation section of the report. In addition to compaction the bearing soils must exhibit stability and be free of "pumping" conditions. If moisture sensitive soils are encountered and compaction is difficult to achieve, the footings can be treated with dry suitable material or acceptable crushed aggregate.

4.3.5 Settlement Estimates

Post-construction settlement of the structure will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics of the bearing soils to a depth of approximately twice the width of the footing; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundation; (3) site preparation and earthwork construction techniques used by the contractor, and (4) external factors, including but not limited to vibration from offsite sources and groundwater fluctuations beyond those normally anticipated for the naturally-occurring site and soil conditions which are present.

Our settlement estimates for the structure are based upon the use of successful adherence to the site preparation recommendations presented later in this report and the maximum loading conditions previously discussed. Any deviation from these recommendations could result in an increase in the estimated post-construction settlement of the structure.



Using the recommended maximum bearing pressure, the assumed maximum structural loads, and the field and laboratory test data which we have correlated into the strength and compressibility characteristics of the subsurface soils, we estimate the total settlements of the structure to be 1 inch or less.

Differential settlements result from differences in applied bearing pressures and the variations in the compressibility characteristics of the subsurface soils. For the foundations prepared as recommended, we anticipate post construction differential settlements of ½-inch or less.

4.3.6 Floor Slabs

The floor slabs will be supported on compacted fill and either is structurally isolated from the other foundation elements or monolithic floor slabs adequately reinforced to prevent distress due to differential movements. For building design, we recommend using a subgrade reaction modulus of 150 pounds per cubic inch (pci) which can be achieved by compacting the subgrade soils as recommended in the site preparation procedure. We recommend the use of a sheet vapor barrier such as visqueen beneath the building slab on grade to help control moisture migration through the slab.

4.4 SITE PREPARATION

We recommend only good practice, site preparation procedures in conjunction with the densification of the upper 1 foot of existing subgrade soils. These procedures include: stripping the site of all existing improvements, vegetation, roots and topsoil, proof-rolling and compacting the subgrade to a depth of 1 foot, and filling to grade with engineered fill.

A more detailed synopsis of this work is as follows:

1. If required, perform remedial dewatering prior to any earthwork operations.
2. Strip the proposed construction limits of all existing improvements, vegetation, grass, roots, topsoil, and other deleterious materials within and 10 feet beyond the perimeter of the proposed building and in all paved areas. Moreover, any existing and/or former below grade elements, such as foundations and utilities should be removed from the limits of the planned building and pavement areas. Any resulting excavations should be replaced with compacted fill according to the recommendations provided later in this section of our report. You should anticipate 6 to 12 inches of stripping. In areas of deeper root bed, additional stripping may be required.
3. After stripping the site as outlined above in Item #2, proof-roll the subgrade with a heavily loaded, rubber-tired vehicle under the observation of a Universal Engineering Sciences geotechnical engineer or his representative. Proof-rolling will help locate any zones of especially loose or soft soils not encountered in the soil test borings. Then undercut, or otherwise treat these zones as recommended by the engineer.
4. Compact the subgrade from the surface until you obtain a minimum density of 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), to a depth of 1 foot below existing grade in the building areas.



5. Test the subgrade for compaction at a frequency of not less than one test per 2,500 square feet per foot of depth improvement in the building area.
6. Place fill and backfill material, as required. The fill should consist of "clean," fine sand with less than 5 percent soil fines. You may use fill materials with soil fines between 5 and 10 percent, but strict moisture control may be required. Place fill in uniform 12-inch compacted lifts and compact each lift to a minimum density of 95 percent of the Modified Proctor maximum dry density.
7. Perform in-place density tests within the fill at a frequency of not less than one test per 2,500 square feet per lift in the building areas.
8. Compact all footings to a depth of 1 foot. Additionally, we recommend that you test one out of every four column footings, and one test per every 50 lineal feet of wall footing to verify the required compaction is obtained.

Using vibratory compaction equipment at this site may disturb adjacent and other nearby structures and roadways. We recommend that you monitor adjacent and nearby structures before and during proof-compaction. If disturbance is noted, halt vibratory compaction and inform Universal Engineering Sciences immediately. We will review the compaction procedures and evaluate if the compactive effort results in a satisfactory subgrade, complying with our original design assumptions.

4.5 CONSTRUCTION RELATED SERVICES

We recommend the owner retain Universal Engineering Sciences to perform construction materials tests and observations on this project. Field tests and observations include verification of foundation and pavement subgrades by monitoring proof-rolling operations and performing quality assurance tests on the placement of compacted structural fill and pavement courses.

