10/22/2025

ADDENDUM NO 1
ITB 2025-09
ANIMAL ENFORCEMENT KENNEL CONSTRUCTION

Questions & Answers

1. Is there a Geotechnical study available for the Retention Pond Location?

Attached is a report dated 2012.04.12 that includes a boring for the approximate pond location, TH-R S6. Also included is a report which shows the roadway.

2. Can the excess pond excavation material be left on-site?

Contractors may bid the work to stockpile "non muck" materials onsite in the designated stockpile areas.

3. On Plan Sheet #12.0 there is a series of ditches through the wetlands west of the Retention Pond (approx. 2,300 lf of ditches). Are these ditches part of the scope of this project?

Yes, these need to be constructed as part of this project.

4. The Pay Item “Resurfacing SP Asphalt Concrete Traffic C 1125 Tn” is for resurfacing US 90. With this being the surface course on US 90 does the referenced Mix require 76-22 Polymer Modified Binder?

Yes, the asphalt located within FDOT rights-of-way need to include 76-22 PMB

5. Does the surface for the turn lane adjacent to US 90 require 76-22 Polymer Modified Binder?

Yes, the asphalt located within FDOT rights-of-way need to include 76-22 PMB

6. Are the water and force able to be shut off to tie in the relocation, or will Inserta valves be required?

Coordinate connection to existing utilities with applicable providers. The main lines will need to remain operational throughout, so inserta valves may be needed, but we defer to the providers.

Report of Subsurface Soil Exploration and Geotechnical Engineering Evaluation for Widening and Paving Tyre Road, and Soil Evaluation at Proposed 4.09 Acre Stormwater Management Facility A-4, Catalyst Site, Columbia County, Florida

February 24, 2015
File No.113-15-40-1014

Ardaman & Associates, Inc.

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Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

February 24, 2015
File No. 113-15-40-1014

Plum Creek Timber Company
PO Box 357700
Gainesville, Florida 32635-7700

Attention: Ms. Allison Megrath, AICP

Subject: Report of Subsurface Soil Exploration and Geotechnical Evaluation for Widening and Paving Tyre Road, and Soil Evaluation at Proposed 4.09 Acre Stormwater Management Facility (SWMF) A-4 at the Catalyst Site, Columbia County, Florida

Ms. Megrath:

Ardaman & Associates, Inc. (Ardaman) has completed the authorized subsurface soil exploration and geotechnical engineering evaluations for the subject project.

Our scope of services included: exploring subsurface conditions via test borings along the initial 1,000-feet of Tyre Road and in the proposed 4.09 acre SWMF A-4; evaluating subsurface conditions encountered; developing recommendations regarding earthwork preparation and pavement section design for Tyre Road; providing estimates of seasonal high groundwater; and providing soil permeability estimates for proposed SWMF A-4.

This report has been prepared for the exclusive use of Plum Creek Timber Company for specific application to the subject project.

We are pleased to be of assistance to you on this phase of your project. When we may be of further service to you, or should you have any questions, please do not hesitate to contact us.

Sincerely,

ARDAMAN & ASSOCIATES, INC.
Florida Certificate of Authorization No. 5950

Jeremy M. Clark, P.E.
Project Engineer
Florida License No. 77660

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Senior Project Manager
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JMC/MSW/ms

C: Roger Wynn, P.E., Moore Bass (rwynn@moorebass.com)

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1.0 PROJECT DETAILS, BACKGROUND, AND SCOPE OF SERVICES

1.1 Proposed Construction

Based upon Moore Bass Consulting *Tyre Road Improvements*, *Sheet 1*, dated 6/19/14, we understand that the initial 1,000-feet of Tyre Road is to be widened to a 4-lane width with a median and roadside ditches, to be called "NFIP Parkway West". The widening will require on-site fill, and the proposed borrow source will be one of the Stormwater Management Facilities (SWMF) on-site.

Based upon Moor Bass Consulting *Enlargement of Subject Area, Sheet 4 of 4*, dated 1/5/15, we understand that a 4.09 acre Stormwater Management Facility (SWMF) is proposed from approximately 300 to 1,150-feet east of the existing Tyre Road. Soils excavated from this SWMF are proposed for re-use in the road widening earthwork preparations.

1.2 Geotechnical Scope of Services

Geotechnical services performed were based on Ardaman's authorized proposal for the project, and generally accepted geotechnical practices, as follows:

1. Ardaman mobilized a drill rig and crew to the site and performed 15 test borings to depths of 5 to 35-feet below existing grade. Six of the borings were Standard Penetration Test (SPT)(ASTM D1586) borings. The remaining borings were auger borings (ASTM D1452).

2. During performance of each test boring our Drill Crew Chief prepared a field log; recorded SPT "N"-Values; field classified the soils; and noted depths to groundwater and strata changes. He transported portions of the samples to our office. These soil samples were visually classified by our engineers, who developed a soil profile for each boring, then laboratory tests of selected soil samples were directed to further assess engineering and index properties of the encountered soils.

3. Our engineers analyzed and evaluated soil and groundwater conditions encountered to develop recommendations regarding site preparation for pavement support, estimates of seasonal high groundwater, suitability of soils for re-use as fill, and provide preliminary design parameters for SWMF design.

2.0 FIELD SUBSURFACE EXPLORATION-LOCATIONS AND METHODS

The approximate locations of the test borings are shown on the attached **Figure 1 *Test Boring Location Plans***. The locations of the three SWMF borings (A4-1 though A4-3) were located using a hand held GPS with coordinates provided by Moore Bass, but were then moved to nearby accessible locations still within the SWMF. The actual GPS coordinates were recorded and/or estimated. The twelve roadway borings were located using a wheel tape measuring from existing landmarks on Tyre Road. The locations of the borings shown on Figure 1 are accurate only to the degree associated with the methods of measurement used.

The test boring designations coincide with their purposes. "A4" test borings were performed in the proposed 4.09 acre SWMF A-4; "TH" borings for the roadway; and the "RD" and "RS" borings were performed during our prior exploration (2/16/12 and 3/5/12). Upon completion of the test borings, they were backfilled with tremie-placed "neat" Portland cement grout.

3.0 LABORATORY TESTING

Laboratory testing was directed by our engineers on selected soil samples from the test borings, to aid classification and to further characterize the engineering properties of the soils. The laboratory tests included: Natural Moisture Content (*NM*; ASTM D2216); Percent Finer than the U.S. No. 200 Sieve (*-200*; ASTM D1140; percent site and clay); full sieve analyses (ASTM D421 &422, gradation curves); Atterberg Limits Determinations (*LL & PI*; ASTM D4318; plasticity); and Organic Content (*ORG:* ASTM D-2974; percent organics).

The results of the laboratory tests are presented adjacent to the ***Soil Boring Profiles*** on Figure 1, at the respective depths from which the tested samples were recovered, except for the gradation curves, which are presented in Appendix A.

4.0 SUBSURFACE SOIL CONDITIONS

4.1 General

Our interpretations of subsurface conditions encountered in the test borings are depicted on the ***Soil Boring Profiles*** presented on Figure 1. The soil descriptions shown on the ***Soil Legend*** are based upon visual classification procedures, and laboratory test-based classification procedures, in general accordance with ASTM D 2488; ASTM D2487; and AASHTO M145.

The stratification lines on the soil boring profiles represent the approximate boundaries between soil types, and the actual transitions may be more gradual than implied. This report does not reflect or address subsurface variations which occur between or away from the borings.

4.2 Soil and Groundwater Conditions - Generalized

In general, the borings initially encountered medium to fine sand with silt and surficial roots-topsoil (Stratum 1), or silty fine sand with trace organics (Stratum 1A) within the top 6-inches. However, two of the roadway hand auger borings performed east of the existing traveled Tyre Road, TH-2 and TH-3, encountered "Peat" in the top6 to 7-inches, so Peat may be expected in most areas east of the traveled road between about Stations 0+00 and 10+00. TH-7, 8, 9, 10, and 12 first encountered Stratum 1A with limerock mixed in the top 6 to 8-inches.

Next, the borings encountered loose to medium dense medium to fine sand with silt to silty fine sand, sometimes with trace organics and fat clay (Strata 2, 3, 4, and 7).

The USDA soil survey map for the area indicate a "Mascotte Fine Sand", and that the landform is considered "Flatwoods on marine terraces" which are "poorly drained". Soil surveys are only intended to broadly characterize the soils to about 80-inches depth.

Groundwater was encountered approximately 1 to 3-feet below grade. Our drillers also monitored some nearby piezometers on 2/2/15, the data for which are indicated on the attached **Figure 2**. Under present site topographic conditions, we estimate a "normal" seasonal high groundwater table (SHGWT) approximately at the October 13, 2012 groundwater depths presented on Figure 2, for the various areas of the site, or 2-feet above that estimated on the date of the respective test boring, whichever is shallower.

For further details regarding soil subsurface conditions encountered, please refer to the attached Figure 1.

5.0 ENGINEERING EVALUATION AND EARTHWORK RECOMMENDATIONS

5.1 Groundwater Management during Construction Considerations

Due to the likelihood of a high groundwater table during construction, control of groundwater will likely be required to achieve the recommended proof-rolling, filling, compaction, and pavement support soil preparation. In general, proper compaction cannot be performed when the groundwater table is shallower than about 2 to 3-feet below the compacted surface, depending on soil type.

Typically, groundwater management consists of maintaining site grades such that stormwater is directed to collection or retention/detention areas. Drying of the near surface soils will still be required, following rainfall events, to achieve the compaction density recommended in the next section. Where finished grades or initial compaction grades are within about 2 to 2.5-feet or less above the estimated SHGWT presented in Section 4.2 of this report, some form of temporary and permanent drainage control shall be provided.

