



GEOTECHNICAL INVESTIGATION
County Road 466A
Ponds 7 and 8
Lake County, Florida
AEI Project # CGGT-05-364

**Andreyev
Engineering,
Inc.**

- ▼ *Groundwater*
- ▼ *Environmental*
- ▼ *Geotechnical*
- ▼ *Materials Testing*





February 23, 2008
Project No. CPGT-05-364

TO: **Kimley Horn & Associates, Inc.**
3660 Maguire Blvd., Suite 200
Orlando, Florida 32803
Attention: Mr. Fred Burkett

SUBJECT: **Geotechnical Investigation, County Road 466A, Ponds 7 and 8, Lake County, Florida**

Dear Mr. Burkett:

In accordance with your request, Andreyev Engineering, Inc. has completed a soil and groundwater investigation of the proposed Ponds 7 and 8 as part of the CR466A widening project. Our investigation consisted of drilling three (3) soil borings within the proposed retention pond for the purpose of characterizing subsurface conditions. The following report presents the results of the geotechnical study, including borings in the proposed retention areas, and engineering evaluations and recommendations for design of the proposed retention ponds.

PROJECT DESCRIPTION

The subject property is located immediately northwest of the intersection of US Hwy 27 and CR466A, Lake County, Florida. The project is specifically located within Sections 4, Township 19 South and Range 24 East. Based on the USGS Topographic Map "Leesburg West, FLA", the ground elevation at the pond sites are approximately +80 ft-NGVD for Pond 7 and +70 ft-NGVD for Pond 8. The proposed Pond 7 location is currently vacant, wooded upland and the proposed Pond 8 location is currently vacant, wooded lowland adjacent to wetland. The USGS Topographic Map showing the layout of the proposed project is presented on the attached **Figure 1**.

PURPOSE AND SCOPE OF INVESTIGATION

The purposes of this study were to explore subsurface conditions along the roadway and provide recommendations for site preparation and pavement section design. To accomplish this purpose, the following tasks were performed:

1. Drilled three (3) auger borings to a depth of 30 feet within the proposed retention ponds.
2. Installed two (2) shallow piezometers and conducted two (2) field permeability tests to determine the saturated horizontal conductivity of the soils underlying the proposed retention areas.

3. Visually classified and stratified the soil samples collected during the drilling operation and conducted laboratory index property tests (moisture and -200) on selected samples.
4. Prepared this report detailing the results of our investigation including field investigation results, evaluation of site conditions and engineering recommendations for retention pond design.

INVESTIGATION AND RESULTS

S.C.S. Soil Survey

The "Soil Survey of Lake County, Florida" published by the U.S. Department of Agriculture Soil Conservation Service (S.C.S.) was reviewed. The shallow soil types identified at the site are presented as follows:

- Candler (Astatula) sand, 0 to 5 percent slopes (AtB, 13). This soil is nearly level to gently sloping, excessively drained soil. The seasonal high groundwater table is at a depth of 72 inches or more. The permeability of Candler soil is very rapid in the surface and subsurface layers and moderately rapid in the subsoil. The hydrological group for Candler soil, 0 to 5 percent slopes is "A".
- Candler (Astatula) sand, 5 to 12 percent slopes (AtD, 15). This soil is gently to moderately sloping, excessively drained soil. The seasonal high groundwater table is at a depth of 72 inches or more. The permeability of Candler soil is very rapid in the surface and subsurface layers and moderately rapid in the subsoil. The hydrological group for Candler soil, 5 to 12 percent slopes is "A".
- Anclote, Myakka and Felda soils (Am, 5). This soil is defined as level, very poorly drained soils found predominately in the wetland areas of the property. The seasonal high groundwater table is at or above ground surface. The permeability of Anclote, Myakka and Felda soil is very rapid in the surface and subsurface layers. The hydrological group for Anclote, Myakka and Felda is "D".

The attached **Figure 2** shows the subject property superimposed in the SCS Survey.

Soil Conditions

The test borings were drilled on February 5, 2008. The boring locations are presented on **Figure 3** and the results of the borings are shown in profile form on **Figure 4**. Laboratory test results are shown at the appropriate depths adjacent to the profiles. Horizontal lines designating the interface between different materials on the profiles represent approximate boundaries. The transition between layers is typically gradual.