The geotechnical engineering design does not end with the advertisement of the construction documents. The design is an on-going process throughout construction. Because of our familiarity with the site conditions and the intent of the engineering design, we are most qualified to address problems that might arise during construction in a timely and cost-effective manner.

5.0 LIMITATIONS

This report has been prepared in order to aid the architect/engineer in the design of the proposed residential development. The scope of services provided was limited to the specific project and locations described herein. The description of the project's design parameters represents our understanding of significant aspects relevant to soil and foundation characteristics.

The recommendations submitted in this report are based upon the data obtained from the limited number of soil borings performed at the locations indicated on the Boring Location Plan and from other information as referenced. This report does not reflect any variations which may occur between the boring locations or unexplored areas of the site. This report should not be used for estimating such items as cut and fill quantities.



Borings for a typical geotechnical report are widely spaced and generally not sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on our boring information to negate presence of anomalous materials or for estimation of material quantities unless our contracted services **specifically** include sufficient exploration for such purpose(s) and within the report we so state that the level of exploration provided should be sufficient to detect such anomalous conditions or estimate such quantities. Therefore, UES will not be responsible for any extrapolation or use of our data by others beyond the purpose(s) for which it is applicable or intended.

All users of this report are cautioned that there was no requirement for Universal to attempt to locate any man-made buried objects or identify any other potentially hazardous conditions that may exist at the site during the course of this exploration. Therefore no attempt was made by Universal to locate or identify such concerns. Universal cannot be responsible for any buried man-made objects or environmental hazards which may be subsequently encountered during construction that are not discussed within the text of this report. We can provide this service if requested.

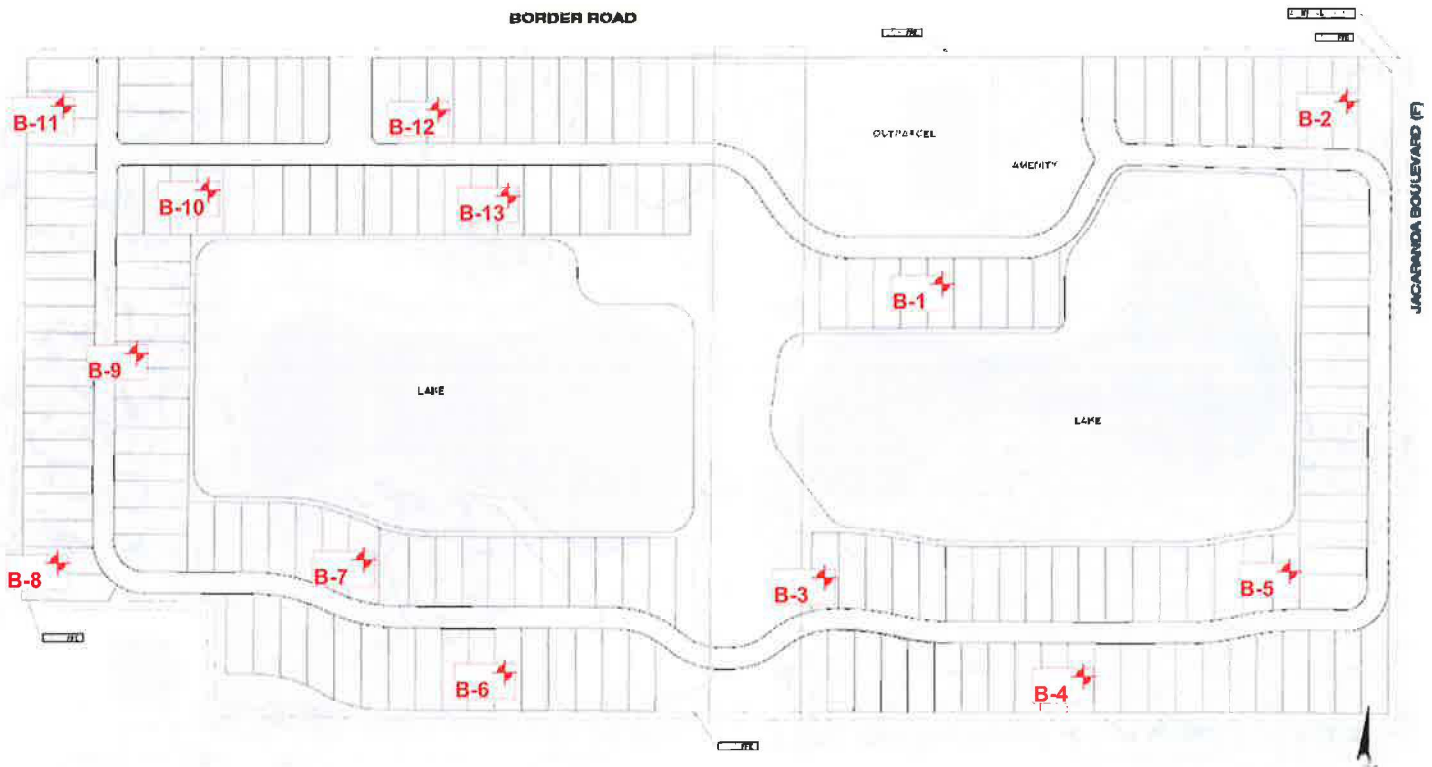
For a further description of the scope and limitations of this report please review the document attached within Appendix B "Important Information About Your Geotechnical Engineering Report" prepared by ASFE, an association of firms practicing in the geosciences.