5.2 Proposed Borrow Soils Evaluation

In accordance with the FDOT Design Standards Index No. 505, Select soils consist of AASHTO Classification A-1, A-3, and A-2-4 soils. However, the index warns that certain types of A-2-4 materials are likely to retain excess moisture and may be difficult to dry and compact, and A-2-4 materials placed below the water table must be non-plastic and contain less than 15% passing the U.S. No. 200 sieve.

Based on the borings performed within or near the 4.09 acre SWMF (borings RD7, RS11, RS12, A4-1, A4-2, and A4-3), Strata 1A, 2, and 4 are considered Select soils, as defined by the FDOT Index. These strata typically had fines contents on the order of 10 to 20%, and therefore some of the Strata 2 and 2A soils shall not be used below the water table.

5.3 Site Preparation for Pavement

In order to perform a detailed Pavement Section Design analysis to determine the thicknesses of the pavement section components, data needed to perform such analyses includes an estimate of the accumulated 18-kip Single Axial Loads over the life of the project ($ESAL_D$). These data are not available at this time, so the following data was assumed to determine the minimum thicknesses of the pavement section components:

Subgrade Minimum Limerock Bearing Ratio:	20
Reliability (R%):	80%
Resilient Modulus (based on assumed LBR):	7,500 psi
Heavy Duty and Extra Heavy Duty traffic	

The following analysis and the assumed data above are based on the pavement areas prepared, proof-compacted, and filled in accordance with the following:

1. The entire pavement widening area, plus a minimum margin of 2-feet, shall be stripped and grubbed of vegetation, Peat, debris, and any deleterious materials encountered. Ardaman shall be requested to inspect and test the exposed subgrade soils during earthwork, to delineate any objectionable inclusions for undercutting and replacement.

Next, excavate to an elevation at least 12-inches below the bottom of the proposed base course, as required to reach bottom of Stabilized Subgrade elevation (excavation is not required where the cleared surface is already 12-inches below proposed base course).

This elevation shall be at least 2 to 2.5-feet above the estimated SHGWT or the groundwater table prevalent at the time of construction (which can be above the estimated SHGWT under certain circumstances). The soils within 24-inches below the base course will comprise, in descending order, the Stabilized Subgrade and the Subgrade. These courses shall consist of AASHTO M145 types A-1, A-3, and A-2-4, per FDOT Index 500. Strata 1A, 2, and 4 appear to meet this criteria.

2. The cleared/cut surfaces in construction areas shall be proof-rolled using appropriate compaction equipment for site and soil conditions. Adjust the moisture content of the soils as necessary to aid compaction. Minimum 95% of the Modified Proctor maximum dry density (AASHTO T180) shall be achieved in the top 12-inches below the compacted surface. Compaction criteria for the subgrade and stabilized subgrade are provided in the first bullet point in Section 5.4, below.

   It is important to contact Ardaman & Associates, Inc. at least a few days prior to proof-rolling, so that we can obtain bulk samples, and perform the Proctor tests in the laboratory. In this manner, the Maximum Dry Density values will be available at the time of proof-rolling and density testing.

3. If any areas "yield" during proof-rolling, they must be explored to evaluate the condition of the soils. Should yielding result from excessive soil moisture, scarify and dry the soils and recompact. Remove any materials if determined to be deleterious or excessively plastic, in areas that "yield" during the proof-rolling operation, and replace with select fill.

4. After satisfactory proof-rolling of the cleared/cut areas, filling, if required to reach bottom of Stabilized Subgrade, may proceed in level, maximum 12-inch lifts in un-compacted thicknesses. Each lift shall be compacted by repeated passes with appropriate compaction equipment to achieve minimum 95% of the Modified Proctor maximum dry density. The filling and compaction operations shall continue until the bottom of Stabilized Subgrade elevations are achieved.

5.4 Flexible Pavement Section

Based on the above assumed traffic data, a preliminary pavement design analysis was performed. Provided below, are minimum thicknesses of the pavement section components.

- The top 24-inches of soil beneath the Base Course (which comprise the Subgrade and Stabilized Subgrade) must be compacted to achieve at least **95%** of the Modified Proctor maximum dry density (AASHTO T-180) in the bottom foot, and minimum **98%** of the Modified Proctor maximum dry density in the top foot.

- The top 12-inches of the 24-inches beneath the base course (the Stabilized Subgrade) must exhibit a minimum laboratory LBR of 40. LBR testing of the proposed Stabilized Subgrade soils must be performed well in advance of pavement section construction. If necessary to achieve LBR=40, perform stabilization in accordance with FDOT *Standard Specifications for Road and Bridge Construction*, latest edition, Section 160, Type B.

- For the base course, we recommend either one of the following:
  - Limerock base meeting the requirements of FDOT “Standard Specifications”, Sections 200 and 911, placed in accordance with Section 200 of the Standard Specifications, compacted to at least 98% of the Modified Proctor maximum dry density (AASHTO T-180), with a minimum LBR value of 100.
  - Or, Graded Aggregate Base, such as Reclaimed Concrete, meeting the requirements of the FDOT Standard Specs. Special Provisions Section 204-2.1 and 204-2.2, exhibiting a minimum LBR value of 120.
- After placement of a prime coat or tack coat (FDOT Section 300), install SP asphaltic concrete in accordance with Section 334 in the FDOT Standard Specifications.

SUMMARY DESIGN OF PAVEMENT
Pavement Slope: 2% to 3%
Subgrade Density: 95% (ASTM D 1557/AASHTO T-180) (Select fill)

ASPHALT CONCRETE PAVEMENT SN=3.7 **FOR HEAVY DUTY TRAFFIC**

COMPONENT	STANDARD DUTY	MATERIAL	% COMPACTION (ASTM D1557)	MINIMUM REQUIREMENTS
Stabilized (Type B) Subgrade	12”	Controlled Fill	98%	LBR = 40
Base Material	8” or	Limerock or	98 %	LBR = 100 or
	10”	Graded Aggregate	98%	LBR = 120
Asphalt Structural Course	2.0”	SP 12.5	FDOT Spec. (Sec 334)	(1 lift)
Asphalt Friction Course	1.0”	SP 9.5	FDOT Spec. (Sec. 334)	(1 lift)*

*Less than minimum per FDOT Specifications (334-1.4)

ASPHALT CONCRETE PAVEMENT SN=4.5 **FOR EXTRA HEAVY DUTY TRAFFIC**

COMPONENT	STANDARD DUTY	MATERIAL	% COMPACTION (ASTM D1557)	MINIMUM REQUIREMENTS
Stabilized (Type B) Subgrade	12”	Controlled Fill	98%	LBR = 40
Base Material	10” or	Limerock or	98 %	LBR = 100 or
	12”	Graded Aggregate	98%	LBR = 120
Asphalt Structural Course	2.75”	SP 12.5	FDOT Spec. (Sec 334)	(1 lift)
Asphalt Friction Course	1.25”	SP 9.5	FDOT Spec. (Sec. 334)	(1 lift)

We recommend that the design elevations and civil design features of the project are planned such that the groundwater table cannot reach an elevation higher than 30-inches below bottom of Limerock or graded aggregate base. Please refer to Section 4.2 and 5.1 of this report for discussion of groundwater conditions at the site, and their potential impact on construction.

6.0 SWMF EVALUATIONS

Based upon visual classification techniques and laboratory results, we judge that the majority of the soils encountered in the SWMF borings consist of "sandy loam", in accordance with the USDA textural classification chart. Based on this USDA classification, and Ardaman's database of infiltration rates of soil types in north Florida, we estimate infiltration rates of the identified site soils to be on the order of 10-inches per day in Strata 1A, 2, 2A, 4, and 7. We note that permeability/infiltration testing was not performed, and our estimate is based on the samples percent fines fraction, and therefore shall be considered approximate.

For modeling purposes, the depth to the aquaclude shall be taken at 35-feet below grade. To depict "normal" seasonal high groundwater, the groundwater table shall be taken, on average, as approximately the October 13, 2012 groundwater depths presented on Figure 2, for the various areas of the site, or 2-feet above that estimated on the date of the respective test boring, whichever is shallower.

7.0 CLOSURE

The recommendations submitted in this report are based upon the data obtained from the soil borings presented on Figure 1, and the groundwater data presented on Figure 2. This report does not reflect any variations which may occur between the borings, or over the course of time. The nature and extent of variations may not become evident until construction. If site or soil variations appear evident, it will be necessary to reevaluate the recommendations of this report after performing further on-site observations during the construction period and noting the characteristics of such variations.