The following 5 strata were identified in the borings:

STRATUM NO.	DESCRIPTION	USCS GROUP	AASHTO GROUP
1	Grayish-brown fine sand	SP	A-3
2	Pale brown to brown fine sand	SP	A-3
3	Very pale brown fine sand	SP	A-3
4	Grayish-brown silty fine sand	SM	A-2-4
5	Very pale brown silty to slightly clayey fine sand	SM, SM-CL	A-2-4, A-2-5

USCS = Unified Soil Classification System

AASHTO = American Association of State Highway and Transportation Officials

In general, the soils encountered in the borings consisted of grayish-brown fine sand (stratum 1) from the surface to depths of 3 to 5 feet followed by pale brown to brown fine sand (stratum 2) to depths of termination at 30 feet. Boring PB-14 encounter a layer of grayish-brown silty fine sand (stratum 4) from 8 to 12 feet below existing grade followed by very pale brown silty to slightly clayey fine sand (stratum 5) to the depth of termination at 30 feet.

Groundwater Conditions

The groundwater table was encountered at depths ranging from 15 to 24 feet below existing grade. Based on the review of the S.C.S. Soil Survey of Lake County, review of the U.S.G.S. Topographic Map "Leesburg West, FLA.", the encountered soil conditions, and nearby water surface features, the seasonal high groundwater table can be assumed to be on the order of 20 feet below ground surface at the location of Pond 7 and 11 feet below existing grade at the location of Pond 8.

Permeability Tests

Two (2) shallow piezometers were installed at the location of auger borings PB-13 and PB-14 for the purpose of conducting field permeability tests. The piezometers were installed to a depth of 8 feet and 10 feet respectively and were screened in the bottom 5 feet with 2 inch diameter, 0.01 inch slotted PVC. The remaining casing consisted of 2 inch diameter solid PVC well casing. The piezometer was backfilled to ground surface using gravel pack.

Following piezometer installation, field permeability tests were conducted using the constant head method as per the U.S Bureau of Reclamation, 1974. The results of the tests indicated a horizontal saturated coefficient of permeability ranging from 18.3 to 24.1 feet per day. The results of the tests are presented adjacent to the soil profiles and at the tested depth intervals on **Figure 4**.

CONCLUSIONS AND RECOMMENDATIONS

Water Retention Areas

Based on the results of this investigation it is our opinion that the site soil and groundwater conditions are generally suitable for operation of dry bottom retention ponds. The soil conditions in the proposed retention areas consisted of well drained, highly permeable fine sands. No unsuitable conditions such as buried debris, organic soils, loose or raveled soils were found to the maximum boring depth.

Infiltration and recovery analysis must be performed for the proposed pond as required by the St. John's River Water Management District. For this purpose we recommend utilizing the shallow aquifer soil and groundwater parameters presented below.

Pond 7 (Borings PB-12 and PB-13)

Depth to Confining Layer (feet).....	30.0
Depth to Seasonal High Groundwater Table (feet).....	20.0
Horizontal Saturated Hydraulic Conductivity (ft/day)	12.0
Vertical Unsaturated Hydraulic Conductivity (ft/day).....	8.0
Soil Storage Coefficient.....	0.20

Factors of safety have been assigned to the horizontal saturated and vertical unsaturated hydraulic conductivity values. Additional factors of safety are not required.

Pond 8 (Boring PB-14)

Depth to Confining Layer (feet)	12.0
Depth to Seasonal High Groundwater Table (feet)	11.0
Horizontal Saturated Hydraulic Conductivity (ft/day)	9.0
Vertical Unsaturated Hydraulic Conductivity (ft/day)	6.0
Soil Storage Coefficient.....	0.20

Factors of safety have been assigned to the horizontal saturated and vertical unsaturated hydraulic conductivity values. Additional factors of safety are not required.

Kimley Horn and Associates
Geotechnical Investigation
CR466A, Ponds 7 and 8
Lake County, Florida

CLOSURE


We appreciate the opportunity to participate in this project and we trust that the information presented herein is sufficient for your immediate needs. Should you have any questions or comments concerning the contents of this report, please do not hesitate to contact the undersigned.

Sincerely,

ANDREYEV ENGINEERING, INC.



John E. Dye
Project Geologist



T. Scott Cavin, P.E.
Vice President
FL Registration No. 48125

FIGURES



REFERENCE:
 U.S.G.S. LEESBURG WEST, FLA.
 QUADRANGLE MAP
 DATED 1966
 PHOTOREVISED 1980
 SECTION 4
 TOWNSHIP 19 SOUTH
 RANGE 24 EAST



**Andreyev
 Engineering,
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GEOTECHNICAL INVESTIGATION
**CR 466A
 PONDS 7 & 8**
 LAKE COUNTY, FL.