APPENDIX A



A-1	SITE LOCATION PLAN	PROPOSED RESIDENTIAL DEVELOPMENT BORDER ROAD VENICE, SARASOTA COUNTY, FL		DRAWN FOR	DR HORTEN		UNIVERSAL ENGINEERING SCIENCES 1748 INDEPENDENCE BLVD. SARASOTA, FL. 941-358-7410
	OBTAINED FROM YAHOO MAPS 2018	PROJECT NO: 1130.1800455.0000	REPORT NO: 13746	DRILLED BY	MW / LR		
				DRAWN BY	R.L.D		
				DRAWING DATE	12/7/2018		
				SCALE	NOT TO SCALE		



LEGEND	
APPROXIMATE LOCATION	
	SPT BORING



A-2	BORING LOCATION PLAN	PROPOSED RESIDENTIAL DEVELOPMENT BORDER ROAD VENICE, SARASOTA COUNTY, FL		DRAWN FOR	DR HORTEN		UNIVERSAL ENGINEERING SCIENCES 1748 INDEPENDENCE BLVD. SARASOTA, FL. 941-358-7410
	THIS MAP SHOWS APPROXIMATE LOCATION			PROJECT NO: 1130.1800455.0000	REPORT NO: 13746		
				DRAWN BY	R.L.D.		
				DRAWING DATE	12/7/2018		
				SCALE	NOT TO SCALE		



