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Consultants in: Geotechnical Engineering • Threshold Inspection
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May 18, 2000

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Orange County Public Schools- Educational Leadership Center
445 West Amelia Street
Orlando, Florida 32801-1127

Attention: Mr. John Martin

Reference: Second Revision Letter - Construction Type
Kennedy Boulevard Property
Eatonville, Orange County, Florida
Purchase Order No. 4500059073
Project No. 10974-001-01
Report No. 115798

Dear Mr. Martin:

Subsequent to the issuance of our preliminary geotechnical exploration report number 107770 on April 19, 2000 and initial revision letter (report number 113403, dated May 2, 2000), you have informed us that the subject property may not be developed with the one or two-story structure(s) we assumed in our initial report. You have informed us that the property will likely be developed with a four or five story office building, similar to the surrounding development.

While this will require more site preparation than a one or two story building, the amount of site preparation necessary should not be considered atypical. Specifically, the loose soils encountered at the site would need to be densified (through undercutting and recompaction or preferably vibro-replacement) to prohibit potential excessive settlements. Alternatively, you may choose to utilize a deep foundation system (piles). Again, the loose sand conditions encountered at this site are typical in this area. Furthermore, structures of the size you describe usually require either some ground improvement program, such as vibro-replacement, or a deep foundation system (piles).

All other conclusions from the original report and first revision remain unchanged. We trust the further amended information presented herein is sufficient for your present needs. As you review this information, should you have additional questions or require further assistance, please contact us.

Respectfully submitted,
UNIVERSAL ENGINEERING SCIENCES, INC.

Brendan S. O'Brien, P.E.
Senior Project Engineer

R. Kenneth Derick, P.E.
P.E. No. 37711
Senior Vice President
Orlando Regional Manager

BSO/RKD:cc
Distributions: Client (4)

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Offices in
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April 19, 2000

Orange County Public Schools
Educational Leadership Center
445 West Amelia Street
Orlando, Florida 32801-1127

Attention: Mr. John Martin

Reference: Preliminary Geotechnical Exploration Report
Kennedy Boulevard Property
Eatonville, Orange County, Florida
Purchase Order No. 4500059073
Project No. 10974-001-01
Report No. 107770

Dear Mr. Martin:

Universal Engineering Sciences has completed the preliminary geotechnical exploration of the Kennedy Boulevard Property in Eatonville, Orange County, Florida. The scope of our work was planned in conjunction with you and authorized by your purchase order number 4500059073.

1.0 PROJECT DESCRIPTION AND PURPOSE

We understand that you are considering the purchase of this parcel for the possible future construction of a school building. The purpose of our preliminary exploration was to determine potential constraints to development, including the presence or absence of muck, the groundwater conditions and general suitability of traditional shallow spread foundations versus deep/pile foundations. Furthermore, you have requested that we evaluate the sinkhole development potential of this site. We have recently (within the past year) performed work for a private client for the adjacent site to the west.

Please note, this is a preliminary report only, based upon limited exploration to answer specific questions posed by you. This report has not been prepared to meet the needs of design professionals, contractors, or any other parties, and the use of this report by them, without the guidance of Universal Engineering Sciences, may lead to erroneous assumptions, faulty conclusions and other problems.

3532 Maggie Blvd. • Orlando, Fl 32811 • (407) 423-0504 • Fax (407) 423-3106

2.0 SITE DESCRIPTION

The site is located on the north side of Kennedy Boulevard, between Keller Road and Deacon Jones Boulevard in Eatonville, Orange County, Florida. Lucien Way runs along the northern portion of the subject parcel. The site is located in Section 34, Township 21 South, Range 29 East. The site is approximately ½ mile west of Interstate 4. The site covers a land area of approximately 18.5 acres.

We examined the USGS topographic quadrangle map Orlando West, Florida, FEMA Flood insurance maps panel #200 of Orange County and the panel of Eatonville and the USDA SCS Soil Survey of Orange County, Florida for relevant information about the subject site.

The noted quadrangle map indicates that the site is relatively level, lying across the 100-foot surface elevation contour. The site is in the vicinity of three lakes: Lake Shadow (approximately ¼ mile west of the site), Hungerford Lake (approximately ¼ mile east of the site) and Harvest Lake (immediately north of the site, across Lucien Way). The noted publications list the mean seasonal water elevation in Lake Shadow at 82 feet (no elevation of the mean seasonal high water level is given for Hungerford Lake or Harvest Lake). Lake Shadow, Harvest Lake and Hungerford Lake are listed as having 100-year flood stage elevations of 86 feet, 92 feet and 97 feet, respectively.

The USDA SCS Soil Survey of Orange County identifies two soil types on this site as defined in Table 1.