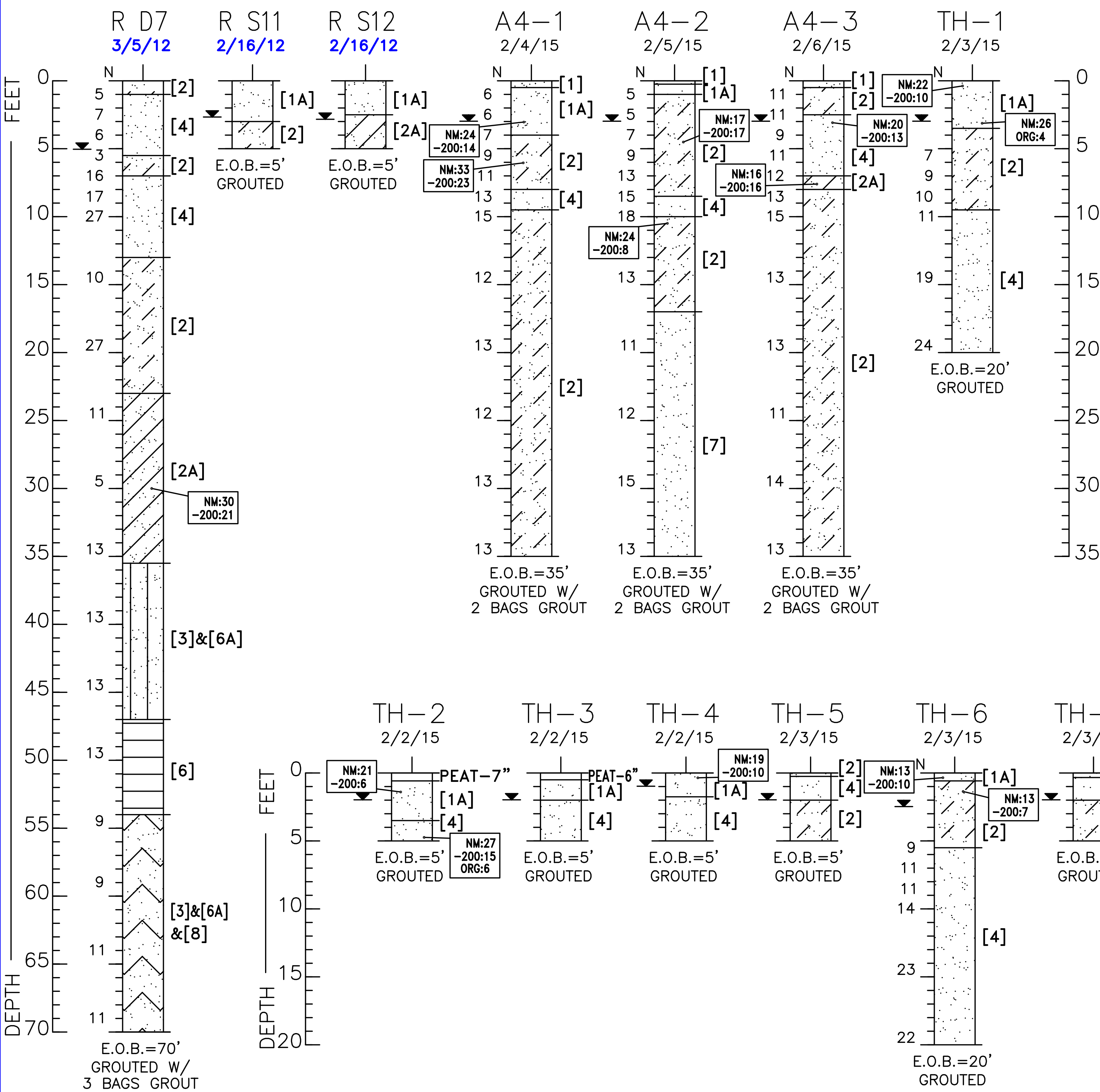
In the event any changes occur in the design, nature, or locations of the proposed construction and/or SWMF area, Ardaman and Associates, Inc. must review the applicability of the conclusions and recommendations in this report. Recommendations in this report shall not be applicable if all the above is not fulfilled by the client or the consultant involved in the project.

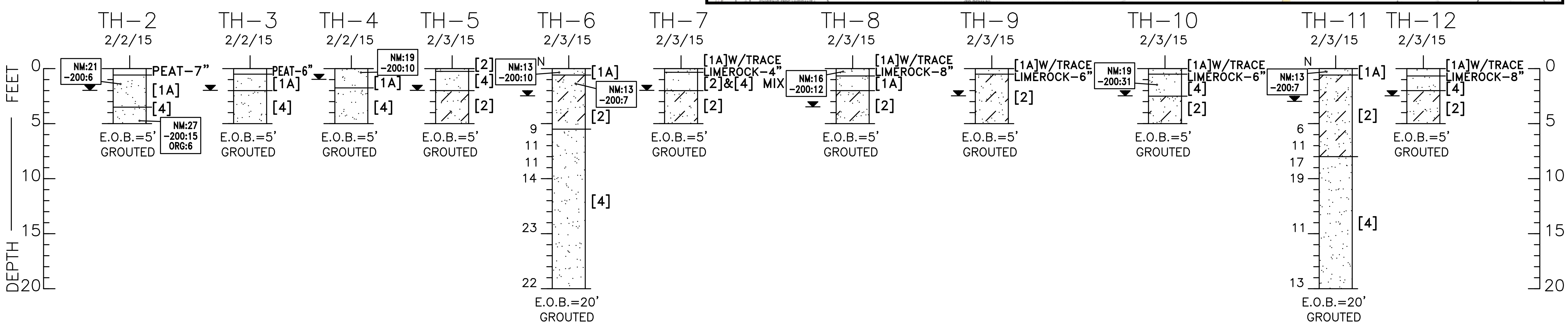
This evaluation does not address the possibility of *eventual* sinkhole development at the site. This exploration and analysis covers the shallow soil and limestone deposits explored at specific locations and to specific depths. It is not intended to include deeper soil or rock strata where cavities and caverns may exist. Additional deep structural borings and/or geophysical explorations are necessary to evaluate the structural condition and stability of deep rock formations.

This report has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

End of Report

SOIL BORING PROFILES





ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	>50

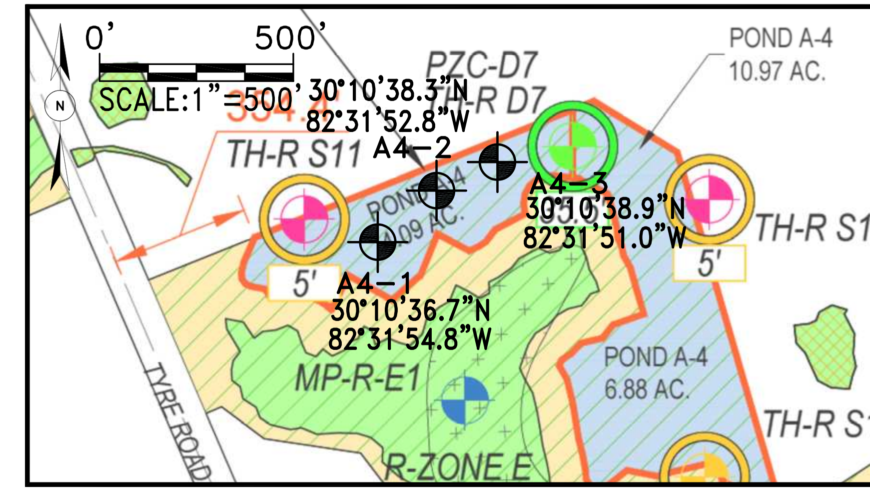
II COHESIVE SOILS

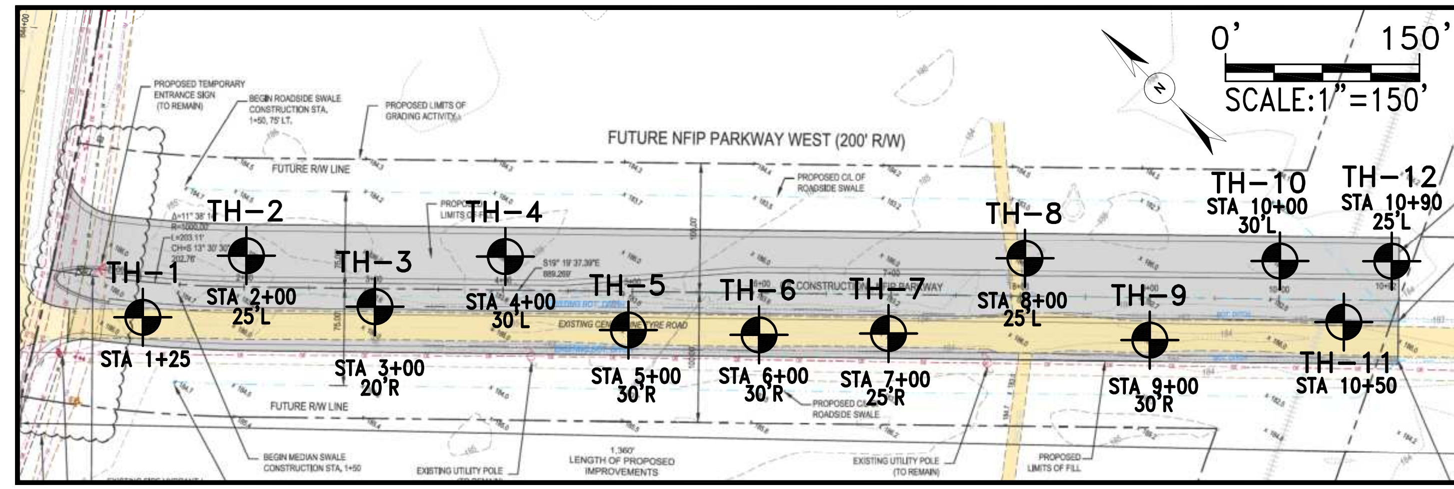
DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, QU, TSF	BLOW COUNT "N"
VERY SOFT	<1/4	0 TO 2
SOFT	1/4 TO 1/2	2 TO 4
MEDIUM STIFF	1/2 TO 1	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	>4	>30

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE.