A-3

**SCS SOIL SURVEY
MAP**

OBTAINED FROM WEB SOIL
SURVEY 2018

PROPOSED RESIDENTIAL
DEVELOPMENT
BORDER ROAD
VENICE, SARASOTA COUNTY, FL

PROJECT NO:
1130.1800455.0000

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SCALE	NOT TO SCALE



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941-358-7410

A-4

SOIL BORING PROFILES

SOIL BORING TEST ARE APPROXIMATE
SUBSURFACE VARIATIONS BETWEEN
BORINGS SHOULD BE ANTICIPATED

PROPOSED RESIDENTIAL
DEVELOPMENT
BORDER ROAD
VENICE, SARASOTA COUNTY, FL

PROJECT NO
1130.1800455.0000

REVISION NO
13746

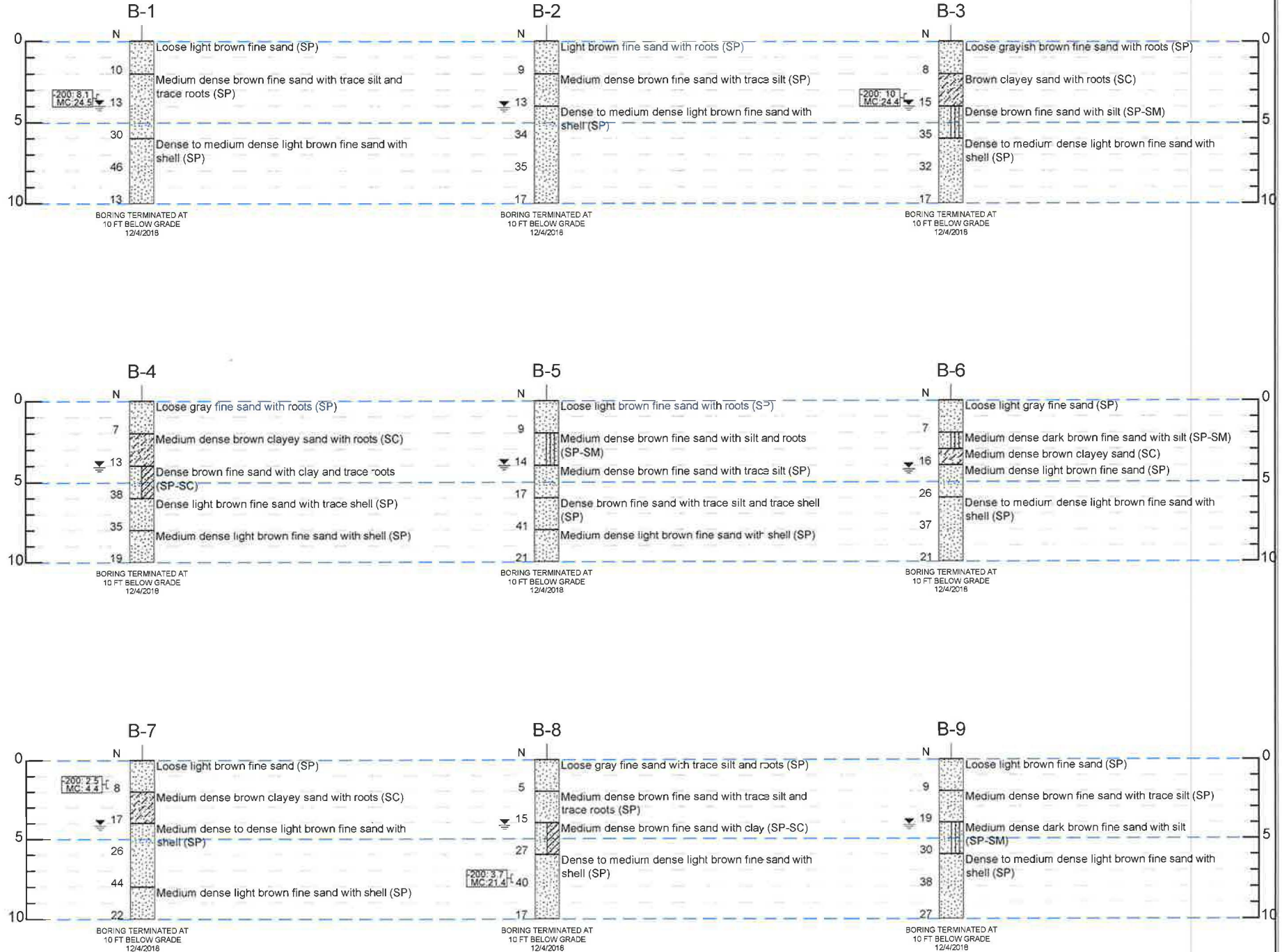
DRAWN FOR
DR. HORTEN

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IMV/LR

SCALE
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A-4

SOIL BORING
PROFILESSOIL BORING TEST ARE APPROXIMATE
SUBSURFACE VARIATIONS BETWEEN
BORINGS SHOULD BE ANTICIPATED

PROPOSED RESIDENTIAL
DEVELOPMENT
BORDER ROAD
VENICE, SARASOTA COUNTY, FL

PROJECT NO.
1130.1800455.0000

REFERENCE
13746

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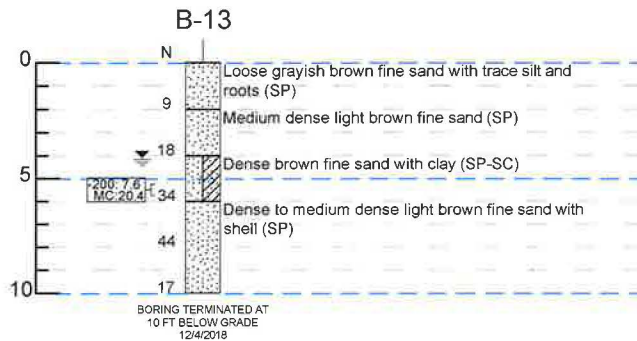
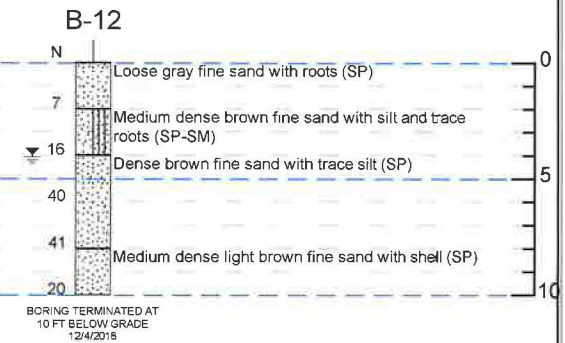
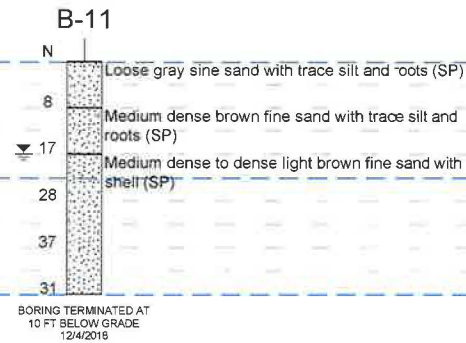
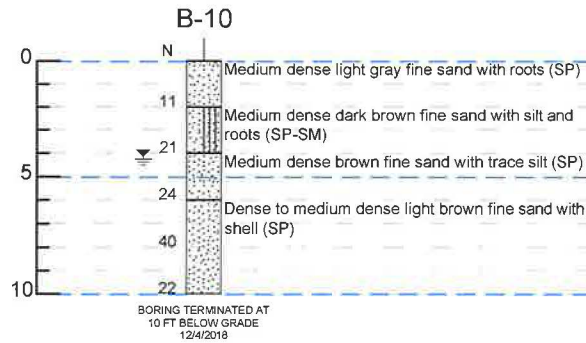
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12/7/2018

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LEGEND

[SP] UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL (ASTM D2487), BASED ON VISUAL OBSERVATION AND LABORATORY TEST.

N STANDARD PENETRATION RESISTANCE (N-VALUE) IN BLOWS PER FOOT (ASTM D1586)

HA HAND AUGER

GROUND WATER LEVEL MEASURED ON DATE DRILLED

GNE GROUNDWATER LEVEL NOT ENCOUNTERED

← (%) LOSS OF CIRCULATION (%)

-200 FINES PASSING NO. 200 U.S. STANDARD SIEVE (%)

WOH WEIGHT OF HAMMER

50/1" 50 BLOWS FOR 1 INCH

OC ORGANIC CONTENT (%)

MC NATURAL MOISTURE CONTENT (%)

