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REPORT OF A GEOTECHNICAL EXPLORATION

Front Street Property
Fernandina Beach, Florida

March 5, 2012

PROJECT NO. 0930.1200006.0000
REPORT NO. 949008

Prepared For:

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March 5, 2012

Zev Cohen & Associates, Inc.
300 Interchange Boulevard
Ormond Beach, Florida 32174

Attention: Mr. Curtis Burkett, P.E.

Reference: **REPORT OF A GEOTECHNICAL EXPLORATION**
Front Street Property
Fernandina Beach, Florida
UES Project No. 0930.1200006.0000 and Report No. 949008

Dear Mr. Burkett:

Universal Engineering Sciences, Inc. (UES) has completed a geotechnical exploration at the site of the proposed improvements located along Front Street in Fernandina Beach, Florida. These services were provided in general accordance with our Proposal No. 2009J-205R dated September 14, 2011. Authorization for our services was provided by Mr. Curtis Burkett of Zev Cohen & Associates, Inc. This report presents the results of our subsurface exploration, an engineering evaluation with respect to the project characteristics described to us, and recommendations for groundwater control, foundation design, pavement design, and site preparation. A summary of our findings is as follows:

Beneath a thin layer of topsoil, the SPT borings generally encountered loose to medium dense fine sand (SP) and silty fine sand (SM) extending from the existing ground surface to depths of approximately 5 to 8 feet underlain with medium dense to loose silty fine sand with some asphalt debris (SM) to depths of approximately 8 to 9 feet. Very soft sandy clayey silt (MH) and clay (CL) interbedded with layers of loose fine sand (SP) and fine sand with silt (SP-SM) were then encountered to depths of approximately 27.5 feet were then encountered and were underlain with loose clayey fine sand (SC) with shell fragments to the 30-foot boring termination depths.

Auger borings A1 through A4 encountered variable soils in the upper 4 to 8 feet consisting of fine sand (SP), clayey fine sand (SC), sand with many roots and organics (Pt), and fine sand with glass and plastic debris. Clayey to very clayey fine sand and silty clay was then encountered to the 10-foot boring termination depths. Borings A5 through A7 encountered fine sand (SP) and fine sand with silt (SP-SM) throughout the 6 to 10-foot boring depths.

Borings LA1 and LA2, performed in the proposed retention area, encountered fine sand (SP) and fine sand with silt (SP-SM) extending from the existing ground surface to depths of 3 to 5 feet underlain with silty clay (CL) and clayey fine sand (SC) to the 15-foot boring termination depths.

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The stabilized groundwater level was encountered at depths ranging from 2.0 to 5.0 feet below the existing grade approximately 24+ hours after completion of the borings. Groundwater levels will vary daily due to tidal fluctuations as well as seasonally due to rainfall and other factors. We estimate the normal seasonal high groundwater level will occur at a depth of 1.5 to 2 feet below the existing ground surface over most of the site but within 1 foot of the existing ground surface at borings A1, LA1, and LA2.

Borings B-1, B-2, A-3, and A-4 encountered soils containing various amounts and types of debris, wood, and many organics at various depths within the upper 7 to 9 feet below the existing ground surface. We recommend backhoe-excavated test pits be performed in these areas to better evaluate the need for over-excavation of these soils, and to delineate the vertical and horizontal extent, if warranted.

Borings B-1 and B-2 encountered very soft silt and clay in the profiles that could experience long-term consolidation settlements if elevating fill heights are greater than two feet. In addition, the very soft silt encountered by boring B-1 from a depth range of approximately 9 to 13 feet could be influenced by shallow foundation loads, depending on foundation loads and sizes. Therefore, we recommend obtaining shelby tube samples from the very soft layers and performing consolidation tests in the laboratory in order to determine the long-term consolidation properties of these soils. If it is determined that the project design may result in excessive settlements, the building areas could be surcharged such that settlements could be generated prior to vertical construction such that post-construction settlements would be within tolerable magnitudes.

Assuming the building areas will be constructed in accordance with our Site Preparation Recommendations, including overexcavation of debris (if necessary) and surcharging the building areas (if necessary), the proposed structures could be supported on a conventional, shallow spread foundation system with an allowable soil bearing pressure of 2,500 pounds per square foot with the understanding that some aesthetic cracking could occur. A stiffened foundation or piling could be utilized to minimize settlement.

Pavements should be designed as a function of the anticipated traffic loadings. Either flexible or rigid pavement systems may be used at this site. Depending on the results of the recommended test pit exploration, some overexcavation of debris may be required in the pavement areas in the vicinity of borings A-3 and A-4 prior to placement of elevating structural fill. As an alternative, it may be feasible to use a geogrid in the pavement area in lieu of overexcavation of debris, with the understanding that the need for pavement maintenance in the future may be accelerated.

We trust this report meets yours needs and addresses the geotechnical issues associated with the proposed construction. 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.

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TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 GENERAL

In this report, we present the results of the subsurface exploration of the site for the proposed facility located along Front Street in Fernandina Beach, Florida. 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

Project information was provided in recent email transmittals from you and in recent telephone conversations. We were provided with the following plans for the project:

1. Front Street Site Layout Plan prepared by Zev Cohen & Associates, Inc. dated 12/2011 (sheets C-4 through C-6, C-9, and C-12).
2. Wetland Map – Fernandina CRA Front Street prepared by Zev Cohen & Associates, Inc. dated 12/07/11.
3. Map of Topographic Survey of the proposed retention pond site prepared by Manzie & Drake Land Surveying dated 2-20-09.
4. Map of Boundary Survey of the proposed retention pond site prepared by Manzie & Drake Land Surveying dated 12-13-2011.

These plans show the boundary limits for the property, an aerial view of the property, the roadways located adjacent to the site, existing features of the site and surrponding areas, and the layout of the proposed construction.

We understand the project will also include improvements along the water side of Front Street in Fernandina Beach, Florida. The improvements will include a retention area for stormwater management, new parking and roadway areas, an approximate 1,000 square foot CMU bath house and an approximate 1,000 square foot pavilion. Detailed structural loads for the buildings have not been provided to us, therefore we have assumed maximum wall and column loads will not exceed 3 klf and 75 kips, respectively. Detailed grading information has not been provided, therefore we assume elevating fill heights will not exceed two feet.

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

2.2 PURPOSE

The purposes of this geotechnical exploration were:

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

This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. 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.

Our exploration was confined to the zone of soil likely to be stressed by the proposed construction. Our work did not address the potential for surface expression of deep geological conditions. This evaluation requires a more extensive range of field services than performed in this study. We will be pleased to conduct an investigation to evaluate the probable effect of the regional geology upon the proposed construction, if you desire.

2.3 FIELD EXPLORATION

A field exploration was performed on January 23-26, 2012. The approximate boring locations are shown on the Boring Location Plans in Appendix A. The approximate boring locations were determined in the field by our personnel using taped measurements from existing site features shown on the Preliminary Site Plan furnished to us and should be considered accurate only to the degree implied by the method of measurement used. Samples of the soils encountered will be held in our laboratory for your inspection for 60 days unless we are notified otherwise.

2.3.1 SPT Borings

To explore the subsurface conditions within the area of the proposed structures, we located and drilled two (2) Standard Penetration Test (SPT) borings to depths of approximately 25 feet each below the existing ground surface in general accordance with the methodology outlined in ASTM D 1586. A summary of these field procedures is included in Appendix A. Split-spoon soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory for further evaluation.

2.3.2 Auger Borings

To explore the subsurface conditions within the proposed pavement and retention areas, we located and drilled seven (7) auger borings to depths of approximately 6 feet below the existing ground surface and two (2) auger borings to depths of approximately 15 feet below the existing ground surface. The auger borings were drilled in general accordance with the methodology outlined in ASTM D 1452. A summary of this field procedure is included in the Field Procedures section of Appendix A. Representative soil samples recovered from the auger borings were returned to our laboratory for further evaluation.

2.4 LABORATORY TESTING

Representative soil samples obtained during our field exploration were returned to our office and examined by a geotechnical engineer. The samples were visually classified in general accordance with ASTM D 2488 (Unified Soil Classification System).