TEST BORING LOCATION PLANS





SOIL LEGEND

1. DARK GRAY TO LIGHT GRAY MEDIUM TO FINE SAND W/ SILT AND SURFICIAL ROOTS; TOPSOIL (SP–SM W/ PT; A–3 W/ A–8)
1A. DARK GRAY TO GRAY TO DARK BROWN SILTY FINE SAND W/ TRACE ORGANICS (SM W/PT; A–2–4 W/ A–8)
2. BROWN TO TAN FINE TO MEDIUM TO FINE SAND W/SILT TO SILTY FINE SAND, SOMETIMES W/INCLUSIONS OF CLAYEY SAND (SP–SM TO SM–SC; A–3 TO A–2–4)
2A. BROWN TO TAN TO TANNISH–ORANGE SILTY FINE SAND W/ LIGHT GRAY SANDY FAT CLAY (=5 TO 20%)(SM W/ CH; A–2–4 W/ A–7)
3. GREENISH–GRAY MEDIUM TO FINE PHOSPHATIC SAND W/SILT, SOMETIMES CLAYEY (SP–SM TO SM–SC; A–3 TO A–2–4)
4. DARK BROWN TO DARK REDDISH–BROWN STAINED MEDIUM TO FINE SAND W/ SILT AND SOMETIMES W/ TRACE ORGANICS (SP–SM; A–3 W/ TR A–8)
5. MARBLED BROWN, TAN, AND ORANGE SILTY, CLAYEY TO VERY CLAYEY FINE SAND (SC; A–2–6 TO A–6)
6. GRAY TO BROWN SLIGHTLY SANDY TO SANDY FAT CLAY TO ELASTIC SILT, SOMETIMES PHOSPHATIC (CH TO MH; A–7)
6A. GRAY TO BROWNISH–GRAY VERY CLAYEY FINE SAND TO VERY SANDY LEAN CLAY (SC TO CL; A–6 TO A–7)
7. TAN MEDIUM TO FINE SAND, SOMETIMES W/ TRACE OF WHITE FAT CLAY (SP–SM W/ TR CH; A–3 W/ TR A–7)
8. TAN TO WHITE LIMESTONE W/ CALCAREOUS CLAY

LEGEND

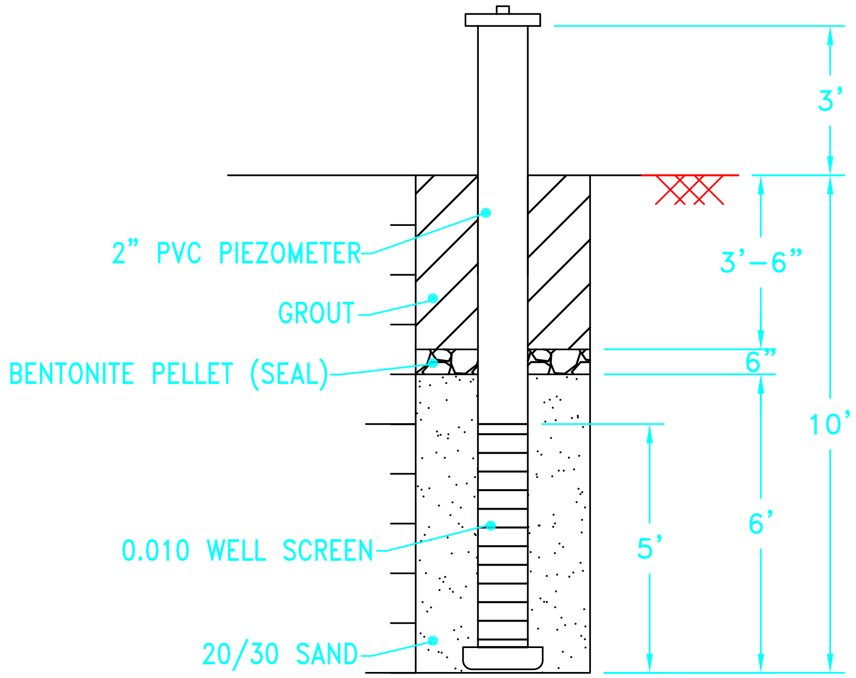
TH	STANDARD PENETRATION TEST (SPT) OR AUGER BORING LOCATION
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT (ASTM D–1586)
EOB	END OF BORING
▼	APPROXIMATE DEPTH TO GROUNDWATER ON DATE DRILLED
NM	NATURAL MOISTURE CONTENT IN PERCENT (ASTM D–2216)
–200	PERCENT PASSING NO. 200 SIEVE SIZE (PERCENT FINES)(ASTM D–1140)
ORG	ORGANIC CONTENTS (PERCENT ORGANIC)(ASTM D–2974)
SP–SM,SM,SC	UNIFIED SOIL CLASSIFICATION SYSTEM
A–3,A–2–4	AASHTO SOIL CLASSIFICATION SYSTEM
DRILLERS:	JDA, BH

Ardaman & Associates, Inc.
3175 W. Tharpe Street
Tallahassee, Florida 32303
(850) 576–6131

SHEET TITLE:
SUBSURFACE SOIL EXPLORATION
2,129 ACRE PLUM CREEK RACEC SITE
LAKE CITY, COLUMBIA COUNTY, FLORIDA

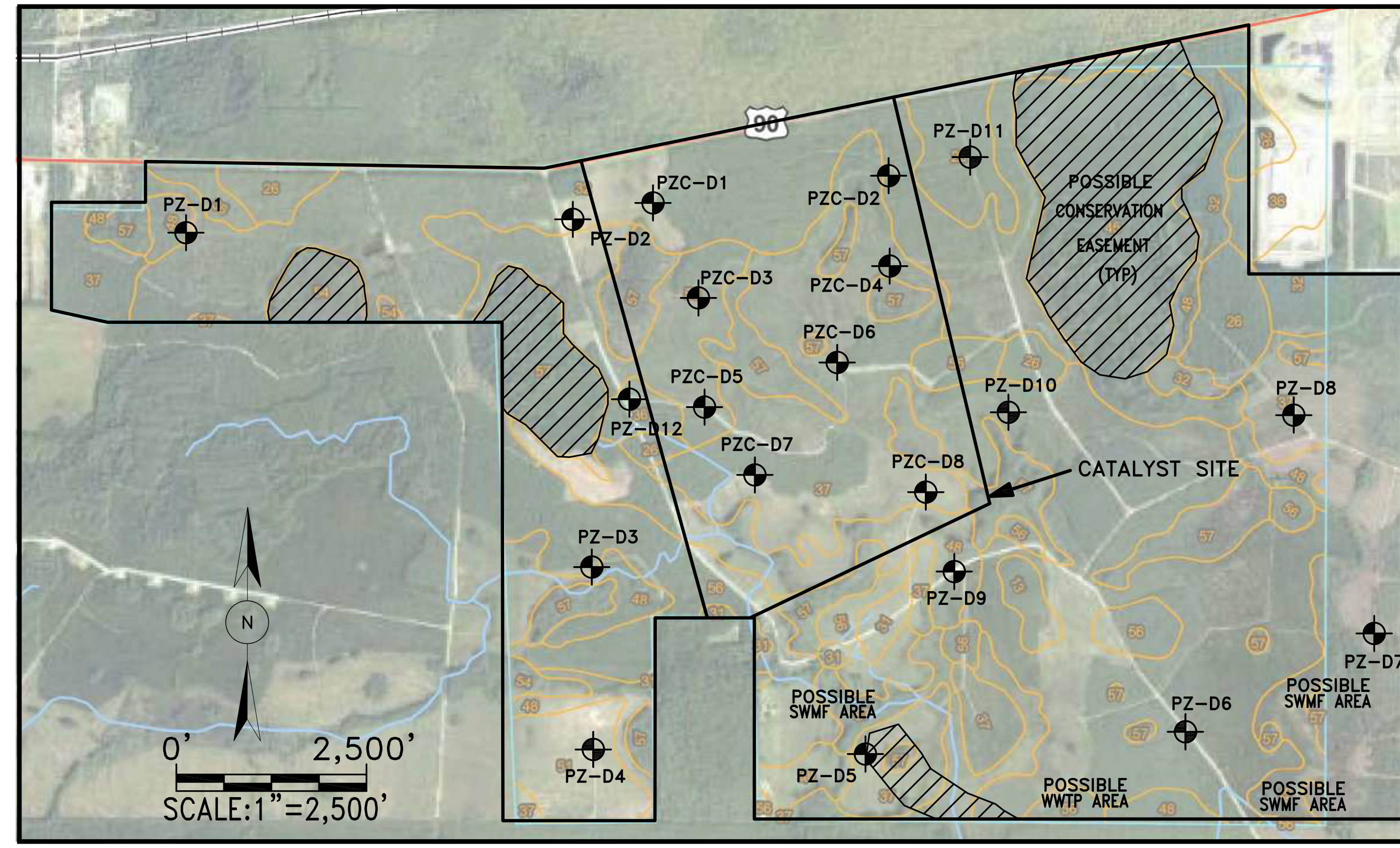
DRAWN BY: JMC | CHECKED BY: WSJ | DATE: FEBRUARY 24, 2015
FILE NO. 113–15–40–1014 | APPROVED BY: W.S. JORDAN, P.E. | FIGURE 1

PIEZOMETER (TYPICAL)



TERMINATION DEPTH=10'