TABLE 1

USDA SCS Soil Classifications

Soil No.	Name	Drainage Characteristics	Hydrologic Group	Predicted Seas. High Water Table*	Relative Location on Site
46	Tavares fine sand, 0 to 5 percent slopes	moderately well drained	A	3.5<GWT<6.0	middle two thirds of site
54	Zolfo fine sand	somewhat poorly drained	C	2.0<GWT<3.5	northern and southern one sixth of site

* At ground surface or feet below ground surface, except where indicated as "+." All predicted water tables are apparent as opposed to perched.

3.0 FIELD EXPLORATION

We explored the subsurface conditions with two soil borings advanced to depths of 100 feet and with four soil borings advanced to depths of 20 feet, while performing the Standard Penetration Test (SPT).

We performed the Standard Penetration Test (SPT) in each of the borings in general accordance with the procedures of ASTM D-1586, with continuous sampling performed above a depth of 10 feet to detect slight variations in the soil profile at shallow depths and approximately every 5 feet thereafter. The basic procedure for the Standard Penetration Test is as follows: A standard split-barrel sampler is driven into the soil by a 140-pound hammer falling 30 inches. The number of blows needed to drive the sampler 1-foot, after seating 6 inches, is designated the penetration resistance, or N-value; this value is an index to soil strength and consistency.

It is important to note that no survey control was available for our soil boring locations. Therefore, you should consider our indicated locations to be a rough approximation.

Jar samples of the soils encountered will be held in our laboratory for your inspection for 60 days and then discarded, unless we are notified otherwise. The water levels were recorded immediately following the completion of each hole and later upon stabilized conditions.

The boring locations and detailed subsurface conditions are illustrated in Appendix B: Boring Location Plan and Boring Logs. The classifications and descriptions shown on the logs are based upon visual and manual characterizations of the recovered soil samples as well as the previously noted laboratory tests. Also, see Appendix B: Soils Classification Chart, for further explanation of the symbols and placement of data on the Boring Logs.

Table 2: General Soil Profile, summarizes the soil conditions encountered by the borings performed. The surface cover was generally frequent scrub pine trees with a heavy palmetto undergrowth.

TABLE 2

General Soil Profile

Typical Depth (ft.)	General Soil Descriptions
0 - 7.5	Loose to medium dense, light gray to brown fine SAND [SP]
7.5- 17	Loose to medium dense, light to dark gray-brown fine SAND to fine SAND with silt [SP to SP-SM], with traces of orange mottling
17 - 48.5	Medium dense, dark brown to light brown silty fine SAND to clayey fine SAND to fine SAND with silt [SM to SC to SP-SM]
48.5- 73	Very loose to loose, dark greenish gray clayey fine SAND [SC] to soft to medium stiff sandy CLAY [CL to CH] with some phosphate nodules
73 - 100*	Medium dense to very dense, light gray-brown to gray clayey fine SAND to silty fine SAND [SM to SP-SM to SC], with some cementation to well cemented

*** Termination of Deepest Boring**

[ ] Bracketed Text Indicates: Unified Soil Classification

We encountered the groundwater table in each of our soil borings between 5.5 feet and 11.3 feet below existing grade. We anticipate that during the normal wet season, the groundwater table will be between 2 feet and 6 feet below existing grade at our soil boring locations.

Detailed descriptions of the soils encountered, the existing and estimated seasonal high water tables, and the boring locations are included as Appendix B: Boring Location Plan and Boring Logs.

4.0 LABORATORY TESTING

The soil samples recovered from the soil borings were returned to our laboratory and then a geotechnical engineer visually examined and reviewed the field descriptions. We selected representative soil samples for laboratory testing consisting of eight soil fines content determinations (No. 200 sieve washes), twelve moisture content determinations, two organic content determinations and two sets of Atterberg Limits (Liquid and Plastic).

We performed these tests to aid in classifying the soils and to help to evaluate the general engineering characteristics of the site soils. See Appendix B: Boring Logs and Description of Testing Procedures, for further data and explanations.

5.0 DISCUSSION

It is our opinion that the site soil and groundwater conditions do not pose any significant constraints to the proposed development. We did not encounter any excessively organic deposits. The impact that the soil conditions will have on pavements and site preparation is discussed in the following paragraphs.

5.1 Preliminary Foundation Design Information

The site conditions generally appear suitable for the use of shallow foundations. We anticipate the proposed school building(s) will be one and/or two story structures, likely concrete-masonry, tilt-up or steel frame construction. Structures of this nature should be feasible without extra site (beyond normal) preparation. Should the anticipated buildings be heavier construction type or more than two stories built, some method of ground improvement (undercutting and recompacting, vibro-replacement, etc.) would be necessary to mitigate potential settlements. The soil conditions encountered at this site are generally suited to an allowable bearing capacity of approximately 2,000 to 3,000 pounds per square foot, also depending upon the actual structural design magnitude of loading, and the specific soil conditions at the actual building location.

5.2 Pavements

The surficial soils appear suitable to support typical light duty pavement sections. We anticipate that stabilizing material (i.e., clay) will be required in order for the soils to provide adequate support for the surface. We do not anticipate the need for underdrains unless pavement grades are cut significantly into the existing grade. The water table should be maintained at all times at least 12 inches below the bottom of the base course.