Eleven (11) fines content tests, eleven (11) moisture content tests, two (2) organic content tests, and three (3) Atterberg limits tests were conducted in the laboratory on representative soil samples obtained from the borings. These tests were performed to aid in classifying the soils and to help quantify and correlate engineering properties. The results of these tests are presented on the Boring Logs in Appendix A. A brief description of the laboratory procedures used is also provided in Appendix A.

3.0 FINDINGS

3.1 SOIL SURVEY

Based on the 2010 Soil Survey data for Nassau County, Florida, as prepared by the US Department of Agriculture Soil Conservation Service, the predominant predevelopment soil types at the site are identified as Arents (2), Urban land (17), and Ridgewood Fine Sand (27). A summary of characteristics of these soil series was obtained from the Soil Survey and is included in Table 1.

TABLE 1
Summary of Soil Survey Information

Soil Type	Constituents		Hydrologic Group	Natural Drainage	Soil Permeability (Inches/Hr)		Seasonal High Water Table (ft.)
Arents (2)	--	variable	--	--	--	--	--
Urban Land (17)	--	variable	--	--	--	--	--
Ridgewood (27)	0-80"	Sand, fine sand	A	Somewhat poorly drained	0-80"	6.0-20	2.0-3.5

3.2 SURFACE CONDITIONS

The site of the proposed facility is located primarily along Front Street in Fernandina Beach, Florida. The proposed retention pond site is wooded and includes a shallow dry retention area. The topographic information provided to us indicates ground elevations at the site range from approximately El. +6 to +8 feet with the pond bottom at approximate El. +4.5. The area of the proposed buildings is generally cleared and currently consists of gravel parking. The areas for the pavement improvements are primarily developed with pavement areas and structures. The site is located adjacent to the Amelia River and, therefore, groundwater levels will fluctuate somewhat daily due to tidal fluctuations which we understand vary as much as 6 feet daily

3.3 SUBSURFACE CONDITIONS

The boring locations and detailed subsurface conditions are presented in Appendix A: Boring Location Plan and Boring Logs. The classifications and descriptions shown on the logs are based upon visual characterizations of the recovered soil samples. Also, see Appendix A: Key to Boring Logs, for further explanation of the symbols and placement of data on the Boring Logs.

3.3.1 Soil 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 and a limited number of laboratory tests. Also, see Appendix A: Key to Boring Logs, for further explanation of the symbols and placement of data on the Boring Logs. Tables 2A-2C: General Soil Profile summarizes the soil conditions encountered.

TABLE 2A General Soil Profile – Structure Borings (B1 and B2), A3		
Typical depth (ft)		Soil Descriptions
From	To	
0	3-1/2 to 8	Loose to medium dense fine sand (SP) to silty fine sand (SM), trace to some limerock, clay lenses, asphalt debris
3-1/2 to 8	8 to 9	Loose silty fine sand (SM) with asphalt debris, glass and plastic debris
8	13	Loose fine sand (SP) – Boring B2 only
9 to 13	13 to 17.5	Very soft sandy clayey silt (ML)
13 to 17.5	17.5 to 22	Loose fine sand (SP)
17.5 to 22	27.5	Very soft to soft sandy clay (CL)
27.5	30*	Loose clayey fine sand (SC) with shell
* Termination Depth of Deepest Boring ( ) Indicates Unified Soil Classification		

TABLE 2B General Soil Profile – Retention Borings (LA1 and LA2), A1, A2, A4		
Typical depth (ft)		Soil Descriptions
From	To	
0	3 to 6-1/2	Fine sand with silt (SP-SM) and some shell, fine sand (SP), trace brick in upper six inches, very clayey fine sand (Sc) in upper 1-1/2 feet of A1
3 to 6-1/2	15*	Clayey fine sand (SC), sandy silty clay (CL), many roots and organics at A4 from 6 to 8 ft
* Termination Depth of Deepest Boring ( ) Indicates Unified Soil Classification		

TABLE 2C General Soil Profile – Retention Borings A5, A6, A7		
Typical depth (ft)		Soil Descriptions
From	To	
0	6 to 10*	Fine sand (SP), fine sand with silt (SP-SM), trace of shell and limerock
* Termination Depth of Deepest Boring ( ) Indicates Unified Soil Classification		

3.3.2 Groundwater Conditions

We measured the groundwater level in the SPT borings approximately 24+ hours after the time of drilling. The stabilized groundwater level was encountered at depths ranging from 2.0 to 5.0 feet below the existing grade with the exception the groundwater level was not encountered within the six-foot boring depth at boring A5. Groundwater levels will vary daily due to tidal fluctuations as well as seasonally due to rainfall and other factors. We estimate the normal seasonal high groundwater level will occur at a depth of 1.5 to 2 feet below the existing ground surface over most of the site but within 1 foot of the existing ground surface at borings A1, LA1, and LA2.

4.0 RECOMMENDATIONS

4.1 GENERAL

In this section of the report, we present our detailed recommendations for groundwater control, building foundation, pavement design, site preparation, and construction related services. 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. We recommend that UES be provided the opportunity to review the project plans and specifications to confirm that our recommendations have been properly interpreted and implemented. If the structural loadings, finished grades, or building locations change significantly from those discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes. The discovery of any subsurface conditions during construction which deviate from those encountered in the borings should be reported to us immediately for observation, evaluation and recommendations.

4.2 GROUNDWATER CONTROL

The groundwater table will fluctuate seasonally depending upon local rainfall. The rainy season in northeast Florida is normally between June and September. Based upon our review of U.S.G.S. data, Nassau County Soils Survey and regional hydrogeology, it is our opinion the seasonal high groundwater level will occur at a depth of 1.5 to 2 feet below the existing ground surface over most of the site but within 1 foot of the existing ground surface at borings A1, LA1, and LA2.

Note: it is possible the estimated seasonal high groundwater levels will temporarily exceed these estimated levels during any given year in the future. Should impediments to surface water drainage exist on the site or should rainfall intensity and duration, or total rainfall quantities exceed the normally anticipated rainfall quantities, groundwater levels may exceed our seasonal high estimates. We recommend positive drainage be established and maintained as needed on the site during construction. We further recommend permanent measures be constructed to maintain positive drainage away from the proposed structure throughout the life of the project.

We recommend all foundation and pavement grade designs be based on the seasonal high groundwater conditions.

4.3 BUILDING FOUNDATION

Based on the results of our exploration, it is our opinion that special site preparation techniques will be required to support the proposed structures on a properly designed conventional shallow foundation system. These techniques may include surcharging the site to generate consolidation of the very soft to soft silty clay layers prior to construction and/or overexcavation of debris to depths on the order of 9 feet below the existing grades. If these techniques are performed (if warranted), both spread footing and monolithic slab foundations are considered appropriate with the understanding that some aesthetic cracking may occur. In order to help reduce cracking a structural stiffened foundation/slab (waffle or post-tensioned) or piling could be utilized. Provided the site preparation and earthwork construction recommendations outlined in Section 4.5 of this report are performed, the following parameters may be used for foundation design.

4.3.1 Bearing Pressure

The maximum allowable net soil bearing pressure for use in shallow foundation design should not exceed 2,500 psf. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. The foundations should be designed based on the maximum load which could be imposed by all loading conditions.

4.3.2 Foundation Size

The minimum widths recommended for any isolated column footings and continuous wall footings are 24 inches and 18 inches, respectively. The turned down edges of monolithic slabs should have a minimum width of 16 inches. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the minimum size of the foundations.

4.3.3 Bearing Depth

The exterior foundations should bear at a depth of at least 18 inches below the finished exterior grades and the interior foundations should bear at a depth of at least 12 inches below the finish floor elevation to provide confinement to the bearing level soils. Monolithic slabs should bear at a depth of at least 12 inches below the finished exterior grades. It is recommended that stormwater be diverted away from the building exteriors to reduce the possibility of erosion beneath the exterior footings.

4.3.4 Bearing Material

The foundations may bear in either the compacted suitable natural soils or compacted structural fill. The bearing level soils, after compaction, should exhibit densities equivalent to at least 95 percent of the Modified Proctor maximum dry density (ASTM D 1557) to a depth of at least one foot below the foundation bearing level. Probing within the footing excavations with a static cone penetrometer is recommended to check the suitability of the soils within 4 feet proposed footing bearing level.