APPROXIMATE SCALE:

1" = 2000'

DATE: 03/05/08

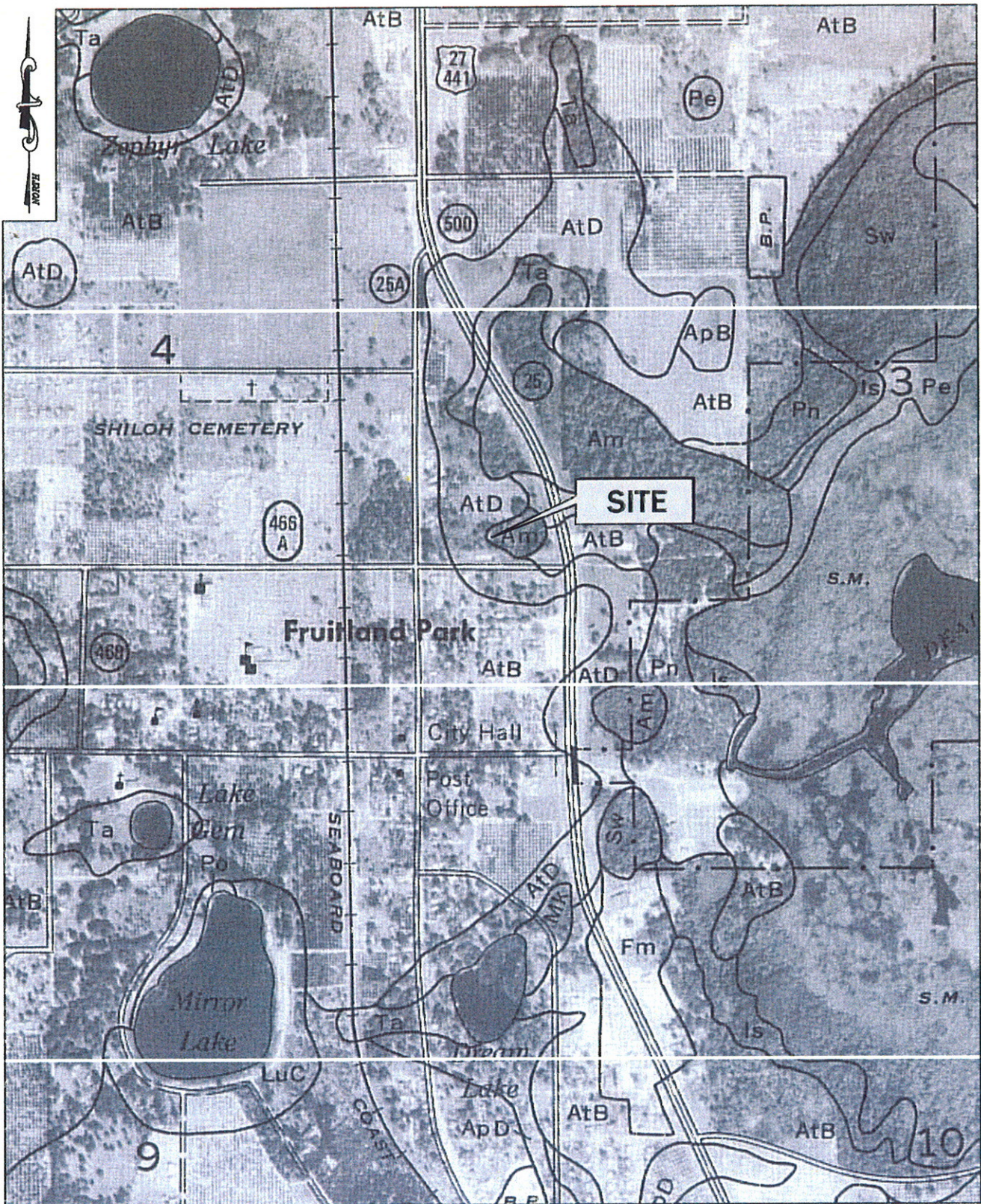
ENGINEER: JD

PN: CGGT-05-364

DRAWN BY: DLS

VICINITY MAP

FIGURE 1



REFERENCE:
SOIL SURVEY OF LAKE
COUNTY AREA
MAP SHEET NO. 21