5.3 Site Preparation

We anticipate only normal, good practice, site preparation procedures to prepare this site to support the proposed structure(s). The very loose to loose surficial sands would need to be compacted to mitigate potential settlements. We anticipate this can be done directly on the stripped/grubbed subgrade without over-excavation and recompaction.

5.4 Assessment of Sinkhole Activity

5.4.1 General Sinkhole Formation

A sinkhole is defined as "a depression caused by the soil and other materials subsiding into an open hole or void below the ground surface." This phenomenon is not uncommon in *karst* geology, where soils are underlain by limestone material that is partially dissolved by the groundwater. The resulting voids in the rock provide paths through which water can travel, taking erodible soil with it.

In much of the Central and Western Florida vicinity, the soil which occurs in close proximity above the limestone consists of a light to dark, green to gray clay to silty or clayey sand resulting from marine deposits, commonly termed the "Hawthorn Formation." This *confining* layer tends to form a barrier to groundwater that ordinarily would be continuous from the surface soils downward into voids in the limestone. The groundwater level or *piezometric surface* in the soils above the confining layer frequently differs from that which exists in the underlying porous limestone because the confining layer prevents a normal, interconnected hydrostatic condition. Provided the confining layer remains intact, the two groundwater regimes can remain independent and stable.

The shallow water table is located within the upper sands and rests on top of the confining layer. The upper water table is not confined or under pressure. The water pressure above the top of the confining layer is simply defined by the height, or depth of groundwater that lies above the confining layer. If a well or standpipe were to penetrate the confining layer into the underlying rock, then the water pressure in the deep water table could be evaluated as the level of water within the standpipe. If the pressure causes the water to rise higher than the level of the shallow water table, then the groundwater regime can be described as having a "net upward gradient." If, however, the water in the upper water table is higher than the water in the standpipe, then the condition exhibits a "net downward gradient."

If an opening develops in the confining layer, connecting the voids or caverns in the limestone bedrock below to the relatively sandy soils above, then the soil and groundwater conditions might become unstable. In some instances, the clay in the confining layer soils may crack, either from shrinkage, such as may result from dry periods when the shallow water table is absent, or from shifting of the limestone bedrock. In other cases, these soils have little clay content, and are inherently more susceptible to erosion. The result can be a breach in the confining layer. If the groundwater has a net downward gradient, then the erodible soils lying both above and below the confining layer can "ravel" through the opening in the confining layer and/or into cavities and fractures in the bedrock, similar to the behavior of sand falling through the orifice of an hourglass. Over a period ranging from hours to possibly many years, the loss of material causes the soil above to loosen until it is incapable of supporting the material above, and it subsides under the weight. The resulting sinkhole can damage and destroy man-made structures on the near-surface soils.

Sinkhole activity may be indicated by the presence of some of the following conditions:

- a zone of loose or raveled sandy overburden soil, indicating movement of the soils into voids through the confining layer into the limestone below;
- the presence of an opening in the confining layer, as indicated by boring through the layer and finding either little or no thickness of clay;
- reduced water pressure in the soil voids ("pore pressure") with increasing depth, indicating downward flow of water;
- depressed, or absent groundwater table;
- depression of the top, or opening, of the limestone bedrock; and
- loss of circulation during drilling.

5.4.2 Site Sinkhole Potential

Although we encountered some of these conditions in our borings, we do not believe the site conditions indicate imminent sinkhole activity. Specifically, our field drilling crew experienced a complete loss of circulation of the drilling fluid in boring B-4 at a depth of 42.5 feet. Besides being a potential sign of sinkhole activity, this condition may independently be associated with a change between vastly differing soil types, such as occurred 1 foot below the loss of circulation in boring B-4. Although we did encounter some very loose to loose overburden soils (between 48.5 feet and 73 feet below the existing grade), we do not believe that this represented a raveled zone. We did not note a hole in the confining layer, nor did we note (based upon the moisture content tests) a downward groundwater gradient. We did not encounter true bedrock, but we did encounter a transition zone of cemented soils which is typically encountered just above bedrock.

Project No. 10974-001-01
Report No. 107770

We appreciate the opportunity to have worked with you on this project and look forward to a continued association. If you should have any questions, or if you need further assistance, or discussion of your development options for this project, please do not hesitate to call.

Respectfully submitted,
UNIVERSAL ENGINEERING SCIENCES, INC.