4.3.5 Settlement Estimates

Based on the existence of very soft, potentially compressible soils encountered by the borings and our experience in the site vicinity, we have estimated that total long-term consolidation settlements due to 2 feet or more of elevating structural fill above the existing site grades will exceed tolerable magnitudes (greater than one inch). Therefore, it may be necessary to surcharge the building areas to generate consolidation settlements prior to vertical construction such that post-construction will be within tolerable magnitudes. The need for surcharging will be highly dependent on finished grades and anticipated structural loads. Additional field and laboratory testing consisting of obtaining relatively undisturbed shelby tube samples of the very soft layers and laboratory consolidation could be performed in order to determine the need for surcharging. Based on the consolidation test results, the need for surcharging can be determined and detailed recommendations for surcharging can be provided. Preliminarily we estimate an earthfill surcharge along with wick drains left in-place within the proposed building areas for 1 to 6 months would likely generate settlements such that total post-construction settlements would be within tolerable magnitudes. The following discussion regarding post construction settlements is based on the assumption that the magnitude of settlement potential has been reduced by surcharging, if warranted.

Post-construction settlements of the structures will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundations; and (3) site preparation and earthwork construction techniques used by the contractor. Our settlement estimates for the structures are based on the use of site preparation/earthwork construction techniques as recommended in Section 4.5 of this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlements of the structures.

Using the recommended maximum bearing pressure, the assumed maximum structural loads, providing site work recommendations include the potential surcharging option, and the field data which we have correlated to geotechnical strength and compressibility characteristics of the subsurface soils, we estimate that total settlements of the structure should be on the order of one inch or less.

Differential settlements result from differences in applied bearing pressures and variations in the compressibility characteristics of the subsurface soils. Based on the subsurface conditions and the recommended site preparation and earthwork construction techniques outlined in Section 4.5, we anticipate that differential settlements of the structures should be on the order of ½ inch or less.

4.3.6 Floor Slab

The floor slab can be constructed as a slab-on-grade member using a modulus of subgrade reaction (K) of 150 pounds per cubic inch (pci) provided the subgrade materials are prepared as outlined in Section 4.5 including the potential use of a surcharge program. It is recommended the floor slab bearing soils be covered with an impervious membrane to reduce moisture entry and floor dampness. A 10-mil thick plastic membrane is commonly used for this purpose. Care should be exercised not to tear large sections of the membrane during placement of reinforcing steel and concrete.

4.4 PAVEMENTS

4.4.1 General

Either a rigid or flexible pavement section could be used on this project. Flexible pavement combines the strength and durability of several layer components to produce an appropriate and cost-effective combination of available construction materials. Concrete pavement has the advantage of the ability to "bridge" over isolated soft areas, it requires less security lighting, and it typically has a longer service life than asphalt pavement. Disadvantages of rigid pavement include an initial higher cost, potential cracking due to settlement of unsuitable soils, and more difficulty repairing distressed areas than occurs with flexible pavement.

Boring A3 encountered some debris at a depth range of approximately 3.5 to 7 feet which may warrant overexcavation prior to construction. Backhoe-excavated test pits could be performed to better determine the composition of this material, to evaluate the need for overexcavation and to delineate the limits of unsuitable material, if encountered. In lieu of overexcavation of debris, it may be possible to utilize a geogrid or geotextile with the understanding that pavement maintenance may be necessary at some time in the future.

4.4.2 Asphalt (Flexible) Pavements

We have recommended a flexible pavement section with a 20-year design life for use on this project. Because traffic loadings are commonly unavailable, we have generalized our pavement design into two groups. The group descriptions and the recommended component thicknesses are presented in Table 3: Summary of Pavement Component Recommendations. The structural numbers in Table 3 are based on a structural number analysis with the stated estimated daily traffic volume for a 20-year replacement design life.

TABLE 3 Summary of Pavement Component Recommendations				
Traffic Group	Structural Number	Component Thickness (inches)		
		Stabilized Subgrade	Base Course	Surface Course
Automobile parking lots and driveways - **standard duty**	2.7	12	6	1.5
Truck parking lots and driveways - **heavy duty**	3.3	12	8	2.0

The Design Traffic Groups are defined below:

- Automobile Parking lots and driveways – **standard duty:**

  1,000 cars and light panel / pickup trucks per day, (average gross weight of 4,000 pounds), two tractor-trailer trucks per week (H-20 loading), and two trash trucks per week (46,000 pound gross weight)

- Truck Parking and driveways – **heavy duty:**

  Standard duty loading plus; twenty 18-wheel tractor-trailer trucks per day (H-20 loading)

4.4.2.1 Stabilized Subgrade

We recommend that subgrade materials be compacted in place according to the requirements in the "Site Preparation" section of this report. Further, beneath limerock base course, stabilize the subgrade materials to a minimum Limerock Bearing Ratio (LBR) of 40, as specified by Florida Department of Transportation (FDOT) requirements for Type B Stabilized Subgrade. The subgrade material should be compacted to at least 98 percent of the Modified Proctor maximum dry density (ASTM D 1557, AASHTO T-180) value.

The stabilized subgrade can be a blend of existing soil and imported material such as limerock. If a blend is proposed, we recommend that the contractor perform a mix design to find the optimum mix proportions.

The primary function of stabilized subgrade beneath the base course is to provide a stable and firm subgrade so that the limerock can be properly and uniformly placed and compacted. Depending upon the soil type, the subgrade material may have sufficient stability to provide the needed support without additional stabilizing material. Generally, sands with silt or clay should have sufficient stability and may not require additional stabilizing material. Conversely, relatively "clean" sand will not provide sufficient stability to adequately construct the limerock base course. Universal Engineering Sciences should observe the soils exposed on the finish grades to evaluate whether or not additional stabilization will be required beneath the base course.

4.4.2.2 Base Course

We recommend the base course consist of limerock or crushed concrete. The base course should have a minimum Limerock Bearing Ratio (LBR) of 100 and should be compacted to 98 percent of the Modified Proctor maximum dry density (ASTM D 1557, AASHTO T-180) value.

An advantage to using crushed concrete is a lower sensitivity to water than what occurs with limerock. The main disadvantage is that crushed concrete may not be available at the time of construction.

Crushed concrete should be supplied by an FDOT approved plant with quality control procedures. The crushed concrete stockpile should be free of sandy pockets, foreign materials, or uncrushed particles. We recommend a crushed concrete base follow the specifications for Graded Aggregate Base in the latest edition of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Testing should be performed at the following frequencies:

- Perform in-place density on the base course at a frequency of 1 test per 300 linear foot of roadway or 5,000 square feet of pavement.
- Perform Limerock Bearing Ratio tests at a frequency of 1 test per visual change in material and a minimum of 1 test per 15,000 square feet of pavement.
- Engineer should perform a final visual base inspection prior to placement of prime or tack coat and paving.

4.4.2.3 Wearing Surface

The wearing surface should consist of Florida Department of Transportation (FDOT) Type S asphaltic concrete having a minimum Marshall Stability of 1,500 lbs and a flow range of 0.07 to 0.12 inches. Specific requirements for Type S asphaltic concrete wearing surface are outlined in the Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, 2000 Edition Section 331 Type S Asphalt Concrete. FDOT no longer uses Type S asphalt; however, it is considered a suitable wearing surface for this project.

After placement and field compaction, the wearing surface should be cored to evaluate material thickness and to perform laboratory densities. Cores should be obtained at frequencies of at least one core per 10,000 square feet of placed pavement or a minimum of two cores per day's production.

4.4.3 Concrete (Rigid) Pavements

Concrete pavement is a rigid pavement that transfers much lighter wheel loads to the subgrade soils than a flexible asphalt pavement. For a concrete pavement subgrade, we recommend using the existing surficial sands or recommend clean fine sand fill (SP), densified to at least 98 percent of Modified Proctor test maximum dry density (ASTM D 1557) without additional stabilization, with the following stipulations:

1. Subgrade soils must be densified to at least 98 percent of Modified Proctor test maximum dry density (ASTM D 1557) to a depth of at least 2 feet prior to placement of concrete.

2. The surface of the subgrade soils must be smooth, and any disturbances or wheel rutting corrected prior to placement of concrete.

3. The subgrade soils must be moistened prior to placement of concrete.

4. Concrete pavement thickness should be uniform throughout, with exception to thickened edges (curb or footing).

5. The bottom of the pavement should be separated from the estimated typical wet season groundwater level by at least 18 inches.