PIEZOMETER LOCATION PLAN



PIEZOMETER NO.	INSTALLATION DATE	DATE OF 1st READING	DEPTH TO WATER FROM GROUND (1st READING)	DATE OF 2nd READING	DEPTH TO WATER FROM GROUND (2nd READING)	DATE OF 3rd READING	DEPTH TO WATER FROM GROUND (3rd READING)	DATE OF 4th READING	DEPTH TO WATER FROM GROUND (4th READING)	DATE OF 5th READING	DEPTH TO WATER FROM GROUND (5th READING)	DATE OF 6th READING	DEPTH TO WATER FROM GROUND (6th READING)	DATE OF 7th READING	DEPTH TO WATER FROM GROUND (7th READING)	DATE OF 8th READING	DEPTH TO WATER FROM GROUND (8th READING)	DATE OF READING	DEPTH TO WATER FROM GROUND	PIEZOMETER NO.
PZ-D1	1/25/12	1/27/12	4'-9"	2/22/12	5'-1"	3/5/12	4'-10"	3/28/12	5'-10"	10/13/12	2'-2"	11/7/12	3'-9"	12/5/12	4'-4"	1/26/13	4'-7"	2/2/15	NOT READ	PZ-D1
PZ-D2	1/23/12		3'-4"		4'-8"		3'-7"		4'-1"		2'-7"		4'-1"		4'-10"		5'-3"		DESTROYED	PZ-D2
PZ-D3	1/25/12		6'-4"		5'-10"		5'-4"		5'-9"		3'-5"		5'-10"		5'-6"		5'-10"		NOT READ	PZ-D3
PZ-D4	1/24/12		5'-5"		6'-9"		6'-0"		6'-7"		3'-4"		6'-2"		5'-2"		5'-7"		NOT READ	PZ-D4
PZ-D5	1/19/12		1'-1"		2'-0"		0'-11"		1'-8"		1'-1"		2'-10"		3'-6"		4'-1"		2'-7"	PZ-D5
PZ-D6	1/19/12		4'-5"		5'-1"		4'-11"		5'-5"		2'-10"		4'-4"		6'-8"		5'-11"		NOT READ	PZ-D6
PZ-D7	1/19/12		2'-7"		4'-0"		2'-10"		4'-8"		2'-0.5"		5'-4"		5'-0"		5'-4"		2'-8"	PZ-D7
PZ-D8	1/19/12		2'-9"		3'-1"		2'-4"		3'-11"		1'-10"		4'-6"		4'-11"		5'-2"		NOT READ	PZ-D8
PZ-D9	1/19/12		6'-1"		6'-11"		6'-5"		6'-10"		3'-1"		6'-5"		6'-11"		7'-2"		NOT READ	PZ-D9
PZ-D10	1/19/12		3'-4"		3'-10"		3'-1"		4'-10"		2'-4"		2'-11"		6'-0"		6'-2"		NOT READ	PZ-D10
PZ-D11	1/19/12		3'-10"		3'-11"		3'-9"		4'-2"		2'-4"		3'-10"		5'-3"		4'-3"		NOT READ	PZ-D11
PZ-D12	1/23/12		4'-1"		4'-11"		4'-2"		4'-11"		2'-2"		3'-8"		4'-8"		5'-2"		2'-10"	PZ-D12

PIEZOMETER NO.	INSTALLATION DATE	DATE OF 1st READING	DEPTH TO WATER FROM GROUND (1st READING)	DATE OF 2nd READING	DEPTH TO WATER FROM GROUND (2nd READING)	DATE OF 3rd READING	DEPTH TO WATER FROM GROUND (3rd READING)	DATE OF 4th READING	DEPTH TO WATER FROM GROUND (4th READING)	DATE OF 5th READING	DEPTH TO WATER FROM GROUND (5th READING)	DATE OF 6th READING	DEPTH TO WATER FROM GROUND (6th READING)
PZC-D1	3/8/12	3/9/12	3'-0"	3/28/12	3'-6"	10/13/12	2'-0"	11/7/12	3'-4"	12/5/12	4'-3"	1/26/13	4'-7"
PZC-D2	3/8/12		4'-3"		4'-8"		2'-9"		3'-5"		4'-7"		5'-0"
PZC-D3	3/8/12		3'-11"		3'-10"		2'-0"		3'-7"		4'-8"		5'-1"
PZC-D4	3/8/12		2'-8"		2'-8"		-4"(standing water)		0'-3"		2'-2"		2'-5"
PZC-D5	3/7/12		5'-4"		5'-9"		3'-5"		4'-11"		6'-0"		6'-3"
PZC-D6	3/7/12		3'-4"		3'-9"		2'-5"		3'-3"		6'-1"		6'-1"
PZC-D7	3/8/12		5'-1"		5'-0"		3'-2"		4'-7"		5'-6"		5'-7"
PZC-D8	3/7/12		4'-4"		4'-5"		3'-2"		4'-10"		5'-7"		5'-11"

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE.

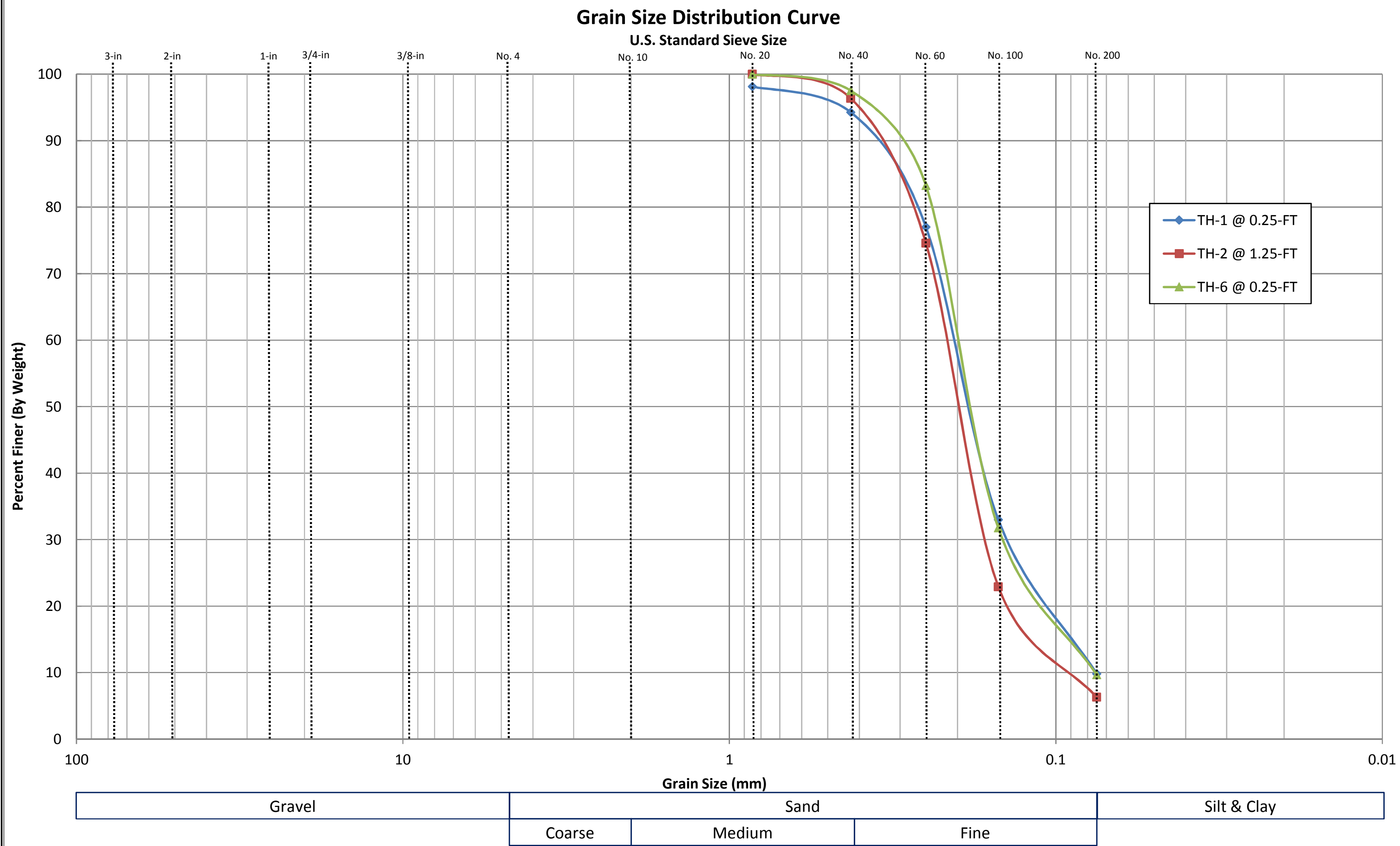
Ardaman & Associates, Inc.
3175 W. Tharpe Street
Tallahassee, Florida 32303
(850) 576-6131