PL PLASTICITY INDEX (%)

LL LIQUID LIMIT (%)

NP NON PLASTIC

UCS UNCONFINED COMPRESSION STRENGTH

CORRELATION OF STANDARD PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY OF SOIL			
COARSE-GRAINED SOL-S-SANDS		FINES - CLAY AND SILT	
CONSISTENCY DESIGNATION	SPT N(BLOWS/FT)	CONSISTENCY DESIGNATION	SPT N(BLOWS/FT)
VERY LOOSE	0-4	VERY SOFT	0-1
LOOSE	5-10	SOFT	2-3
MEDIUM DENSE	11-30	MEDIUM STIFF	4-7
DENSE	31-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	16-31
		HARD	32-50
		VERY HARD	>50



SOIL CLASSIFICATION CHART

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE-GRAINED SOILS (major portions retained on No. 200 sieve): includes (1) clean gravel and sands and (2) silty or clayey gravels and sands. Condition is rated according to relative density as determined by laboratory tests or standard penetration resistance tests.

Descriptive Terms	Relative Density	SPT Blow Count
Very loose	0 to 15 %	< 4
Loose	15 to 35 %	4 to 10
Medium dense	35 to 65 %	10 to 30
Dense	65 to 85 %	30 to 50
Very dense	85 to 100 %	> 50

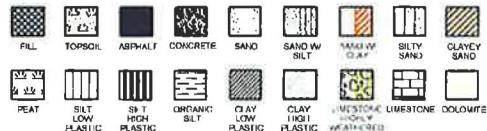
FINE-GRAINED SOILS (major portions passing on No. 200 sieve): includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings, SPT blow count, or unconfined compression tests.

Unconfined Compressive		
Descriptive Terms	Strength kPa	SPT Blow Count
Very soft	< 25	< 2
Soft	25 to 50	2 to 4
Medium stiff	50 to 100	4 to 8
Stiff	100 to 200	8 to 15
Very stiff	200 to 400	15 to 30
Hard	> 400	> 30

GENERAL NOTES

- Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.
- Surface elevations are based on topographic maps and estimated locations.
- Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were made. They are not guaranteed to be representative of subsurface conditions at other locations or times.