Brendan S. O'Brien, P.E.
Senior Project Engineer

R. Kenneth Derick, P.E.
P.E. No. 37711
Senior Vice President
Orlando Regional Manager

BSO/RKD:cc

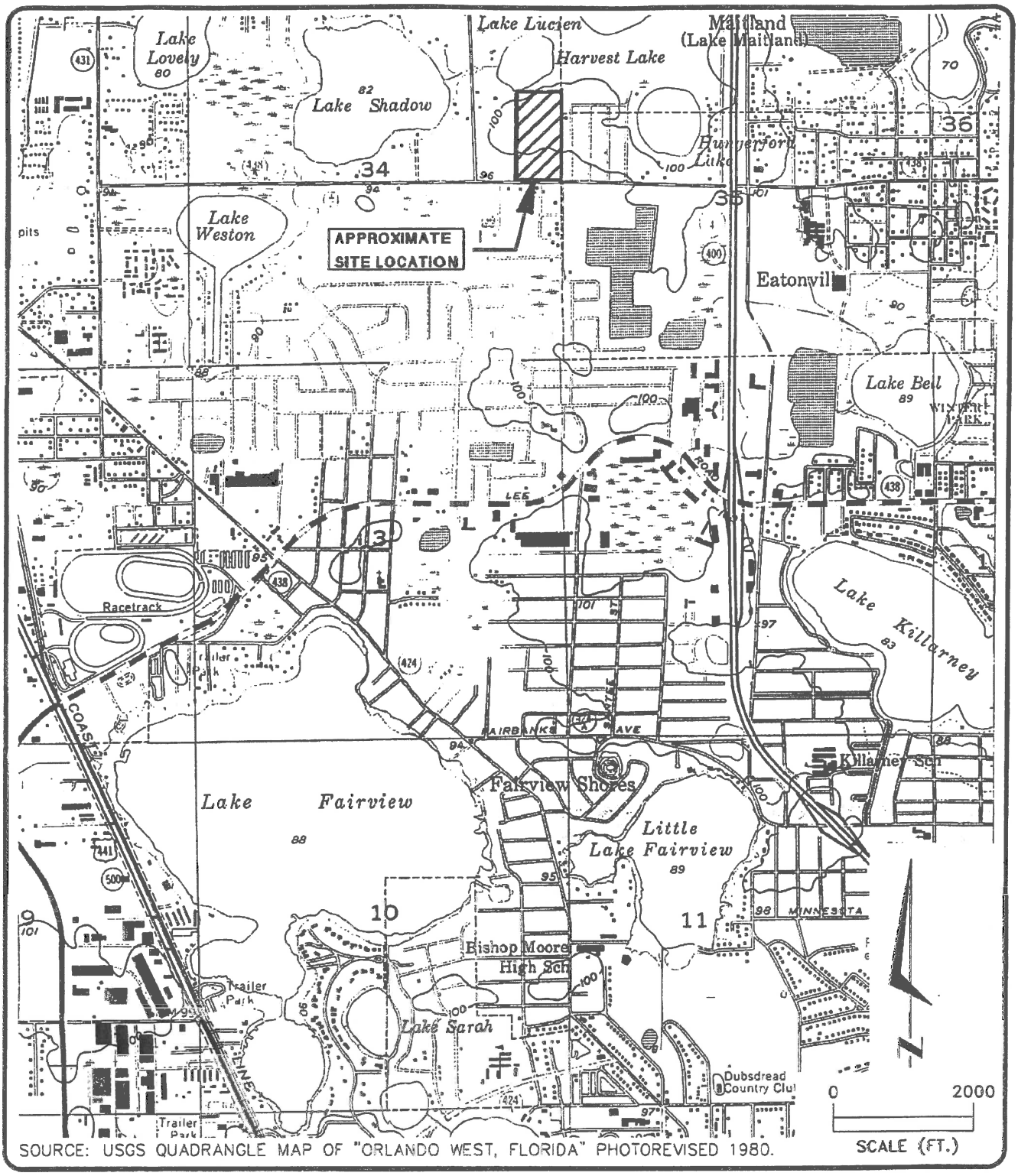
Distribution: Client (4)

Appendix A:
Site Location Map

Appendix B:
Boring Location Plan
Logs of Hand Auger Borings
Soils Classification Chart
Laboratory Testing Procedures

Appendix C:
Important Information About Your Geotechnical Engineering Report
Constraints and Restrictions

APPENDIX A



SOURCE: USGS QUADRANGLE MAP OF "ORLANDO WEST, FLORIDA" PHOTOREVISED 1980.