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GEOTECHNICAL INVESTIGATION

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ENGINEER: JD

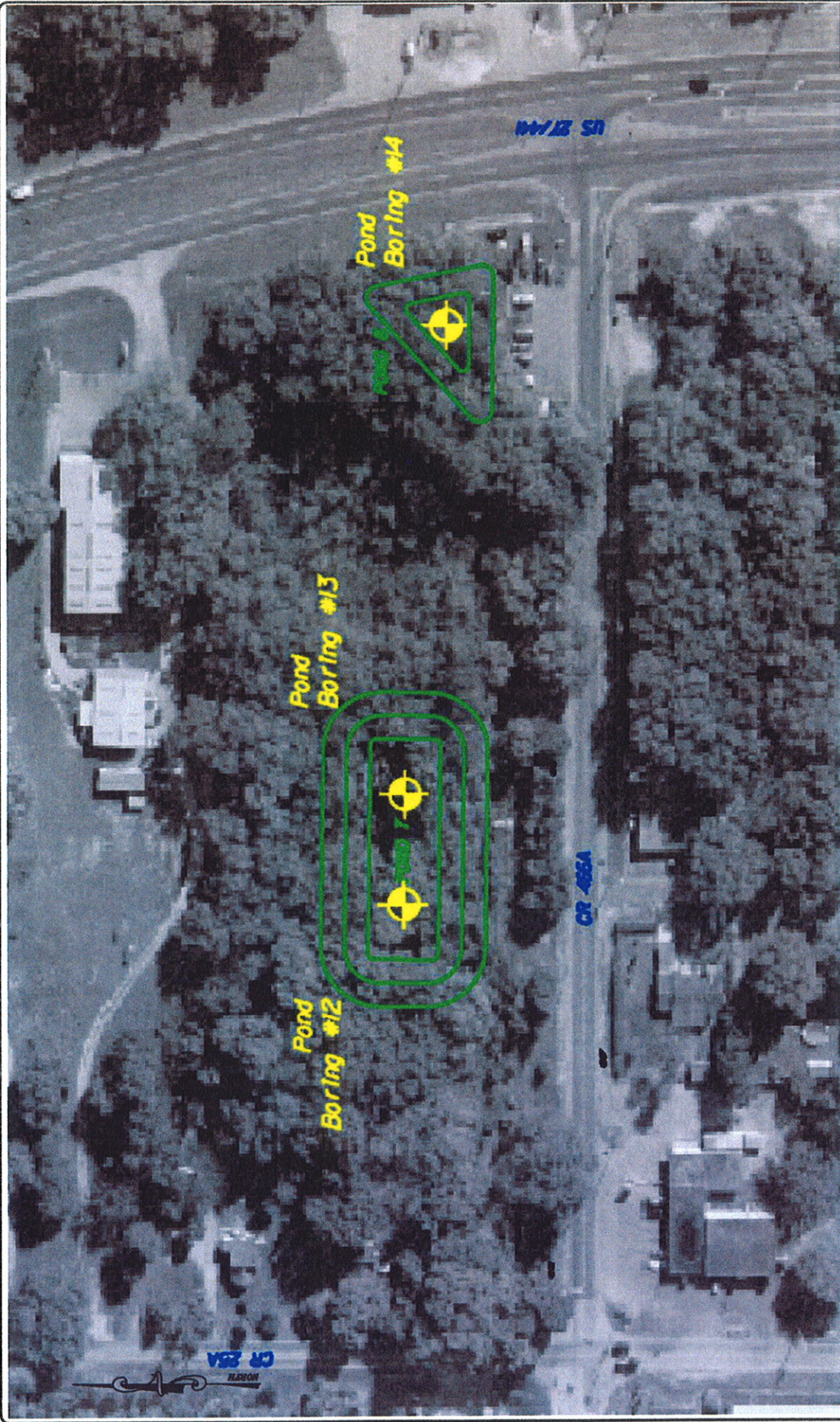
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PN: CGGT-05-364