Our recommendations for slab thickness for standard duty and heavy duty concrete pavements are based on a) subgrade soils densified to 98 percent of the Modified Proctor maximum dry density (ASTM D 1557), b) modulus of subgrade reaction (k) equal to 200 pounds per cubic inch, c) a 20 year design life, and 3) the previously stated traffic conditions in Section 4.4.2, we recommend using the design shown in Table 4 for standard duty concrete pavements.

TABLE 4
Standard Duty (Unreinforced) Concrete Pavement

Minimum Pavement Thickness	Maximum Control Joint Spacing	Minimum Sawcut Depth
5 Inches	10 Feet x 10 Feet	1¼ Inches

Our recommended design for heavy duty concrete pavement is shown in Table 5 below.

TABLE 5
Heavy Duty (Unreinforced) Concrete Pavement

Minimum Pavement Thickness	Maximum Control Joint Spacing	Minimum Sawcut Depth
6 Inches	12 Feet x 12 Feet	1½ Inches

We recommend using concrete with a minimum 28-day compressive strength of 4000 psi and a minimum 28-day flexural strength (modulus of rupture) of at least 600 pounds per square inch, based on 3rd point loading of concrete beam test samples. Layout of the sawcut control joints should form square panels, and the depth of sawcut joint should be at least ¼ of the concrete slab thickness. The joints should be sawed within six hours of concrete placement or as soon as the concrete has developed sufficient strength to support workers and equipment. We recommend allowing Universal to review and comment on the final concrete pavement design, including section and joint details (type of joints, joint spacing, etc.), prior to the start of construction.

For further details on concrete pavement construction, please reference the "Guide to Jointing on Non-Reinforced Concrete Pavements" published by the Florida Concrete and Products Associates, Inc., and "Building Quality Concrete Parking Areas", published by the Portland Cement Association.

4.4.4 Effects of Groundwater

One of the most critical factors influencing pavement performance in northeast Florida is the relationship between the pavement subgrade and the seasonal high groundwater level. Many roadways and parking areas have been damaged as a result of deterioration of the base conditions and/or the base/surface course bond. We recommend that the seasonal high groundwater and the bottom of the flexible pavement limerock base course be separated by at least 24 inches. We recommend a separation of at least 18 inches below the bottom of a rigid concrete pavement or below a flexible pavement with a crushed concrete base. The recommended minimum separations should not be an issue at this site.

4.4.5 Curbing

We recommend that curbing around the landscaped sections adjacent to the parking areas and driveways be constructed with full-depth curb sections. Using extruded curb sections which lie directly on top of the final asphalt level, or eliminating the curbing entirely, can allow migration of irrigation water from the landscape areas to the interface between the asphalt and the base. This migration often causes separation of the wearing surface from the base and subsequent rippling and pavement deterioration. Topsoil placed behind curbing in landscaped areas should be limited to 6 inches vertical thickness within five feet of flexible pavement.

4.4.6 Construction Traffic

Light duty roadways and incomplete pavement sections will not perform satisfactorily under construction traffic loadings. We recommend that construction traffic (construction equipment, concrete trucks, sod trucks, garbage trucks, dump trucks, etc.) be re-routed away from these roadways or that the pavement section be designed for these loadings.

4.5 SITE PREPARATION

We recommend normal, good practice site preparation procedures. These procedures include: removing the existing trees and associated root systems from the construction areas, stripping the construction areas of topsoil and vegetation; compacting the subgrade with a medium-weight vibratory drum roller, placing engineered fill to the desired grades, and potentially implementing a surcharge program. A more detailed synopsis of this work is as follows:

1. Prior to construction, the location of any existing underground utility lines within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. It should be noted that if underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which may subsequently lead to excessive settlement of overlying structure(s).

2. The groundwater level was encountered at a depth of 2.0 to 5.0 feet below the existing ground surface in the SPT borings 24+ hours after our exploration. The seasonal high groundwater level is estimated to occur at a depth range of 1.5 to 2 feet below the existing ground surface within the proposed pavement and building areas. The groundwater level should be maintained at least 1 foot below any excavations and 2 feet below the surface of any vibratory compaction procedures. We anticipate that surface water management could be needed if the construction occurs during a relatively wet climatic period.

3. Remove the existing trees and associated root systems from the construction areas; strip away the existing pavement, vegetation, topsoils and other deleterious materials from within the proposed construction limits. Root rake the exposed subgrade soils (in perpendicular directions) to a depth of at least 12 inches to help locate and remove large roots, extensive root systems and pieces of organic debris that may occur just below the ground surface. The surface stripping and root raking should be performed within and 5 feet beyond the perimeter of the proposed building areas and within and 3 feet beyond the perimeter of the proposed paved areas. Expect typical stripping at this site to a depth of 6 inches more or less. Some isolated areas may require more than a foot of stripping or undercutting to remove the root systems of large trees.

   Borings B1, B2, A3, and A4 encountered asphalt debris, glass and plastic, and organic material in varying thicknesses between depths of approximately 3.5 to 9 feet. These materials appear unsuitable to remain beneath building and pavement areas. If warranted, these materials should be overexcavated to the depths encountered from within and to a distance of five feet beyond the perimeter of the building areas and within and to a distance of three feet beyond the perimeter of the pavement areas. The need for overexcavation should be determined by performing test pits as recommended in section 4.7. In lieu of over-excavating these materials to the depths encountered, a geogrid could be incorporated in the pavement system if the client is willing to take the risk that pavement maintenance may be needed in the future. We can provide more detailed recommendations for geogrids once test pits are performed.

4. Compact the subgrade from the surface with a medium-weight vibratory drum roller (a 3- to 4-ton roller, static weight and 3- to 4-foot drum diameter) until you obtain a minimum density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), to a depth of 1 foot below the compacted surface. The surface compaction should be conducted after making any required earthwork cuts but prior to fill placement. Typically, the soils should exhibit moisture contents within ± 2 percent of the Modified Proctor optimum moisture content during compaction. A minimum of eight (8) complete coverages (in perpendicular directions) should be made in the building construction area with the roller to improve the uniformity and increase the density of the underlying sandy soils.

5. Care should be exercised to avoid damaging any nearby structures while the compaction operation is underway. The existing conditions of any adjacent structures should be documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to the adjacent structure. Universal Engineering Sciences can provide vibration monitoring services to help document and evaluate the effects of the surface compaction operation on existing structures. In the absence of vibration monitoring it is recommended the vibratory roller remain a minimum of 50 feet from existing structure. Within this zone, use of a bulldozer or a vibratory roller operating in the static mode is recommended.

6. Test the subgrade for compaction at a frequency of not less than one test per 2,500 square feet in the building area, or a minimum of two test locations, whichever is greater, and every 10,000 square feet in pavement areas, or a minimum of two test locations, whichever is greater.

7. Place fill material, as required. The fill should consist of an inorganic, non-plastic granular soil with less than 10 percent soil fines (relatively clean fine sand). Typically, the soils should exhibit moisture contents within ± 2 percent of the Modified Proctor optimum moisture content during compaction. Place fill in uniform 10- to 12-inch loose lifts and compact each lift to a minimum density of 95 percent of the Modified Proctor maximum dry density.

   The top 12 inches of fill beneath flexible pavement areas and the top 24 inches of fill beneath rigid pavements should be compacted to 98 percent of the Modified Proctor maximum dry density. For flexible pavements, stabilize this zone as needed with clay, shell or limerock to obtain a minimum LBR of 40 as recommended in Section 4.4.2.

8. Perform compliance tests within the fill/backfill at a frequency of not less than one test per 2,500 square feet per lift in the building areas, or at a minimum of two tests per building area, whichever is greater. In paved areas, perform compliance tests at a frequency of not less than one test per 10,000 square feet per lift, or at a minimum of two test locations, whichever is greater.

9. Test all footing cuts for compaction to a depth of 1 foot. Additionally, we recommend you conduct density testing in every column footing, and every 100 linear feet in wall footings. Recompaction of the foundation excavation bearing level soils, if loosened by the excavation process, can probably be achieved by making several coverages with a light weight walk-behind vibratory sled or roller. Also, we recommend probing the footing excavations with a static cone penetrometer to check for unsuitable soils within 4 feet of the proposed footing bearing levels.