SOIL SYMBOLS



OTHER SYMBOLS

- Measured Water Table Level Estimated Seasonal High Water Table

Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria		Particle Size	
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	Not meeting all gradation requirements for GW	mm < 0.075	Sieve sizes < #200
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines				
		GM	Silty gravels, gravel-sand-silt mixtures				
		GC	Clayey gravels, gravel-sand-silt mixtures				
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	Not meeting all gradation requirements for SW	mm < 0.075	Material Silt or clay Sand Fine Medium Coarse
		SP	Poorly-graded sands, gravelly sands, little or no fines				
		SM	Silty sands, sand-silt mixtures				
		SC	Clayey sands, sand-clay mixtures				
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Sils and Clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity		FOR CLARIFICATION OF FINE-GRAINED SOIL AND FINE-GRAINED FRACTION OF COARSE-GRAINED SOILS	mm 4.75 to 19.1	Sieve #4 to 3/4 in 3/4 in to 3 in 3 in to 12 in 12 in to 36 in
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
		OL	Organic silts and organic silty clays of low plasticity				
	Sils and Clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts				
		CH	Inorganic clays of high plasticity, fat clays				
		OH	Organic clays of medium to high plasticity, organic silts				
	Highly Organic Soils	Pt	Peat and other highly organic soils				

* When the percent passing a No. 200 sieve is between 5% and 12%, a dual symbol is used to denote the soil. For example, SP-SC, poorly-graded sand with clay content between 5% and 12%.

APPENDIX B

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared solely for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated subsurface conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only from the design drawings and specifications*. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



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CONSTRAINTS AND RESTRICTIONS

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until construction begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other explorations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of exploration. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

Universal Engineering Sciences, Inc.
GENERAL CONDITIONS

SECTION 1: RESPONSIBILITIES

- 1.1 Universal Engineering Sciences, Inc., ("UES"), has the responsibility for providing the services described under the Scope of Services section. The work is to be performed according to accepted standards of care and is to be completed in a timely manner. The term "UES" as used herein includes all of Universal Engineering Sciences, Inc.'s agents, employees, professional staff, and subcontractors.
- 1.2 The Client or a duly authorized representative is responsible for providing UES with a clear understanding of the project nature and scope. The Client shall supply UES with sufficient and adequate information, including, but not limited to, maps, site plans, reports, surveys and designs, to allow UES to properly complete the specified services. The Client shall also communicate changes in the nature and scope of the project as soon as possible during performance of the work so that the changes can be incorporated into the work product.
- 1.3 The Client acknowledges that UES's responsibilities in providing the services described under the Scope of Services section is limited to those services described therein, and the Client hereby assumes any collateral or affiliated duties necessitated by or for those services. Such duties may include, but are not limited to, reporting requirements imposed by any third party such as federal, state, or local entities, the provision of any required notices to any third party, or the securing of necessary permits or permissions from any third parties required for UES's provision of the services so described, unless otherwise agreed upon by both parties.
- 1.4 Universal will not be responsible for scheduling our services and will not be responsible for tests or inspections that are not performed due to a failure to schedule our services on the project or any resulting damages.
- 1.5 **PURSUANT TO FLORIDA STATUTES §558.0035, ANY INDIVIDUAL EMPLOYEE OR AGENT OF UES MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.**

SECTION 2: STANDARD OF CARE

- 2.1 Services performed by UES under this Agreement will be conducted in a manner consistent with the level of care and skill ordinarily exercised by members of UES's profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty, express or implied, is made.
- 2.2 The Client recognizes that subsurface conditions may vary from those observed at locations where borings, surveys, or other explorations are made, and that site conditions may change with time. Data, interpretations, and recommendations by UES will be based solely on information available to UES at the time of service. UES is responsible for those data, interpretations, and recommendations, but will not be responsible for other parties' interpretations or use of the information developed.
- 2.3 Execution of this document by UES is not a representation that UES has visited the site, become generally familiar with local conditions under which the services are to be performed, or correlated personal observations with the requirements of the Scope of Services. It is the Client's responsibility to provide UES with all information necessary for UES to provide the services described under the Scope of Services, and the Client assumes all liability for information not provided to UES that may affect the quality or sufficiency of the services so described.
- 2.4 Should UES be retained to provide threshold inspection services under Florida Statutes §553.79, Client acknowledges that UES's services thereunder do not constitute a guarantee that the construction in question has been properly designed or constructed, and UES's services do not replace any of the obligations or liabilities associated with any architect, contractor, or structural engineer. Therefore it is explicitly agreed that the Client will not hold UES responsible for the proper performance of service by any architect, contractor, structural engineer or any other entity associated with the project.