SHEET TITLE:
GROUNDWATER ELEVATIONS IN PIEZOMETERS
RACEC AND CATALYST SITE
LAKE CITY, COLUMBIA COUNTY, FLORIDA

DRAWN BY: WSJ | CHECKED BY: WSJ | DATE: FEBRUARY 24, 2015

FILE NO. 113-15-40-1014 | APPROVED BY: W.S. JORDAN, P.E. | FIGURE 2

APPENDIX A



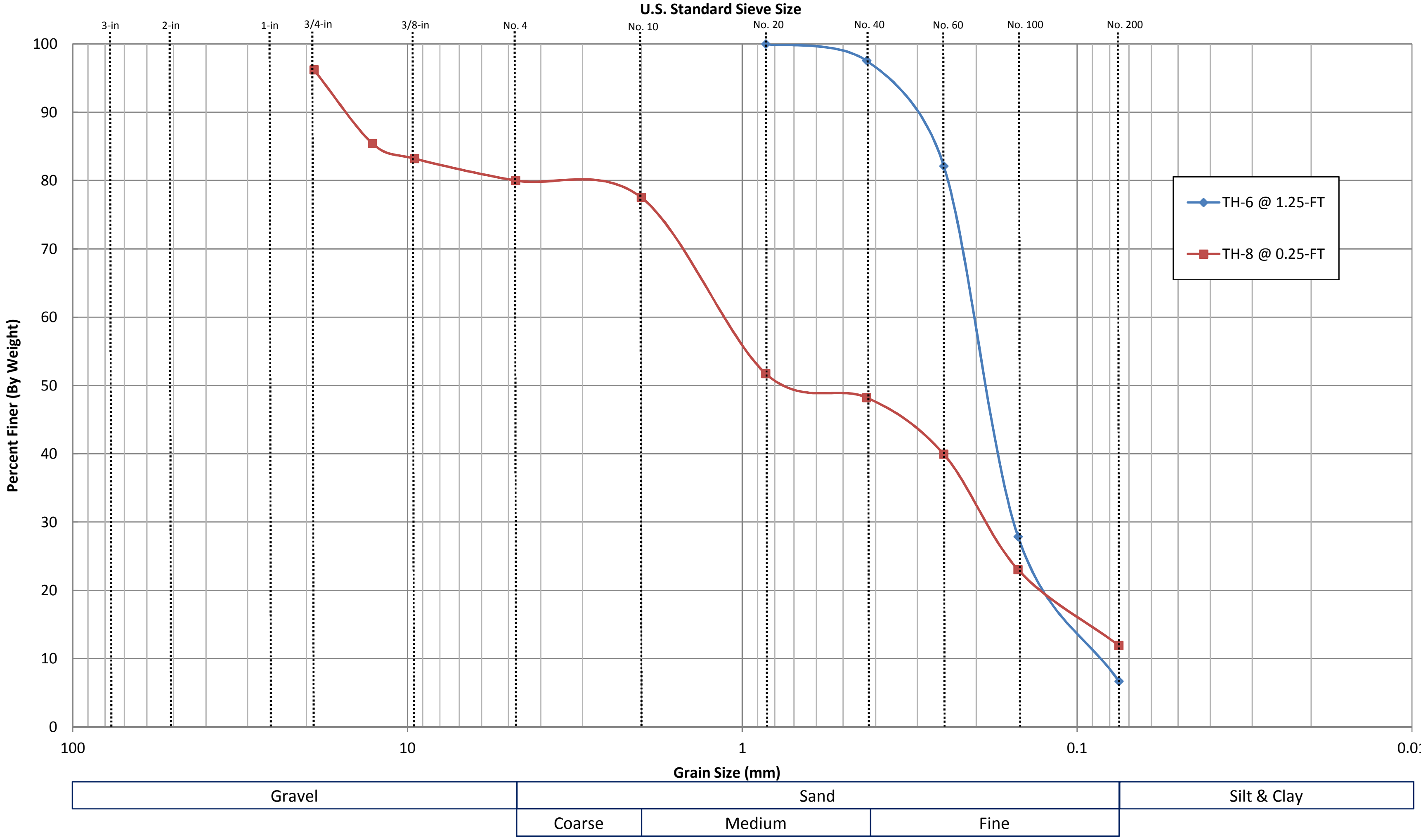
Soil Sampled Information			Sieve Name												
Test Hole No.	Sampled Depth	Stratum No.	3-in	2-in	1-in	3/4-in	3/8-in	No.4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	
TH-1	@ 0.25-FT									98.1	94.3	77.0	33.0	9.8	Soil Passing (%)
TH-2	@ 1.25-FT									100.0	96.4	74.6	22.9	6.3	
TH-6	@ 0.25-FT									100.0	97.5	83.3	31.7	9.7	

Soil Description

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

Project Name:	Entry Road
Client:	Plum Creek
Project File No.	113-15-40-1014
Date:	2/24/15
Engineer:	Jeremy M. Clark, P.E.
Reviewed By:	William S. Jordan, P.E.

Grain Size Distribution Curve



Soil Sampled Information			Sieve Name												Soil Passing (%)
Test Hole No.	Sampled Depth	Stratum No.	3-in	2-in	3/4-in	1/2-in	3/8-in	No.4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200	
TH-6	@ 1.25-FT									100.0	97.5	82.1	27.8	6.7	
TH-8	@ 0.25-FT				96.2	85.4	83.2	79.8	79.4	51.7	48.2	39.9	23.0	11.9	

Soil Description	

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

Project Name:	Entry Road
Client:	Plum Creek
Project File No.	113-15-40-1014
Date:	2/24/15
Engineer:	Jeremy M. Clark, P.E.
Reviewed By:	William S. Jordan, P.E.

Report of
Preliminary Subsurface Soil Exploration and Geotechnical Engineering Evaluation for the 500 Acre Plum Creek North Central RACEC Catalyst Site, Columbia County, Florida

File No. 113-12-40-1037
April 12, 2012

Ardaman & Associates, Inc.

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Florida Institute of Consulting Engineers

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

April 12, 2012
File No. 113-12-40-1037

Columbia County Economic Development Department
164 NW Madison Street, Suite 102
Lake City, Florida 32055

Attention: Mr. Jesse Quillen, Executive Director

Subject: **Report:** Preliminary Subsurface Soil Exploration and Geotechnical Engineering Evaluation for 500 Acre Plum Creek North Central Rural Area of Critical Economic Concern (RACEC) Catalyst Site, Columbia County, Florida

Dear Mr. Quillen:

As authorized, Ardaman and Associates, Inc. (Ardaman) has completed the preliminary subsurface soil exploration and geotechnical engineering evaluation for the subject project. Ardaman also installed and monitored piezometers to obtain accurate groundwater table data. The purposes were to evaluate subsurface soil and groundwater conditions encountered at widely spaced locations across the site, to provide a preliminary assessment of potential subsurface soil and groundwater challenges to site development.

This report has been prepared for the exclusive use of Columbia County Economic Development Department (CCEDD), for specific application to the 500 Acre Catalyst Site. Ardaman prepared a separate report for the surrounding 2,129-acre RACEC site, transmitted to Plum Creek Timber Company, and copied to CCEDD.

We recommend retaining Ardaman and Associates, Inc. to perform the final subsurface soil exploration and evaluation, when proposed development plans are at the appropriate stage. We also recommend continued monitoring of groundwater levels in the piezometers, to better understand potential seasonal groundwater level impacts.

We are pleased to be of assistance to you on this phase of your project. When we may be of further service to you or should you have any questions, please do not hesitate to contact us.

Sincerely,

ARDAMAN & ASSOCIATES, INC.
Florida Certificate of Authorization No. 5950

Jeremy M. Clark, E.I.	For Mike Wilson WJ Michael S. Wilson, P.E.	William S. Jordan, P.E.
Staff Engineer	Tallahassee Branch Manager	Senior Project Manager
	FL Eng. License No. 46088	FL Eng. License No. 33026

WILLIAM SMALLWOOD JORDAN LICENSE No 33026 STATE OF FLORIDA PROFESSIONAL ENGINEER 4-12-2012

JMC/WSJ/mss
cc: Mr. Richard A. Moore, P.E. - Moore Bass Consulting
cc: Ms. Allison Megrath, AICP – Plum Creek Timber Company

3175 W. Tharpe Street, Tallahassee, Florida 32303 Phone (850) 576-6131 FAX (850) 574-0735
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Florida: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port St. Lucie, Sarasota, Tallahassee, Tampa, West Palm Beach

1.0 PROJECT DESCRIPTION AND SCOPE OF SERVICES

The North Florida Economic Development Partnership has selected the Lake City site in Columbia County to serve as a *catalyst* site for the North Central Florida Region. This will be one of four authorized sites in the State of Florida, and will provide a central hub for economic development in the region. The 500-acre catalyst site is part of a 2,629 acre land tract owned by Plum Creek Timber Company, and managed by sustainable forestry initiatives (SFI).

Columbia County was selected as a Rural Area of Critical Economic Concern (RACEC) due to its location and ability to serve the emerging trade flows as Florida prepares itself for the ability to handle the increased flow of goods expected to move through the state due to the expansion of the Panama Canal, which is expected to be complete in 2014. The location of the site was considered "prime" due to its proximity to two major interstates (I-10 and I-75), an airport, two railroads (CSX and Norfolk Southern), and a deep sea port (JaxPort).

Columbia County is partnering with Plum Creek for the development of the catalyst site, which will include the Intermodal Logistic Center (Inland Port) and the Industrial and Distribution Center. The Inland Port will utilize transportation infrastructure in Columbia County to receive and transport goods throughout Florida and the Southeast. The Inland Port is intended to relieve transportation congestion by providing a hub to sort and process goods.

Since the site will be used for the distribution of heavy bulk shipments, heavy traffic flows are expected to occur on-site by both rail shipment containers and trucks. Furthermore, the Industrial and Distribution Center will require a facility to store freight containers and goods. Additional supporting manufacturing facilities are likely to be constructed on-site. Specific traffic and structure loading conditions, site grading, or facility placement are not yet known.

Preliminary Geotechnical services performed were as follows:

1. An Ardaman engineer performed site reconnaissance in late December, 2011, for the purpose of observing general site topography, to roughly delineate apparent frequently wetted areas, and to delineate areas possibly containing "muck", so that we could focus portions of the subsurface exploration among such areas.

2. Ardaman mobilized a drill rig and crew to the site, and performed forty-six (46) test borings, which included sixteen (16) hand auger borings; eight (8) Standard Penetration Test (SPT) borings; and twenty-two (22) hand auger borings with Static Cone Penetration (SCP) soundings (muck probes) in twelve zones within the site boundaries. We also installed and monitored eight (8) each 10-foot deep piezometers.

3. Ardaman's Drill Crew Chief prepared a field log for each boring, recorded SPT "N"-values or SCP "P"-values, visually classified the soils, and transported portions of the samples to our office for further classification by our engineers. The Drill Crew Chief also estimated the depth of groundwater in each boring, if encountered.