4.6 BORROW SUITABILITY

The pond auger borings were planned, in part, to provide an indication of the suitability of excavated soils from the proposed retention pond area for use as structural fill. Based on the boring results and classification of the soil samples, the soil described as fine sands (SP) and fine sand with silt (SP-SM) encountered below the surficial topsoil to depths of approximately 3 to 5 feet at borings LA1 and LA2 are considered suitable for use as structural fill. It should be understood that soils excavated from below the water table may be excessively wet and may require stockpiling or spreading to dry prior to placement and compaction. Soils described as silty fine sands (SM), clayey fine sands (SC), and silty sandy clay (CL) are considered unsuitable for use as structural fill due the excessive fines contents and moisture sensitivity of these soils.

4.7 ADDITIONAL SERVICES

Borings B-1, B-2, A-3, and A-4 encountered soils containing various amounts of asphalt debris, glass and plastic debris, and organics in varying thicknesses between depths of 3-1/2 to 9 feet below the existing ground surface. These soils do not appear to be suitable to remain in place beneath the proposed structure and pavement areas. We recommend backhoe-excavated test pits be performed to better evaluate the need for over-excavation of these soils, and to delineate the vertical and horizontal extent, if warranted.

We also recommend that at least two relatively undisturbed shelby tube samples be obtained from the very soft silty clay layers encountered by borings B1 and B2. Laboratory consolidation should be performed on these soils to determine their long-term settlement characteristics and the need for surcharging the building areas. Detailed recommendations regarding the need for surcharging and surcharging procedures can be provided after performing the consolidation tests.

4.8 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 performing quality assurance tests on the placement of compacted structural fill and pavement courses. We can also provide concrete testing, pavement section testing, structural steel testing, and general construction observation services.

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

Our geotechnical exploration has been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Universal Engineering (UES) is not responsible for any independent conclusions, interpretation, opinions or recommendations made by others based on the data contained in this report.

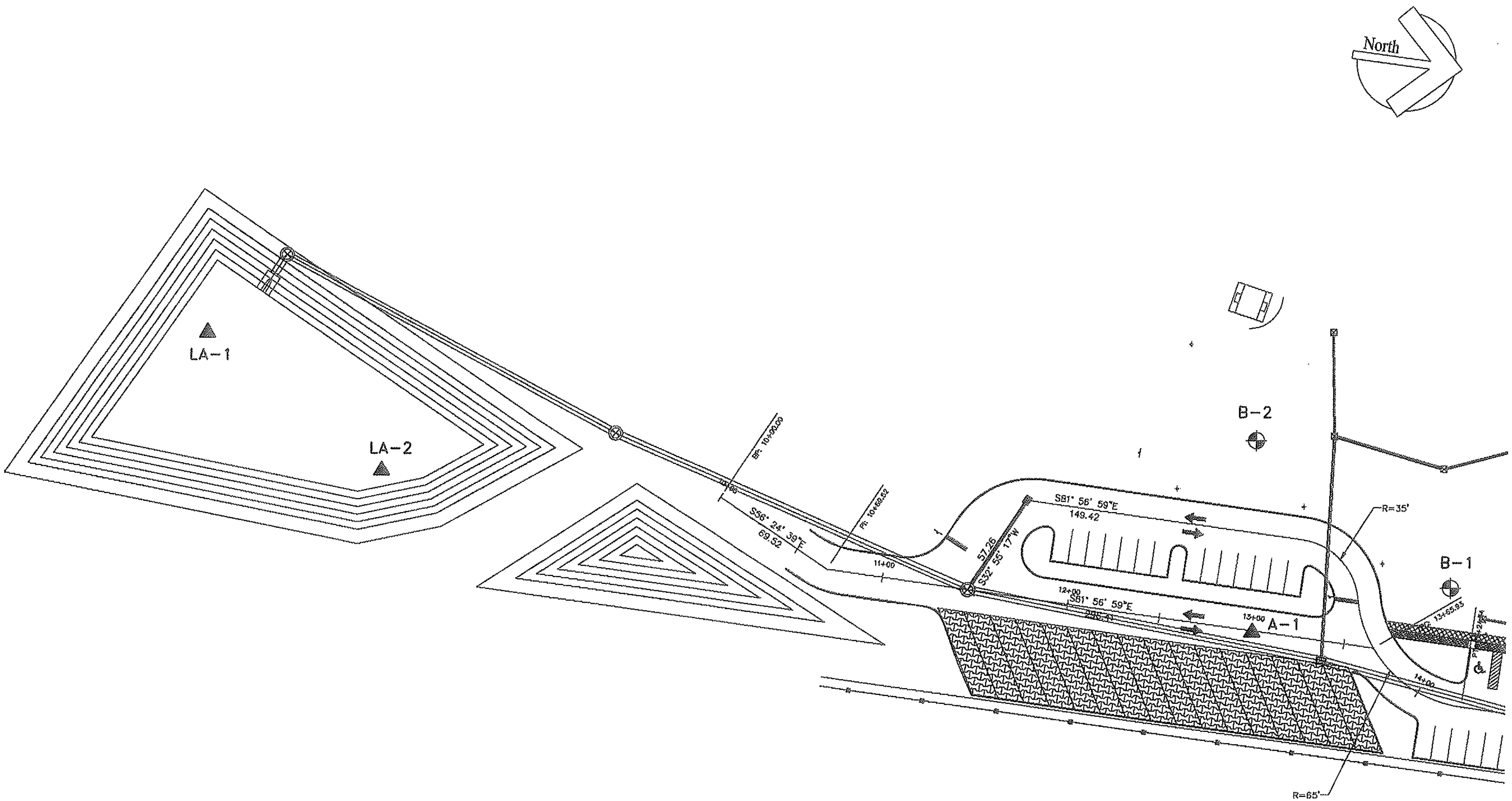
This report does not reflect any variations which may occur away from the soil borings. The discovery of any site or subsurface condition during construction which deviates from the data obtained during this geotechnical exploration should be reported to us for our evaluation. Also, in the event of any change to the location of the structures, please contact us so that we can review our recommendations.

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. An Association of Engineering Firms Practicing in the Geosciences (ASFE) publication, "Important Information About Your Geotechnical Engineering Report" appears in Appendix B, and will help explain the nature of geotechnical issues.

Further, we present documents in Appendix B: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report and the General Conditions under which our services are provided.

APPENDIX A

BORING LOCATION PLAN
BORING LOGS
KEY TO BORING LOGS
FIELD EXPLORATION PROCEDURES
LABORATORY TESTING PROCEDURES



LEGEND

▲ AUGER BORING LOCATIONS

⊕ SPT BORING LOCATIONS

CLIENT: ZEV COHEN & ASSOCIATES

DRAWN BY: TW	DATE: 2/9/12
CHECKED BY: SW	DATE: 2/9/12
SCALE: 1"=60'	
PROJECT NO: 0930.1200006.000	REPORT NO:

GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

BORING LOCATION PLAN

UNIVERSAL
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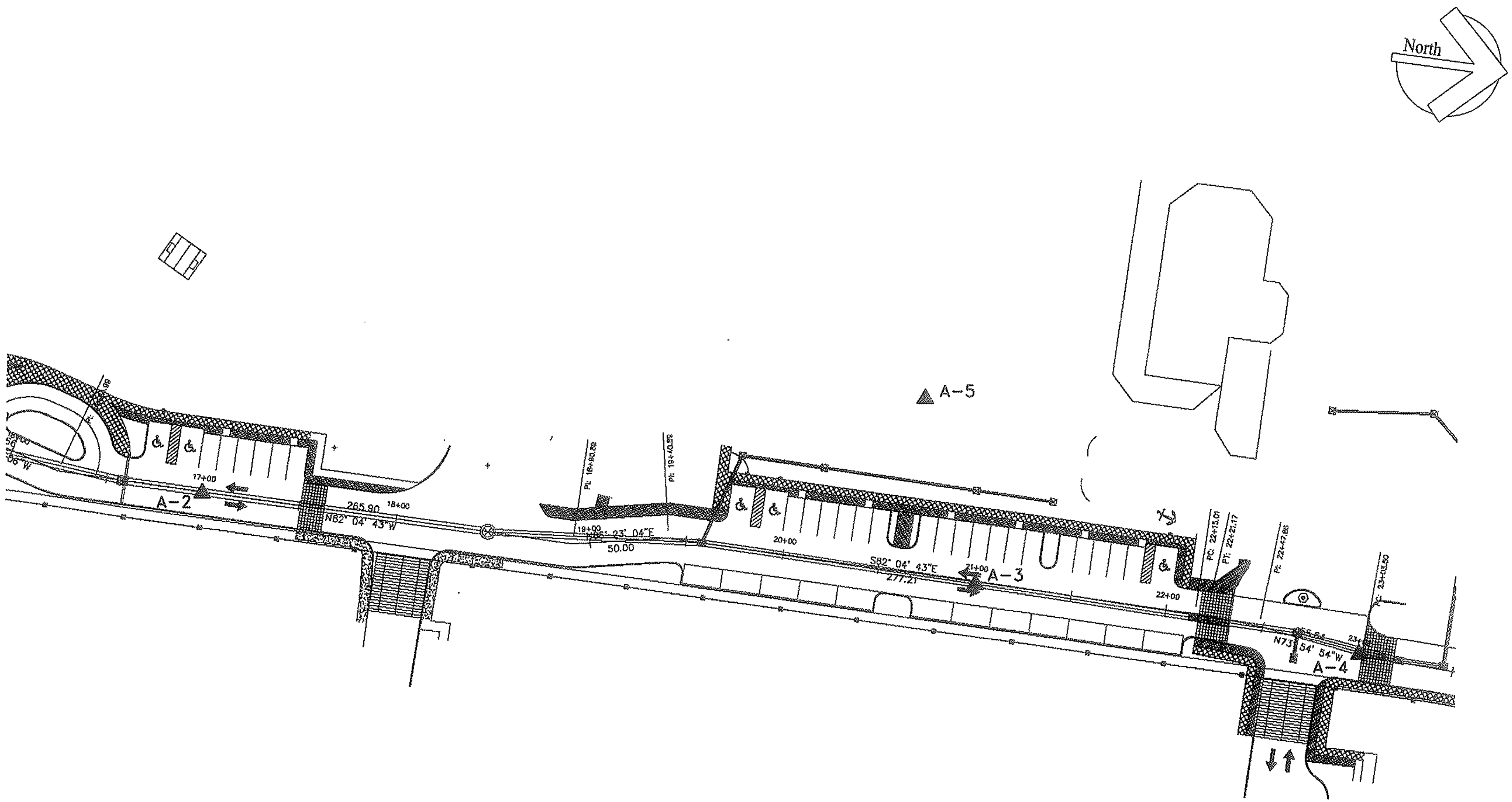
PAGE NO: A-1



LEGEND

▲ AUGER BORING LOCATIONS

⊕ SPT BORING LOCATIONS

CLIENT: ZEV COHEN & ASSOCIATES

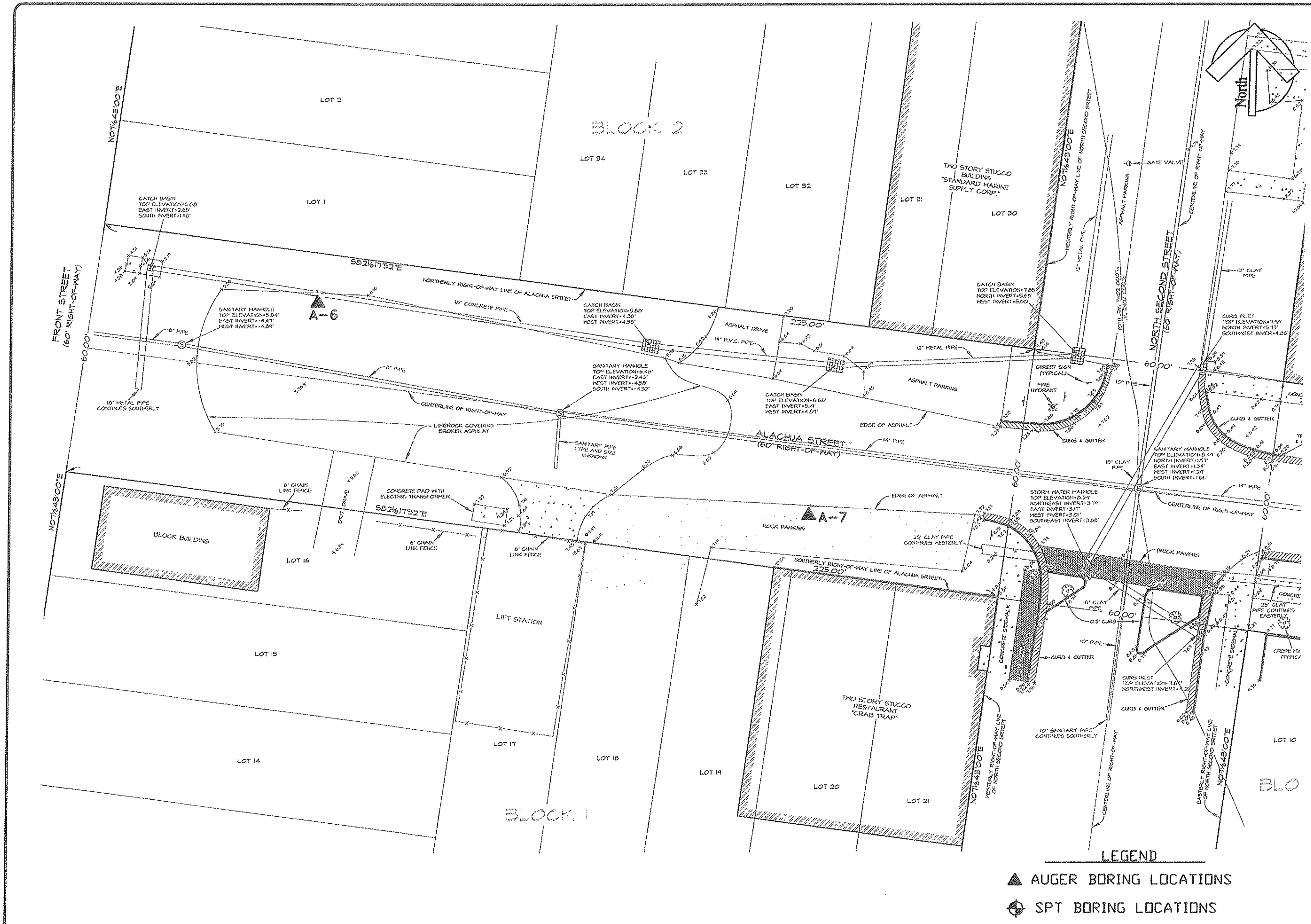
DRAWN BY: TW	DATE: 2/9/12
CHECKED BY: SW	DATE: 2/9/12
SCALE: 1"=60'	
PROJECT NO: 0930.1200006.000	REPORT NO:

GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

BORING LOCATION PLAN

UNIVERSAL
ENGINEERING SCIENCES

PAGE NO: A-1A



CLIENT: ZEV COHEN & ASSOCIATES

DRAWN BY: TW | DATE: 2/9/12

CHECKED BY: SW | DATE: 2/9/12

SCALE: 1"=20'

PROJECT NO: 0930.1200006.000 | REPORT NO:

GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

BORING LOCATION PLAN

UNIVERSAL
ENGINEERING SCIENCES

PAGE NO: A-1B

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 0930.1200006.0000
REPORT NO.:
PAGE: A-2

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES
LOCATION: SEE BORING LOCATION
REMARKS:

BORING DESIGNATION: **B-1** SHEET: **1 of 2**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.3
DATE OF READING: 1/26/12
EST. W.S.W.T. (ft):

DATE STARTED: 1/25/12
DATE FINISHED: 1/25/12
DRILLED BY: DAVID/SID
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORG. CONT. (%)
0						LIMEROCK (6")						
						Medium dense brown fine SAND with Limerock (SP)						
	X	15-15-12	27									
						Medium dense gray fine SAND with limerock and Clayey Sand lenses (SP)						
	X	9-10-8	18									
						Medium dense to loose dark grayish-brown Silty fine SAND (SP-SM)						
	X	7-6-6	12	▼								
5												
	X	5-5-5	10				16.4	22.5				2.9
						Loose dark gray Silty fine SAND with Clay seams (SM)						
	X	5-4-3	7									
						Loose dark gray brown Silty fine SAND with some Asphalt Debris (SM)						
	X	4-4-4	8									
						Very soft dark gray Sandy Clayey SILT with Limerock fragments (MH)						
10	X	WOH	0				64.6	127	54	13		
						Loose grayish-brown fine SAND (SP)						
15	X	3-4-6	10									
						Very Soft to Soft gray brown Sandy CLAY (CL)						
20	X	1-1-1	2				69.0	53.2	49	33		
25	X	2-2-2	4									