SECTION 3: SITE ACCESS AND SITE CONDITIONS

- 3.1 Client will grant or obtain free access to the site for all equipment and personnel necessary for UES to perform the work set forth in this Agreement. The Client will notify any and all possessors of the project site that Client has granted UES free access to the site. UES will take reasonable precautions to minimize damage to the site, but it is understood by Client that, in the normal course of work, some damage may occur, and the correction of such damage is not part of this Agreement unless so specified in the Proposal.
- 3.2 The Client is responsible for the accuracy of locations for all subterranean structures and utilities. UES will take reasonable precautions to avoid known subterranean structures, and the Client waives any claim against UES, and agrees to defend, indemnify, and hold UES harmless from any claim or liability for injury or loss, including costs of defense, arising from damage done to subterranean structures and utilities not identified or accurately located. In addition, Client agrees to compensate UES for any time spent or expenses incurred by UES in defense of any such claim with compensation to be based upon UES's prevailing fee schedule and expense reimbursement policy.

SECTION 4: SAMPLE OWNERSHIP AND DISPOSAL

- 4.1 Soil or water samples obtained from the project during performance of the work shall remain the property of the Client.
- 4.2 UES will dispose of or return to Client all remaining soils and rock samples 60 days after submission of report covering those samples. Further storage or transfer of samples can be made at Client's expense upon Client's prior written request.
- 4.3 Samples which are contaminated by petroleum products or other chemical waste will be returned to Client for treatment or disposal, consistent with all appropriate federal, state, or local regulations.

SECTION 5: BILLING AND PAYMENT

- 5.1 UES will submit invoices to Client monthly or upon completion of services. Invoices will show charges for different personnel and expense classifications.
- 5.2 Payment is due 30 days after presentation of invoice and is past due 31 days from invoice date. Client agrees to pay a finance charge of one and one-half percent (1 ½ %) per month, or the maximum rate allowed by law, on past due accounts.
- 5.3 If UES incurs any expenses to collect overdue billings on invoices, the sums paid by UES for reasonable attorneys' fees, court costs, UES's time, UES's expenses, and interest will be due and owing by the Client.

SECTION 6: OWNERSHIP AND USE OF DOCUMENTS

- 6.1 All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, as instruments of service, shall remain the property of UES.
- 6.2 Client agrees that all reports and other work furnished to the Client or his agents, which are not paid for, will be returned upon demand and will not be used by the Client for any purpose.
- 6.3 UES will retain all pertinent records relating to the services performed for a period of five years following submission of the report, during which period the records will be made available to the Client at all reasonable times.
- 6.4 All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, are prepared for the sole and exclusive use of Client, and may not be given to any other party or used or relied upon by any such party without the express written consent of UES.

SECTION 7: DISCOVERY OF UNANTICIPATED HAZARDOUS MATERIALS

- 7.1 Client warrants that a reasonable effort has been made to inform UES of known or suspected hazardous materials on or near the project site.
- 7.2 Under this agreement, the term hazardous materials include hazardous materials (40 CFR 172.01), hazardous wastes (40 CFR 261.2), hazardous substances (40 CFR 300.6), petroleum products, polychlorinated biphenyls, and asbestos.
- 7.3 Hazardous materials may exist at a site where there is no reason to believe they could or should be present. UES and Client agree that the discovery of unanticipated hazardous materials constitutes a changed condition mandating a renegotiation of the scope of work. UES and Client also agree that the discovery of unanticipated hazardous materials may make it necessary for UES to take immediate measures to protect health and safety. Client agrees to compensate UES for any equipment decontamination or other costs incident to the discovery of unanticipated hazardous waste.
- 7.4 UES agrees to notify Client when unanticipated hazardous materials or suspected hazardous materials are encountered. Client agrees to make any disclosures required by law to the appropriate governing agencies. Client also agrees to hold UES harmless for any and all consequences of disclosures made by UES which are required by governing law. In the event the project site is not owned by Client, Client recognizes that it is the Client's responsibility to inform the property owner of the discovery of unanticipated hazardous materials or suspected hazardous materials.
- 7.5 Notwithstanding any other provision of the Agreement, Client waives any claim against UES, and to the maximum extent permitted by law, agrees to defend, indemnify, and save UES harmless from any claim, liability, and/or defense costs for injury or loss arising from UES's discovery of unanticipated hazardous materials or suspected hazardous materials including any costs created by delay of the project and any cost associated with possible reduction of the property's value. Client will be responsible for ultimate disposal of any samples secured by UES which are found to be contaminated.