DRAWN BY: DLS

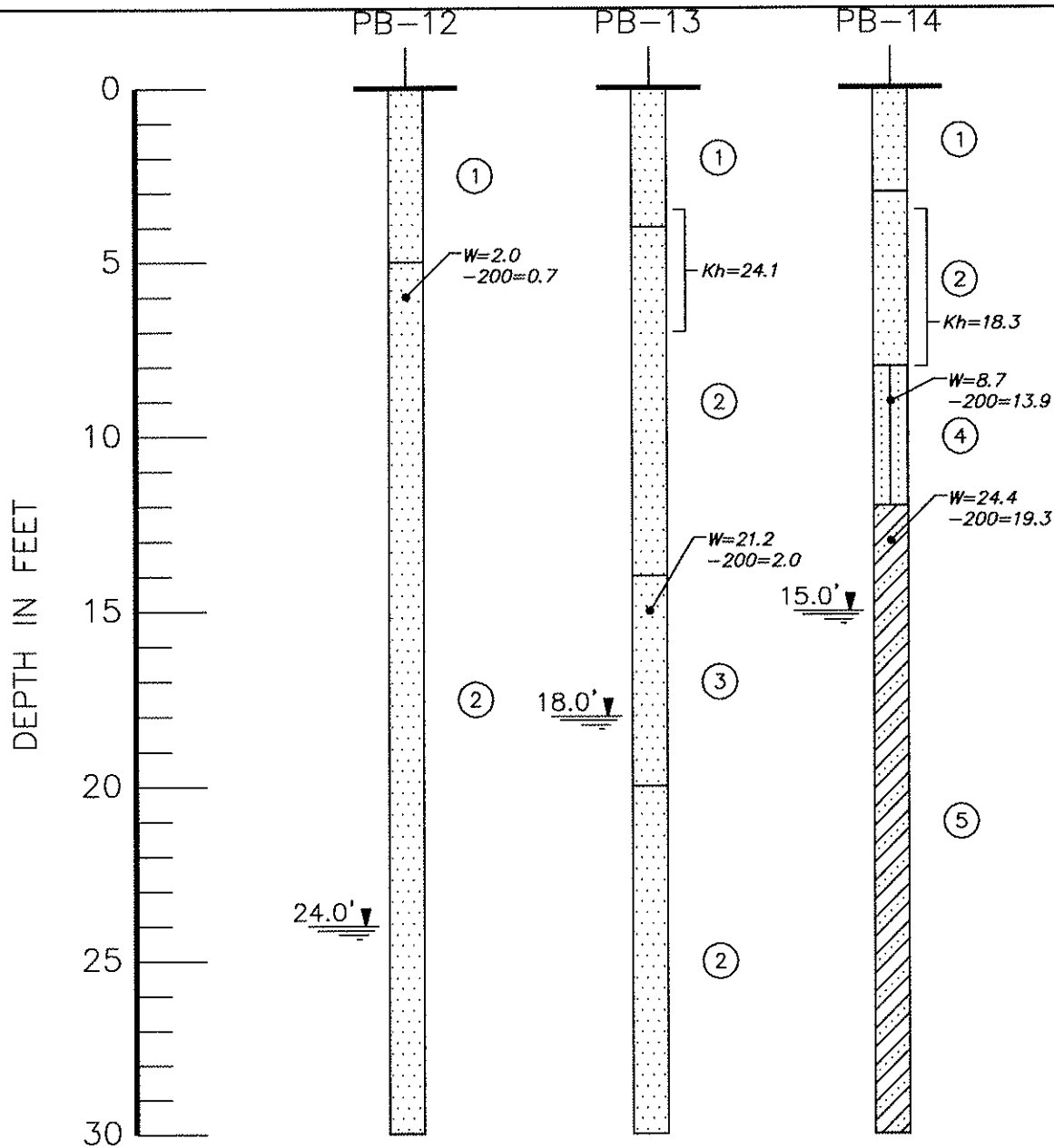
SCS SOIL SURVEY

FIGURE 2



 Andreyev Engineering, Inc.		GEOTECHNICAL INVESTIGATION CR 466A PONDS 7 & 8 LAKE COUNTY, FL.	
		LOCATION PLAN	
APPROXIMATE SCALE: N. T. S.	DATE: 03/05/08 ENGINEER: JD	PN: CCGT-05-364 DRAWN BY: DLS	FIGURE 3

LEGEND:
 LOCATION OF AUGER BORING



LEGEND:

- ① GRAYISH-BROWN FINE SAND (SP) (SP) UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL
- ② PALE BROWN TO BROWN FINE SAND (SP) $\underline{1.0'}$ DEPTH TO GROUNDWATER, FEBRUARY, 2008
- ③ VERY PALE BROWN FINE SAND (SP) W MOISTURE CONTENT, IN PERCENT
- ④ GRAYISH-BROWN SILTY FINE SAND (SM) -200 PERCENT OF FINES PASSING THE U.S. No. 200 SIEVE
- ⑤ VERY PALE BROWN SILTY TO SLIGHTLY CLAYEY FINE SAND (SM)(SM-CL) Kh HORIZONTAL COEFFICIENT OF PERMEABILITY, IN FEET PER DAY

Andreyev Engineering, Inc.	GEOTECHNICAL INVESTIGATION CR 466A PONDS 7 & 8 LAKE COUNTY, FL.	
	APPROXIMATE SCALE: 1" = 5'	DATE: 03/05/08 ENGINEER: JD PN: CCGT-05-364 DRAWN BY: DLS