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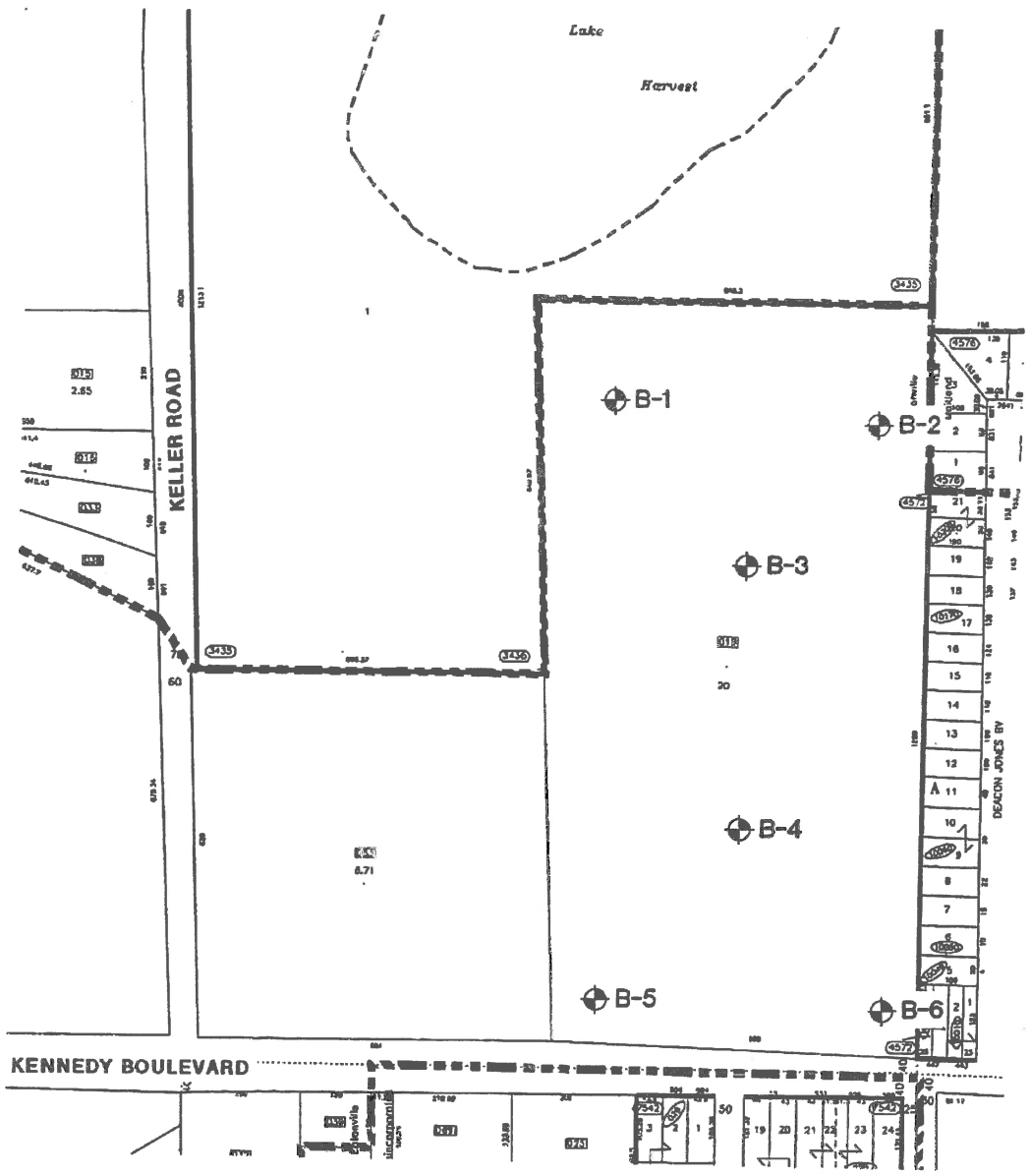
PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

SITE LOCATION MAP

DRAWN BY: R.K.S.	DATE: 4/11/00	CHECKED BY: BJO	DATE: 4/13/00		
SCALE: AS SHOWN	PROJECT NO: 10974-001-01	REPORT NO: 107770	PAGE NO: A-1		

APPENDIX B



LEGEND

⊕ STANDARD PENETRATION TEST BORING LOCATION

BORINGS PERFORMED 4/4/00

0 300

SCALE (FT.)

SOURCE: ASSESSOR MAP FROM MICROBASE PLUS DATABASE SEARCH MANAGER BY MICRODECISIONS, INC.

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PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

BORING LOCATION PLAN

DRAWN BY:	R.K.S.	DATE:	4/11/00	CHECKED BY:	BJO	DATE:	4/13/00
SCALE:	AS SHOWN	PROJECT NO:	10974-001-01	REPORT NO:	107770	PAGE NO:	B-1

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	10974-001-01
REPORT NO.:	107770
PAGE:	B-2.1

PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

CLIENT: ORANGE COUNTY PUBLIC SCHOOLS - REAL PROPERTY

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

BORING DESIGNATION: B-1 SHEET: 1 of 1
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

G.S. ELEVATION (ft):
WATER TABLE (ft): 8.5
DATE OF READING: 4/4/00
EST. W.S.W.T. (ft): 4.5

DATE STARTED: 4/4/00
DATE FINISHED: 4/4/00
DRILLED BY: U.E.S. - ORLANDO
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												
	X	2-2-2	4			Very loose light brown fine SAND; trace of small roots [SP]						
	X	2-2-2	4				3	1				
5	X	2-3-4	7	▽		– loose, no roots						
	X	2-3-3	6			– light gray						
	X	3-4-4	8	▼		– light gray-brown						
	X	4-5-4	9									
10												
						– medium dense, gray						
	X	6-8-7	15									
15												
						Loose dark brown silty fine SAND [SM]						
	X	4-6-4	10			BORING TERMINATED AT 20.0 FT.						
20												
25												
30												
35												
40												
45												
50												