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-3

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

BORING DESIGNATION: **B-1** SHEET: **2 of 2**
SECTION: TOWNSHIP: RANGE:

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	PI	K (FT./ DAY)	ORG. CONT. (%)
25												
						Loose gray very Clayey fine SAND with some Shell fragments (SC)						
30		2-3-7	10									

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/5/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 0930.1200006.0000
REPORT NO.:
PAGE: A-4

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **B-2** SHEET: **1 of 2**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.4
DATE OF READING: 1/26/12
EST. W.S.W.T. (ft):

DATE STARTED: 1/25/12
DATE FINISHED: 1/25/12
DRILLED BY: DAVID/SID
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Loose dark brown fine SAND with Silt (SP-SM)						
		2-3-4	7									
		4-5-6	11			Medium dense dark brown Silty fine SAND (SM)	18.3	25.5				3.6
		4-6-7	13	▼		Medium dense dark brown Silty fine SAND with trace of Clay and trace Asphalt Debris (SM)						
5		4-6-6	12			Medium dense to loose dark brown Silty fine SAND with some Asphalt Debris (SM)						
		3-4-6	10									
		4-4-4	8			Loose gray fine SAND (SP)						
10		7-4-2	6									
						Very soft brown Sandy Clayey SILT (MH)						
15		WOH	0				87.8	117.6	90	49		
						Loose gray fine SAND with Silt (SP-SM)						
20		3-3-2	5									
						Soft gray CLAY (CL)						
25		2-2-1	3									

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/5/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 0930.1200006.0000
REPORT NO.:
PAGE: A-5

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

BORING DESIGNATION: **B-2** SHEET: **2 of 2**
SECTION: TOWNSHIP: RANGE:

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	PI	K (FT./ DAY)	ORG. CONT. (%)
25												
						Loose gray Clayey fine SAND with many Shells (SC)						
30	X	2-4-4	8									

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/5/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-1

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **A-1** SHEET: **1 of 1**

SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):

WATER TABLE (ft): 2.0

DATE OF READING: 1/25/12

EST. W.S.W.T. (ft):

DATE STARTED: 1/25/12

DATE FINISHED: 1/25/12

DRILLED BY: DAVID/SID

TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Dark grayish-brown Very Clayey fine SAND with Rock and Shell fragments (SC)	37.3	29.4				
				▼		Grayish-brown fine SAND with Shell fragments (SP)						
5						Grayish-brown Clayey fine SAND with Shell fragments (SC)						
						Dark gray Silty CLAY (CL)						
10												

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/5/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 0930.1200006.0000
REPORT NO.:
PAGE: A-2

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **A-2** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 5.0
DATE OF READING: 1/26/12
EST. W.S.W.T. (ft):

DATE STARTED: 1/26/12
DATE FINISHED: 1/26/12
DRILLED BY: DAVID/SID
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						ASPHALT (1")						
						LIMEROCK (5 1/2")						
						Brown fine SAND with Rock fragments (SP)						
						Dark brown fine SAND with cemented fragments (SP)						
5				▼		Gray fine SAND with Shell fragments (SP)						
						Gray Clayey fine SAND with Shell fragments (SC)						
10												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-3

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **A-3** SHEET: **1 of 1**

SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): DATE STARTED: 1/26/12

WATER TABLE (ft): 5.0 DATE FINISHED: 1/26/12

DATE OF READING: 1/26/12 DRILLED BY: DAVID/SID

EST. W.S.W.T. (ft): TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						ASPHALT (2")						
						LIMEROCK (4 1/2")						
						Gray fine SAND with trace Rock fragments (SP)						
						Brown fine SAND with some Glass and Plastic Debris (SP)						
5				▼								
						Gray very Clayey fine SAND with Shell and Rock fragments (SC)						
10												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-4

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **A-4** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): DATE STARTED: 1/26/12
WATER TABLE (ft): 5.0 DATE FINISHED: 1/26/12
DATE OF READING: 1/26/12 DRILLED BY: DAVID/SID
EST. W.S.W.T. (ft): TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORG. CONT. (%)
0						ASPHALT (4")						
						LIMEROCK (3 1/2")	5.9	8.1				
						Grayish Brown fine SAND with Silt and Shell fragments (SP-SM)						
						Gray fine SAND (SP)						
5				▼		Dark Gray Clayey fine SAND with Shell fragments (SC)						
						Dark Gray SAND with Clay with Many Roots and Organics (Pt)						
						Gray Silty CLAY (CL)						
10												

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/1/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-5

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS: NE - Groundwater not encountered

BORING DESIGNATION: **A-5** SHEET: **1 of 1**

SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):

WATER TABLE (ft): NE

DATE OF READING: 1/25/12

EST. W.S.W.T. (ft):

DATE STARTED: 1/25/12

DATE FINISHED: 1/25/12

DRILLED BY: DAVID/SID

TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORG. CONT. (%)
0						Grayish-brown fine SAND with limerock fragments (SP)						
						Grayish-brown fine SAND with Shell fragments (SP)	4.8	2.8				
5												
						Tan and brown fine SAND (SP)						

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/1/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-6

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **A-6** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):
WATER TABLE (ft): 4.5
DATE OF READING: 1/25/12
EST. W.S.W.T. (ft):

DATE STARTED: 1/25/12
DATE FINISHED: 1/25/12
DRILLED BY: DAVID/SID
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Gray fine SAND with Limerock (SP)						
						Grayish-brown fine SAND (SP)						
5				▼								

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/1/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-7

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **A-7** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): DATE STARTED: 1/25/12
WATER TABLE (ft): 4.7 DATE FINISHED: 1/25/12
DATE OF READING: 1/25/12 DRILLED BY: DAVID/SID
EST. W.S.W.T. (ft): TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./DAY)	ORG. CONT. (%)
									LL	PI		
0						Grayish-brown fine SAND with trace of Shell fragments (SP)						
				▼		Grayish-brown fine SAND with Silt (SP-SM)						
5						Brown fine SAND (SP)						
10												

BORING_LOG 0930.1200006.0000-FRONT STREET PROPERTY.GPJ UNIENGSC.GDT 3/1/12

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 0930.1200006.0000
REPORT NO.:
PAGE: A-12

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **LA-1** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): DATE STARTED: 1/23/12
WATER TABLE (ft): 3.0 DATE FINISHED: 1/23/12
DATE OF READING: 1/23/12 DRILLED BY: DAVID/SID
EST. W.S.W.T. (ft): TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	PI	K (FT./ DAY)	ORG. CONT. (%)
0						Grayish-brown fine SAND with Silt with some Shell (SP-SM)	7.1	16.1				
				▼								
5						Gray Clayey fine SAND with Shell fragments (SC)						
10												
						Gray Clayey fine SAND with Sand seams (SC)						
15												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0930.1200006.0000
REPORT NO.:	
PAGE:	A-13

PROJECT: GEOTECHNICAL EXPLORATION
FRONT STREET PROPERTY
FERNANDINA BEACH, FLORIDA

CLIENT: ZEV COHEN & ASSOCIATES

LOCATION: SEE BORING LOCATION

REMARKS:

BORING DESIGNATION: **LA-2** SHEET: **1 of 1**

SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft):

WATER TABLE (ft): 2.0

DATE OF READING: 1/23/12

EST. W.S.W.T. (ft):

DATE STARTED: 1/23/12

DATE FINISHED: 1/23/12

DRILLED BY: DAVID/SID

TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Grayish-brown fine SAND with Brick Debris and some Roots (DEBRIS)						
						Grayish-brown Silty fine SAND (SM)	8.3	22.7				
				▼		Grayish-brown fine SAND with Silt (SP-SM)						
						Brown fine SAND (SP)						
						Gray Silty Sandy CLAY with Shell fragments (CL)	70.6	111.5				
5												
10						Gray Silty CLAY with sand lenses (CL)						
15												