4. Ardaman's engineers visually/manually classified recovered soil samples, and developed soil boring profiles in CAD format. Laboratory tests of selected soil samples were directed to further assess engineering and index properties of recovered soils.

5. Our engineers analyzed and evaluated soil and groundwater conditions encountered, and developed preliminary evaluations and opinions regarding potential subsurface soil and groundwater challenges to site development.

2.0 FIELD SUBSURFACE EXPLORATION-LOCATIONS AND METHODS

The approximate locations of the test borings (TH) are shown superimposed on the USDA Soils Map on the attached **Figures 1 and 2**, on the *Test Boring Location Plan*. The letter "R" is for RACEC; "S" is for *shallow* boring; and "D" is for *deep* boring. The borings were located on site by our staff referencing site features on *Google Earth Maps*, and a GPS device. The color coding of the test boring location "targets" is discussed in report Sections 4.5 and 5.1.

The deep SPT borings were performed in accordance with ASTM D 1586, advanced by "mud" rotary drilling procedures, using a Model CME-55 drill rig mounted on a flat-bed truck. The shallow borings were advanced using a manually-operated "bucket" auger in general accordance with ASTM D 1452.

The locations of the twelve (12) alphabetized zones tested via "muck" probe methods are presented on the attached **Figure 3**. A Static Cone Penetration device utilized in the "muck" probes is Ardaman's in-house equipment consisting of penetrometer rods with a conical tip, connected to a dial calibrated proving ring and push handle. The approximate relationship between the Penetrometer Dial Reading and the density condition of the soils is presented in the *Engineering Classification* chart on the attached **Figure 3**.

Upon completion of each test hole, the deep and shallow borings were grouted using "neat" Portland cement grout (tremie-placed for the deep borings). The muck probes and one of the shallow borings were backfilled with well tamped auger cuttings.

Piezometers were installed to 10-feet depth near all eight (8) deep test boring locations, in separate boreholes. The locations and construction details of these piezometers are presented on the attached **Figure 4**. The piezometers were monitored on two separate dates to determine accurate water table depths. (Please see also Piezometer notification in Section 7.0)

3.0 LABORATORY TESTING OF SOILS

Laboratory testing was directed by our engineers on selected soil samples from the test borings, to aid classification and to further define the engineering properties of the soils. The laboratory tests included: Nature Moisture Content (NM)(ASTM D 2216); Percent Finer than the U.S. No. 200 Sieve (-200)(ASTM D 1140, percent silt and clay); Atterberg Limits determinations (LL&PI)(ASTM D 4318, plasticity), and Organic Contents (ORG)(ASTM D-2974, percent organics).

The results of the laboratory tests are presented adjacent to the *Soil Boring Profiles* on the attached **Figures 1 and 2**, at the respective depths from which the tested samples were recovered. The *Laboratory Test Results for Muck Probes* are tabulated on **Figure 3**.

4.0 SUBSURFACE SOIL AND GROUNDWATER CONDITIONS

4.1 General

Ardaman's interpretations of subsurface conditions encountered are depicted as *Soil Boring Profiles* on the attached **Figures 1 and 2**. The soil descriptions shown in the ***Soil Legend*** are based upon visual/manual and laboratory test-based classification procedures in general accordance with ASTM D 2488; ASTM D 2487; and AASHTO M145.

The stratification lines on the *Soil Boring Profiles* represent the approximate boundaries between the soil types, but the actual transitions may be more gradual than implied. This report does not address variations which occur between or away from the borings. The nature and extent of such variations may not become evident until during the course of the final geotechnical exploration, or construction. If any variations become evident, Ardaman must be authorized to provide additional testing and evaluations.

4.2 Soil Conditions

The following soil types were encountered during the preliminary subsurface exploration:

Stratum	Description	USCS	AASHTO
1	Dark gray to light gray medium to fine sand with silt and surficial roots; topsoil	SP-SM W/ PT	A-3 W/ A-8
1A	Dark gray silty fine sand with trace organics	SM W/ PT	A-2-4 W/ A-8
2	Brown to tan medium to fine sand with silt, sometimes with inclusions of clay	SP-SM to SM-SC	A-3 to A-2-4
2A	Brown to tan to tannish-orange silty fine sand with light gray sandy fat clay (=5 to 20% fat clay)	SM W/ CH	A-2-4 W/ A-7
3	Greenish-gray medium to fine phosphatic sand with silt, sometimes clayey	SP-SM to SM-SC	A-3 to A-2-4
4	Dark brown to dark reddish-brown (stained) medium to fine sand with silt and sometimes with trace organics	SP-SM W/ TRACE OH	A-3 W/ TR A-8
5	Marbled brown, tan, and orange silty, clayey to very clayey fine sand	SC	A-2-6 to A-6
6	Gray to brown slightly sandy to sandy fat clay to elastic silt, sometimes phosphatic	CH TO MH	A-7
6A	Gray to brownish-gray very clayey fine sand to very sandy lean clay	SC TO CL	A-6 to A-7
7	Tan medium to fine sand, sometimes with trace of white fat clay	SP-SM W/ TRACE CH	A-3 W/ TR A-7
7A	Gray medium to fine sand with silt	SP-SM	A-3
8	Tan to white limestone with calcareous clay	---	---

The site stratigraphy is somewhat variable below about 35 feet. Limestone (stratum 8) was encountered in 5 of the 8 deep test borings, typically mixed with other strata, and sometimes discontinuous vertically. The limestone was shallowest in TH-R D8 at about 36 feet depth, and was not encountered within the depth limits of 66.5 feet to 80 feet in TH-R D2, D3, and D4,.

In general, the top 35 to 55-feet of soils consisted of loose to medium dense, medium to fine sands, and silty fine sands, or soft to stiff clayey sands and sandy clays. Below 35 to 55-feet, the soils generally consisted of very clayey fine sands to very sandy lean clays; fat clays to elastic silts; phosphatic sands w/ silt and clay; and limestone with calcareous clay.

Very loose and very soft zones in the substrata were encountered in five (5) of the deep test borings, below about 35 feet depth. These zones are shaded red on the profiles on Figure 2. Such loose/soft zones are indicated by SPT "N"-values less than about 3. These conditions may be indicative of a higher than average potential for ground subsidence, although no localized ground subsidence at these locations was discernible at the time of our subsurface exploration.

4.3 Muck Probes Results

In general, the muck probes were performed in depressional areas delineated by an engineer during site reconnaissance, and areas delineated on the Soil Survey as possible frequently ponding. These are areas where highly organic materials would more likely be encountered.

There are often only subtle distinctions between muck and topsoil, usually the percentage organics and/or fibrous material. Referring to **Figure 4**, among the 12 alphabetized zones where muck probes were concentrated, the **thickest** muck/topsoil layers measured varied from approximately 17 to 30 inches, in Zones A, I, J, K and L, all in the northern half of the site.

The mucks were only surficial, or just topsoil, 12 inches or less thick, at our test locations in Zones B, C, D, F, G and H (MP#1 in Zone E encountered topsoil 15 inches thick).

Our drillers noted that Zone G is a depressional area about 2 feet below surrounding grades, and Zone I appeared to be a "dry pond", about 3 feet below surrounding grades, about 125 feet diameter, "with an apparent high water mark about 2 to 3 feet above the lowest points". There was standing water in a small depression in Zone "H" at Lat.-Long.: 30° 10.720'; 82° 31.486'.

4.4 USDA Soil Survey Review

Based upon review of the US Department of Agriculture and Natural Resources Conservation Services (USDA) "Soil Survey" for the site, excerpts of which are presented in **Appendix A**, and mapped on **Figures 1 and 2**, we observed that approximately 100% of the site area is mapped as containing various fine sands. Generally, soil surveys are only intended to broadly characterize the soils to about 80-inches depth.

In general, the fine sands are considered "very poorly drained" to "somewhat poorly drained". However, according to the Survey, neither flooding nor ponding is expected in the majority of these sands, except for the Surrency Fine Sand (Map Unit 57) which the survey indicates "ponds frequently".

4.5 Surface Water and Groundwater Conditions

According to data obtained from Suwanee River Water Management District records, average annual rainfall in northern Columbia County is approximately 54-inches. Roughly average total rainfall had occurred in the 12 months preceding our subsurface exploration in February and March 2012, but rainfall was significantly below normal in January and February 2012, so groundwater could be somewhat below average in our test borings and Piezometer readings.

During site reconnaissance, our engineer observed surface water or evidence of frequent wetting in the southwest water courses identified on the USDA Maps. Most other areas where surface saturation might have been expected, where ***Soil Series* 57** is indicated on the USDA maps (Figures 1, 2 and 3, and Appendix A) were relatively dry, except for a small ponded area in Zone H, noted in Section 4.3, above. However, most Soil Series 57 areas exhibit signs of past ponding, and will likely experience ponding or wetness during above normal rainfall events and months, and during the wet season of June through August.

At the time our test borings were performed, groundwater was encountered in all sixteen (16) shallow hand auger borings (**Figure 1**), and in all eight (8) deep SPT borings (**Figure 2**). Water level readings were also taken in the eight piezometers (**Figure 4**), near the eight deep SPT borings. The piezometer data indicated groundwater levels 2'-8" to 5'-9" below grade. In the test borings, estimated groundwater levels were 3 to 6-feet below grade. The muck probes encountered groundwater as shallow as 1 inch below grade in Zone H (**Figure 3**) near the small ponded location (the muck probes were purposely concentrated in low areas).