02857

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BORING LOG

PROJECT NO.:	10974-001-01
REPORT NO.:	107770
PAGE:	B-2.2

PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **B-2** SHEET: **1 of 1**
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

CLIENT: ORANGE COUNTY PUBLIC SCHOOLS - REAL PROPERTY

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 9.5
DATE OF READING: 4/4/00
EST. W.S.W.T. (ft): 5.5

DATE STARTED: 4/4/00
DATE FINISHED: 4/4/00
DRILLED BY: U.E.S. - ORLANC
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												
	X	1-2-1	3			Very loose light brown fine SAND; trace of fine roots [SP]						
	X	2-1-2	3									
5	X	2-3-3	6	▽		-- loose, mild pine odor						
	X	4-7-7	14			-- medium dense, light gray-brown, trace of orange mottling						
	X	3-5-6	11			-- no mottling						
	X	4-3-4	7	▼		-- loose						
10						Loose dark brown silty fine SAND [SM]						
	X	4-4-6	10									
15												
	X	12-15-13	28			-- medium dense, brown						
20						BORING TERMINATED AT 20.0 FT.						
25												
30												
35												
40												
45												
50												

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BORING LOG

PROJECT NO.:	10974-001-01
REPORT NO.:	107770
PAGE:	B-2.3

PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **B-3** SHEET: **1 of 2**
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

CLIENT: ORANGE COUNTY PUBLIC SCHOOLS - REAL PROPERTY

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 11.3
DATE OF READING: 4/4/00
EST. W.S.W.T. (ft): 6.0

DATE STARTED: 4/4/00
DATE FINISHED: 4/4/00
DRILLED BY: U.E.S. - ORLANDO
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												
	X	1-1-1	2			Very loose light brown fine SAND [SP]						
	X	1-1-1	2									
5	X	1-2-3	5	▽		-- loose						
	X	3-2-4	6			-- brown						
	X	3-3-4	7									
	X	3-4-3	7									
10				▼								
	X	5-6-8	14			Medium dense dark gray-brown fine SAND; with silt [SP-SM]						
15												
	X	18-20-16	36			Dense brown silty fine SAND [SM]						
20												
	X	6-6-7	13			Medium dense light brown clayey fine SAND; with silt [SC]						
25												
	X	2-3-3	6			Loose light brown silty fine SAND; with clay [SM]						
30												
	X	2-3-6	9			Loose light brown fine SAND; with silt [SP-SM]						
35												
	X	9-11-12	23			Medium dense light brown fine SAND [SP]						
40												
	X	4-4-5	9			Loose light brown fine SAND; with silt [SP-SM]						
45												
	X	8-8-11	19			-- medium dense, fine to medium grained						
50												

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BORING LOG

PROJECT NO.:	10974-001-01
REPORT NO.:	107770
PAGE:	B-2.4

PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **B-3** SHEET: **2 of 2**
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

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. (%)
50												
55	X	2-3-3	6			Medium stiff dark greenish-gray sandy CLAY; with silt [CH]	68	54	68	39		
60	X	3-2-2	4			Very loose dark greenish-gray clayey fine SAND; with silt [SC]						
65	X	2-2-2	4			Soft gray-brown silty CLAY; some phosphates nodules [CL]						
70	X	1-2-1	3			Soft gray-brown clayey fine SAND; with phosphate nodules [SC]						
75	X	4-9-12	21			Medium dense gray-brown clayey fine SAND; with phosphate nodules and some cemented clayey sand [SC]						
80	X	13-20-43	63			-- very dense, light gray-brown						
85	X	100	100/5"			-- gray-brown, well-cemented						
90	X	115	115/6"									
95	X	21-25-37	62			-- some cementation						
100	X	43-41-100	141/11"			BORING TERMINATED AT 100.0 FT.						

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BORING LOG

PROJECT NO.:	10974-001-01
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PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **B-4** SHEET: **1 of 2**
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

CLIENT: ORANGE COUNTY PUBLIC SCHOOLS - REAL PROPERTY

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 9.6
DATE OF READING: 4/3/00
EST. W.S.W.T. (ft): 5.0