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KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive Standard Spoon 1Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample From Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
% REC	Percent Core Recovery from Rock Core Drilling
RQD	Rock Quality Designation
▼	Stabilized Groundwater Level
▽	Seasonal High Groundwater Level
NE	Not Encountered
BT	Boring Terminated
-200	Fines Content or % Passing No. 200 Sieve
MC	Moisture Content
LL	Liquid Limit
PI	Plasticity Index
K	Coefficient of Permeability
Org. Cont.	Organic Content

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve *	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve *	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

* Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as, SP-SM and SP-SC) for soil with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)

Very Loose -Less than 4 Blows / Foot
Loose - 4 to 10 Blows / Foot
Medium Dense - 11 to 30 Blows / Foot
Dense - 31 to 50 Blows / Foot
Very Dense - More than 50 Blows / Foot

CONSISTENCY
(Silts and Clays)

Very Soft - Less than 2 Blows / Foot
Soft - 2 to 4 Blows / Foot
Firm - 5 to 8 Blows / Foot
Stiff - 9 to 15 Blows / Foot
Very Stiff - 16 to 30 Blows / Foot
Hard - More than 30 Blows / Foot

RELATIVE HARDNESS
(Limestone)

Soft - 100 Blows for more than 2"
Hard - 100 Blows for less than 2"

MODIFIERS

These Modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace - 5% or Less
With Silt or With Clay - 6% to 11%
Silty or Clayey - 12% to 30%
Very Silty or Very Clayey - 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace - Less than 3%
Few - 3% to 4%
Some - 5% to 8%
Many - Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace - 5% or Less
Few - 6% to 12%
Some - 13% to 30%
Many - 31% to 50%

FIELD EXPLORATION PROCEDURES

Standard Penetration Test Boring

The penetration boring was made in general accordance with the latest revision of ASTM D 1586, "Penetration Test and Split-Barrel Sampling of Soils". The boring was advanced by rotary drilling techniques using a circulating bentonite fluid for borehole flushing and stability. At 2 ½ to 5 foot intervals, the drilling tools were removed from the borehole and a split-barrel sampler inserted to the borehole bottom and driven 18 inches into the soil using a 140 pound hammer falling on the average 30 inches per hammer blow. The number of blows for the final 12 inches of penetration is termed the "penetration resistance, blow count, or N-value". This value is an index to several in-place geotechnical properties of the material tested, such as relative density and Young's Modulus.

After driving the sampler 18 inches (or less if in hard rock-like material), the sampler was retrieved from the borehole and representative samples of the material within the split-barrel were placed in glass jars and sealed. After completing the drilling operations, the samples for each boring were transported to our laboratory where they were examined by our engineer in order to verify the driller's field classification.

Auger Boring

The auger boring was performed mechanically by the use of a continuous-flight auger attached to the drill rig and in general accordance with the latest revision of ASTM D 1452, "Soil Investigation and Sampling by Auger Borings". Representative samples of the soils brought to the ground surface by the augering process were placed in glass jars, sealed and transported to our laboratory where they were examined by our engineer to verify the driller's field classification.

LABORATORY TESTING PROCEDURES

Natural Moisture Content

The water content of the sample tested was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of "pore" or "free" water in a given mass of material to the mass of solid material particles.

Organic Loss on Ignition (Percent Organics)

The organic loss on ignition or percent organic material in the sample tested was determined in general accordance with ASTM D 2974. The percent organics is the material, expressed as a percentage, which is burned off in a muffle furnace at 550° Celsius.

Percent Fines Content

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

Atterberg Limits

The Atterberg Limits consist of the Liquid Limit (LL) and the Plastic Limit (PL). The LL and PL were determined in general accordance with the latest revision of ASTM D 4318. The LL is the water content of the material denoting the boundary between the liquid and plastic states. The PL is the water content denoting the boundary between the plastic and semi-solid states. The Plasticity Index (PI) is the range of water content over which a soil behaves plastically and is denoted numerically by as the difference between the LL and the PL. The water content of the sample tested was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of "pore" or "free" water in a given mass of material to the mass of solid material particles.

APPENDIX B

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

CONSTRAINTS AND RESTRICTIONS

Important Information About Your

Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

Geotechnical 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 civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one–not even you–*should apply the report for any purpose or project except the one originally contemplated.

Read the full report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- 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,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- 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. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ–sometimes significantly–from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject To Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of the 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 equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE

8811 Colesville Road Suite G106 Silver Spring, MD 20910
Telephone: 301-565-2733 Facsimile: 301-589-2017
email: info@asfe.org www.asfe.org

Universal Engineering Sciences, Inc.
GENERAL CONDITIONS

SECTION 1: RESPONSIBILITIES

1.1 *Universal Engineering Sciences, Inc.*, heretofore referred to as the Consultant, 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 "Consultant" 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 the Consultant with a clear understanding of the project nature and scope. The Client shall supply the Consultant with sufficient and adequate information, including, but not limited to, maps, site plans, reports, surveys and designs, to allow the Consultant 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.

SECTION 2: STANDARD OF CARE

2.1 Services performed by the Consultant under this Agreement are expected by the Client to be conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Consultant'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 the Consultant will be based solely on information available to the Consultant at the time of service. The Consultant is responsible for those data, interpretations, and recommendations, but will not be responsible for other parties' interpretations or use of the information developed.

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 the Consultant 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 Consultant free access to the site. The Consultant 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. The Consultant will take reasonable precautions to avoid known subterranean structures, and the Client waives any claim against Consultant, and agrees to defend, indemnify, and hold Consultant 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 Consultant for any time spent or expenses incurred by Consultant in defense of any such claim with compensation to be based upon Consultant'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 The Consultant 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 Consultant 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 the Consultant incurs any expenses to collect overdue billings on invoices, the sums paid by the Consultant for reasonable attorneys' fees, court costs, Consultant's time, Consultant's expenses, and interest will be due and owing by the Client.

SECTION 6: OWNERSHIP OF DOCUMENTS

6.1 All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by the Consultant, as instruments of service, shall remain the property of the Consultant.

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 The Consultant 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.

SECTION 7: DISCOVERY OF UNANTICIPATED HAZARDOUS MATERIALS

7.1 Client warrants that a reasonable effort has been made to inform Consultant 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. Consultant and Client agree that the discovery of unanticipated hazardous materials constitutes a changed condition mandating a renegotiation of the scope of work. Consultant and Client also agree that the discovery of unanticipated hazardous materials may make it necessary for Consultant to take immediate measures to protect health and safety. Client agrees to compensate Consultant for any equipment decontamination or other costs incident to the discovery of unanticipated hazardous waste.

7.4 Consultant 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 Consultant harmless for any and all consequences of disclosures made by Consultant 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 Consultant, and to the maximum extent permitted by law, agrees to defend, indemnify, and save Consultant harmless from any claim, liability, and/or defense costs for injury or loss arising from Consultant'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 the Consultant which are found to be contaminated.

SECTION 8: RISK ALLOCATION

8.1 Client agrees that Consultant's liability for any damage on account of any error, omission or other professional negligence will be limited to a sum not to exceed $50,000 or Consultant's fee, whichever is greater. Client agrees that the foregoing limits of liability extend to all of consultant's employees and professionals who perform any services for Client. If Client prefers to have higher limits on professional liability, Consultant agrees to increase the limits up to a maximum of $1,000,000.00 upon Clients' 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 The Consultant 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 Consultant has such coverage under public liability and property damage insurance policies which the Consultant 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, Consultant agrees to indemnify and save Client harmless from and against loss, damage, or liability arising from negligent acts by Consultant, its agents, staff, and consultants employed by it. The Consultant 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 Consultant harmless for loss, damage or liability arising from acts by Client, Client's agent, staff, and other consultants employed by Client.

SECTION 10: DISPUTE RESOLUTION

10.1 All claims, disputes, and other matters in controversy between Consultant and Client arising out of or in any way related to this Agreement will be submitted to alternative dispute resolution (ADR) such as mediation and/or arbitration, before and as a condition precedent to other remedies provided by law.

10.2 If a dispute at law 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 Consultant'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, Consultant 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, Consultant may complete such analyses and records as are necessary to complete his 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 Consultant in completing such analyses, records and reports.

SECTION 12: ASSIGNS

12.1 Neither the Client nor the Consultant may delegate, assign, sublet or transfer his 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.

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 excavation 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 investigations 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 investigation. 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.