SECTION 8: RISK ALLOCATION

- 8.1 Client agrees that UES's liability for any damage on account of any breach of contract, error, omission or other professional negligence will be limited to a sum not to exceed \$50,000 or UES's fee, whichever is greater. If Client prefers to have higher limits on contractual or professional liability, UES agrees to increase the limits up to a maximum of \$1,000,000.00 upon Client's written request at the time of accepting our proposal provided that Client agrees to pay an additional consideration of four percent of the total fee, or \$400.00, whichever is greater. The additional charge for the higher liability limits is because of the greater risk assumed and is not strictly a charge for additional professional liability insurance.

SECTION 9: INSURANCE

- 9.1 UES represents and warrants that it and its agents, staff and consultants employed by it, is and are protected by worker's compensation insurance and that UES has such coverage under public liability and property damage insurance policies which UES deems to be adequate. Certificates for all such policies of insurance shall be provided to Client upon request in writing. Within the limits and conditions of such insurance, UES agrees to indemnify and save Client harmless from and against loss, damage, or liability arising from negligent acts by UES, its agents, staff, and consultants employed by it. UES shall not be responsible for any loss, damage or liability beyond the amounts, limits, and conditions of such insurance or the limits described in Section 8, whichever is less. The Client agrees to defend, indemnify and save UES harmless for loss, damage or liability arising from acts by Client, Client's agent, staff, and other UESs employed by Client.

SECTION 10: DISPUTE RESOLUTION

- 10.1 All claims, disputes, and other matters in controversy between UES and Client arising out of or in any way related to this Agreement will be submitted to alternative dispute resolution (ADR) such as mediation or arbitration, before and as a condition precedent to other remedies provided by law, including the commencement of litigation.
- 10.2 If a dispute arises related to the services provided under this Agreement and that dispute requires litigation instead of ADR as provided above, then:
- (a) the claim will be brought and tried in judicial jurisdiction of the court of the county where UES's principal place of business is located and Client waives the right to remove the action to any other county or judicial jurisdiction, and
 - (b) The prevailing party will be entitled to recovery of all reasonable costs incurred, including staff time, court costs, attorneys' fees, and other claim related expenses.

SECTION 11: TERMINATION

- 11.1 This agreement may be terminated by either party upon seven (7) days written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof. Such termination shall not be effective if that substantial failure has been remedied before expiration of the period specified in the written notice. In the event of termination, UES shall be paid for services performed to the termination notice date plus reasonable termination expenses.
- 11.2 In the event of termination, or suspension for more than three (3) months, prior to completion of all reports contemplated by the Agreement, UES may complete such analyses and records as are necessary to complete its files and may also complete a report on the services performed to the date of notice of termination or suspension. The expense of termination or suspension shall include all direct costs of UES in completing such analyses, records and reports.

SECTION 12: ASSIGNS

- 12.1 Neither the Client nor UES may delegate, assign, sublet or transfer their duties or interest in this Agreement without the written consent of the other party.

SECTION 13. GOVERNING LAW AND SURVIVAL

- 13.1 The laws of the State of Florida will govern the validity of these Terms, their interpretation and performance.
- 13.2 If any of the provisions contained in this Agreement are held illegal, invalid, or unenforceable, the enforceability of the remaining provisions will not be impaired. Limitations of liability and indemnities will survive termination of this Agreement for any cause.

SECTION 14. INTEGRATION CLAUSE

- 14.1 This Agreement represents and contains the entire and only agreement and understanding among the parties with respect to the subject matter of this Agreement, and supersedes any and all prior and contemporaneous oral and written agreements, understandings, representations, inducements, promises, warranties, and conditions among the parties. No agreement, understanding, representation, inducement, promise, warranty, or condition of any kind with respect to the subject matter of this Agreement shall be relied upon by the parties unless expressly incorporated herein.
- 14.2 This Agreement may not be amended or modified except by an agreement in writing signed by the party against whom the enforcement of any modification or amendment is sought.