DATE STARTED: 4/4/00
DATE FINISHED: 4/4/00
DRILLED BY: U.E.S. - ORLANDO
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												
	X	2-3-3	6			Loose gray fine SAND; trace of organics [SP]		3				2.4
	X	3-3-5	8			-- gray-brown						
5	X	6-6-9	15	▽		-- medium dense, light gray						
	X	8-9-7	16									
	X	4-4-4	8			-- loose						
10	X	4-5-6	11	▽		-- medium dense						
15	X	4-3-4	7			Loose dark brown fine SAND; with silt [SP-SM]						
20	X	4-5-6	11			Medium dense brown silty fine SAND [SM]						
25	X	3-3-4	7			-- loose, light brown						
30	X	2-3-6	9			-- light gray						
35	X	1-2-3	5			-- light gray-brown						
40	X	1-0-1	1			-- very loose, light gray, with clay	15	24				
45	X	2-2-2	4			LOSS OF CIRCULATION AT 42.5 FT. Very loose gray-brown clayey fine SAND [SC]	37	40				
50	X	2-3-3	6			-- loose, gray						

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BORING LOG

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PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **B-4** SHEET: **2 of 2**
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

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. (%)
50												
55	X	2-3-5	8			– greenish-gray						
60	X	3-3-1	4			Soft dark greenish-gray silty CLAY; with abundant phosphate nodules and some sand [CH]		61	96	57		
65	X	21-34-47	81			Very dense light green-gray clayey fine SAND; with silt, trace of phosphates and some cemented sand [SC]						
70	X	50-67-100	167/9"			Very hard gray silty CLAY; with sand, some phosphates and some cemented sand [CL]						
75	X	12-15-17	32			Dense gray clayey fine SAND; with silt and some limestone fragments [SC]						
80	X	20-10-23	33				24	36				
85	X	8-12-10	22			– medium dense, light gray		37				
90	X	100	100/3"			LOSS OF CIRCULATION AT 87.0 FT. Very dense gray-brown silty fine SAND; trace of phosphate nodules, well-cemented [SM]						
95	X	73-100	100/4"									
100	X	100	100/2"			BORING TERMINATED AT 100.0 FT.						

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	10974-001-01
REPORT NO.:	107770
PAGE:	B-2.7

PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **B-5** SHEET: **1 of 1**
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

CLIENT: ORANGE COUNTY PUBLIC SCHOOLS - REAL PROPERTY

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 6.0
DATE OF READING: 4/4/00
EST. W.S.W.T. (ft): 2.5

DATE STARTED: 4/4/00
DATE FINISHED: 4/4/00
DRILLED BY: U.E.S. - ORLANDO
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												
	X	1-2-1	3	▽		Very loose light gray-brown fine SAND [SP]	5	2				
	X	2-3-4	7			-- loose, with small root piece						
5	X	4-6-5	11			-- medium dense						
	X	4-3-3	6	▼		-- loose, brown						
	X	1-1-1	2			Very loose dark brown fine SAND; with silt [SP-SM]						
	X	2-3-5	8			-- loose, dark brown						
10						-- medium dense, light gray-brown						
	X	4-6-7	13									
15												
	X	4-3-4	7			Loose light brown silty fine SAND [SM]						
20						BORING TERMINATED AT 20.0 FT.						
25												
30												
35												
40												
45												
50												

02857

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	10974-001-01
REPORT NO.:	107770
PAGE:	B-2.8

PROJECT: PRELIMINARY GEOTECHNICAL EXPLORATION REPORT
KENNEDY BOULEVARD PROPERTY
ORANGE COUNTY, FLORIDA

CLIENT: ORANGE COUNTY PUBLIC SCHOOLS - REAL PROPERTY

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

BORING DESIGNATION: **B-6** SHEET: **1 of 1**
SECTION: 34 TOWNSHIP: 21S RANGE: 29E

G.S. ELEVATION (ft):
WATER TABLE (ft): 5.5
DATE OF READING: 4/4/00
EST. W.S.W.T. (ft): 2.0

DATE STARTED: 4/4/00
DATE FINISHED: 4/4/00
DRILLED BY: U.E.S. - ORLAND
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						Very loose light gray fine SAND; trace of small roots [SP]						
		1-1-2	3	▽								
		2-3-2	5			-- loose, light brown						
5		2-1-2	3	▼		-- very loose						
		2-2-2	4			Very loose gray-brown silty fine SAND; with a trace of small roots [SM]	14	22				
		3-3-3	6			-- loose, dark brown, no roots						
10		3-4-3	7			-- some small roots		35				3.8
						-- medium dense, light brown						
15		8-10-12	22									
						Medium dense light gray clayey fine SAND [SC]						
20		4-6-10	16				29	33				
						BORING TERMINATED AT 20.0 FT.						
25												
30												
35												
40												
45												
50												

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KEY TO BORING LOGS

SYMBOLS

22	Number of Blows of a 140-lb Weight Falling 30 In. Required to Drive Standard Spoon One Foot
WOR	Weight of Drill Rods
S	Thin-Wall Shelby Tube Undisturbed Sampler Used
90% Rec.	Percent Core Recovery from Rock Core-Drilling Operations
	Sample Taken at this Level
	Sample Not Taken at this Level
	Change in Soil Strata
	Free Ground Water Level
	Seasonal High Ground Water Level

UNIFIED CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on 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, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes 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, silty 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 diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

* Based on the material passing the 3-in. (75-mm) sieve.

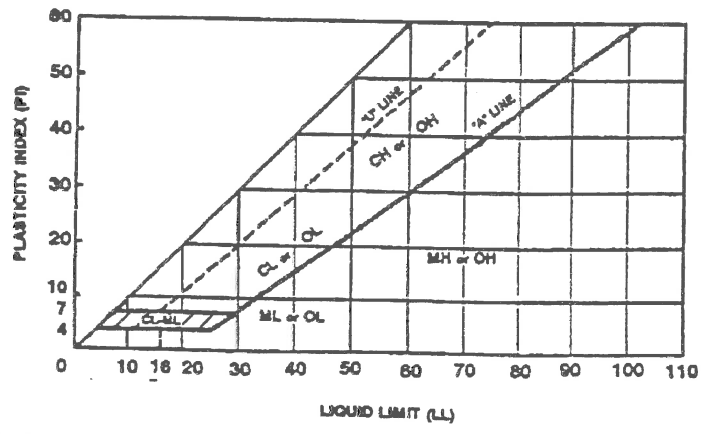
RELATIVE DENSITY (sand-silt)

Very Loose - Less Than 4 Blows/Ft.
Loose - 4 - 10 Blows/Ft.
Medium - 10 to 30 Blows/Ft.
Dense - 30 to 50 Blows/Ft.
Very Dense - More Than 50 Blows/Ft.

CONSISTENCY (clay)

Very Soft - Less Than 2 Blows/Ft.
Soft - 2 to 4 Blows/Ft.
Medium - 4 to 8 Blows/Ft.
Stiff - 8 to 15 Blows/Ft.
Very Stiff - 15 to 30 Blows/Ft.
Hard - More Than 30 Blows/Ft.

PLASTICITY CHART



DESCRIPTION OF LABORATORY TESTING PROCEDURES

ATTERBERG LIMITS TEST - ASTM D-4318

The Atterberg Limits are a series of moisture (water) contents which define the plastic behavior of clays. The pertinent Atterberg Limits which were tested for in our laboratory analysis were the liquid limit and the plastic limit. The liquid limit and the plastic limit are the upper and lower limits of the range of water content over which a soil exhibits plastic behavior. The difference between the liquid limit and the plastic limit is termed the plasticity index. Generally, the greater the plasticity index, the greater the shrink/sweil potential of the clay.

The liquid limit is determined as follows: The soil is mixed with distilled water to form a thick paste, which is then placed in a brass cup which is mounted on an edge pivot and rests initially on a rubber base. The soil in the brass cup is then leveled off horizontally and divided by cutting a groove with a standard tool. The two halves of the soil gradually flow together as the cup is repeatedly dropped on to its base at a specified rate. The liquid limit is defined as the water content at which 25 blows are required to close the grove over a distance of ½ inch. At water contents greater than the liquid limit the clay acts more like a liquid than a soil-water mixture.

The plastic limit is determined as follows: The soil is mixed with distilled water until it can be molded. A ball of soil is then rolled into a thread 1/8 inch in diameter between the soil technician's hand and a glass plate. The soil is molded together again and the process repeated until the thread crumbles when its diameter is 1/8 inch. The water content of the crumbled soil is determined and defined as the plastic limit. At water contents less than the plastic limit the clay acts more like a solid mass than a soil-water mixture.

MOISTURE CONTENT DETERMINATION - ASTM D-2216

Moisture content is the ratio of the weight of water to the dry weight of soil. Moisture content is measured by drying a sample at 105 degrees Celsius. The moisture content is expressed as a percent of the oven dried soil mass.

WASH 200 TEST - ASTM D-1140

The Wash 200 test is performed by passing a representative soil sample over a No. 200 sieve and rinsing with water. The percentage of the soil grains passing this sieve is then calculated.

ORGANIC CONTENT DETERMINATION ASTM D-2974

This test method determines the moisture content, ash content, and organic matter in peats and other organic soils, such as organic clay, silt, sand, and "muck". The organic content determinations were performed by placing a sample of soil in a low temperature oven. The soils are then dried to determine the initial moisture content. The soils were then transferred to a high temperature kiln which burns off the organic materials. The organic content is then calculated based on the dry weight of the soil.

APPENDIX C

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 uniquely prepared for the client. No one except you should rely on your geotechnical engineering report without first confiding 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.

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 conduced 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 when 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 flood, 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 identified 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 judgement 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 over rely on the construction recommendations included in your report. Those recommendations are not final, because geotechnical engineers develop them principally from judgement 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 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 these provisions indicate where geotechnical engineer's 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 PROFESSIONAL FIRMS PRACTICING IN THE GEOSCIENCES

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Telephone: 301-565-2733 Facsimile: 301-589-2017
email: info@asfe.org www.asfe.org

IIGER06983.5M

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.