For ease of identification, test boring and Piezometer locations with groundwater encountered deeper than 5-feet are coded with a "green" target on **Figures 1, 2 and 4**; test borings with groundwater between 4 and 5-feet with an "orange" target; and the test borings with groundwater less than 4-feet below ground surface are coded with a dark "pink" target.

5.0 PRELIMINARY EVALUATION AND RECOMMENDATIONS

5.1 General Evaluation and Groundwater Ramifications

5.1.1 Very Soft, Deep Substrata Encountered

In this preliminary subsurface soil exploration, 5 of the 8 deep test holes encountered very soft zones below about 35 feet depth, which suggest ancient karstic erosion of the limestone, and could be indicative of elevated subsidence potential in those areas. It is very interesting that, of the 11 deep preliminary test borings in the surrounding 2,129 acre portion of the site (reported separately to Plum Creek Timber Company, copied to CCEDD), none encountered these types of problematic conditions.

On average, in North Florida, deep very soft conditions are not uncommon, and may be encountered in 1 or 2 of every 10 deep test borings (10% to 20%). The occurrence of very soft deposits in the Catalyst site is 5 of 8 test borings (63%). For all 2,629 acres, the ratio is 5 of 19 test borings, or 26%, which is reasonably close to statistical expectations. Either it is coincidence that the odds are stacked in the Catalyst site, or the Catalyst site could be underlain by more weathered/erodible limestone deposits. We do not know yet.

Free fall of the drill rods for several feet, as in TH-R D6, is less common and generally occurs in roughly 1 of every 50 test borings or 2%. This is indicative of either an open cavity or a silt filled cavity. The occurrence rate on this 500 acre site is 1/8, or 12.5%, and for the overall 2,629 acre site it is 1/19, or 5%, also reasonably close to statistical expectations.

In any case, these deep very soft strata may limit development options or foundation options in some areas of the 500 acre Catalyst site; and/or could cause development to be more costly in terms of stiffer or deeper foundations being required; and/or subsurface remediation may be required, such as deep pressure grouting of weak zones. Such subsurface conditions may yet be found in the 2,129 acre site as well.

Therefore, there are at least three options for moving forward:

1. Perform additional preliminary test borings and evaluations in the Catalyst site now, to determine if these problematic conditions appear to be localized or more widespread. In this manner we can better statistically evaluate possible limitations on developable areas; and/or the need for more costly foundation options; and/or the possibility of deep remediation being required. It is likely that the ratio of "good" subsurface conditions to "poor" subsurface conditions will increase, but that remains to be seen.

2. Move forward with Catalyst site development, but be prepared to perform deeper and more concentrated subsurface explorations in proposed structure areas when their desired footprints are known (or advise prospective tenants of the need). With this option, it may be found that certain areas are suitable for development as-is, or it may be found to be advisable to re-site a proposed building, or implement a more costly foundation option, and/or subsurface remediation.

3. Plan the Catalyst 500 acres elsewhere in the surrounding 2,129 acre parcel(s). Possibly perform additional preliminary test borings and geotechnical evaluations in/for the relocated Catalyst site, considering that existing test borings in that parcel are more widespread than in the Catalyst site.

In summary, there are areas which can be developed as-is, and areas which will be more challenging, in terms of land use and development costs. Generally, these types of problematic subsurface conditions do not limit roadway development, unless the conditions are closer to the surface than encountered, or more extensive.

5.1.2 Groundwater Ramifications

The position of the site groundwater table will have a significant influence on the ability to achieve **proper soil compaction** preparation for shallow foundations and roadways.

In general, proper compaction cannot be performed when the groundwater table is shallower than about 2 to 3-feet below the compacted surface. The bottoms of relatively small shallow foundations are generally imbedded about 2-feet, and minimum allowable embedment is generally at least 18-inches, so the implications are as follows:

- Where the groundwater table is deeper than about 5-feet (see the green "targets" on Figures 1 and 2), it is probable that the appropriate compaction beneath foundations can be performed with site grades as is, except during unusual rainfall months, and possibly the wet season, which is typically June through August.

- Where the groundwater table is between about 4-feet and 5-feet depth (see orange "targets" on Figure 1), it is possible that about 1-foot of compacted fill will be required to elevate construction areas such that the resulting groundwater table is at least 5-feet below the new land surface elevation, to allow compaction under proposed buildings. While considering this, note that capillary water can also impede compaction.

- Where the groundwater table is shallower than 4-feet (dark pink "targets"), compacted fill would have to be placed to elevate the site such that the bottom of foundation grade is at least 3-feet above the site groundwater table at the time of construction, or dewatering would have to be implemented to achieve compaction.

- A typical pavement section for a roadway consists of, from the bottom up, at least 24-inches of compacted select materials, the top 12-inches of which must be stabilized to at least Florida Limerock Bearing Ratio 40; then, a compacted limerock base course, typically 6 to 8-inches or more thick, depending upon the intensity of expected traffic loading; and then 2 to 4-inches of asphaltic concrete. In order to achieve the proper pavement section compaction, the site groundwater table must generally be at least 2-feet, and preferably 3-feet below the planned bottom of limerock base elevation.

Topsoil and muck (see Figures 1, 2 and 3) will need to be removed as encountered in proposed development areas. Areas with thicker muck deposits (A, I, J, K and L on Figure 3) will be more costly to develop, in terms of muck removal and required fill thicknesses.

5.2 Some Expansive Soils Encountered

Moderately to highly plastic soils, such as Strata 6 and 6A, are known to be expansive/contractive, and have an undesirable differential movement influence on un-stiffened shallow foundations and floor slabs, if these soil types are present within about 10 feet of land surface. These Strata were only shallower than 10-feet in test holes D5 and D9. Highly plastic soils are not suitable within about 2 to 3 feet below bottom of pavement section base course.

5.3 Deep Foundations

Deep foundations are generally only required when structure column loads exceed about 300 or 350 kips. In areas where very soft strata are encountered, and to further assess for the potential presence of soft strata, additional explorations will be required.

With the exception the red hatched zones on Figure 2, site soils appear to exhibit suitable frictional strengths for deep foundations such as auger-cast piles, driven piles, and Drilled Shafts (Caissons). Hard deposits containing Stratum 8 provide good end bearing for deep foundations, although end bearing is not necessarily required, if the deep foundation is designed for friction only.

The weak/soft zones encountered in 5 of the deep test holes reduce deep foundation type options. Driven end bearing piles, or end-bearing Drilled Piers (Caissons) may be required where deeper problematic conditions exist.

6.0 DESK-TOP KARST EVALUATION

6.1 Geologic Setting

Based upon the *Florida Geological Survey* publication *"Reconnaissance of the Geology and Groundwater Resources of Columbia County, FL"* (1962), Report of Investigations No. 30, Columbia County lies within two topographic regions, the Central Highlands and the Coastal Lowlands. The Central Highlands are composed of clay and sand which were terraced by seas of Early Pleistocene Age, which occurred at approximately 170 and 215-feet above current mean sea level. The Coastal Lowlands is a region of karst topography, which ranges from approximately 25 to 100-feet above mean sea level. The Wicomico Terrace separates the two topographic regions, and is approximately 100-feet above mean sea level. The subject site appears to lie within the Central Highlands.

In the Central Highlands, two terraces, the Coharie and Sunderland, form a high ridge which crosses central Columbia County from west to east. These terraces appear to cross through the subject site, along with cities such as Wellborn, Lake City, and Olustee. The surface of the ridge is a sandy, almost level, poorly to well drained area that is commonly referred to as "flatwoods". Along this ridge, solution depressions and sinkhole lakes, such as the Alligator Lake, about 6-miles west-southwest of the Catalyst site, are fairly common. Although sinkhole lakes do not appear on the site, multiple shallow depressions exist at the site. The muck probes performed during the exploration were largely concentrated in these depressed areas.

In Columbia County and its neighboring counties, groundwater is derived mostly from precipitation soaking into the ground and moving downward into the porous zone of saturation. It moves laterally under the influence of gravity toward places of discharge such as wetlands, water bodies, wells, springs, or the sea.

Based upon the above referenced 1962 publication, the following significant geologic *formations* underlie the site, in descending order: Pleistocene and Recent sediments; Hawthorn formation; Miocene Sandstone and Limestone; Suwannee Limestone; Ocala Group Limestone; and Avon Park Limestone.

The Pleistocene and Recent deposits consist of about 20 to 60-feet of sands and include silty and clayey sand with occasional muck and clay deposits. The muck deposits are generally concentrated in the solution depressional features where water stands at least seasonally.

The Hawthorne Formation is composed of gray to green, sandy clay with interbedded hard phosphatic or dolomitic limestone laminae, and fine to coarse phosphorite sands. The Hawthorne Formation is clearly evident in Stratum 3 and the mixture of Strata 3 and 6. The Hawthorne Formation typically contains an unconfined aquifer, and also acts as a semi-confining unit to the Floridan aquifer. The formation has relatively low permeability in comparison to the underlying beds of the Floridan aquifer. According to the 1962 reference, the Hawthorne Formation is about 100-feet thick below the subject site.

The Miocene Sandstone and Limestone formations include fragments of white, sandy limestone containing a common foraminifer of Miocene Age. Fragments of mollusks, shark teeth, and ostracods are common, along with thin beds of green clay which occur at irregular intervals. This formation is saturated, and forms the upper part of the Floridan aquifer. The Miocene Sandstone and Limestone formation is approximately 20-feet thick below the site.

The Suwannee Limestone is of late Oligocene Age and consists of a yellowish limestone which can be seen along the Suwannee River downstream from White Springs. The Suwannee Limestone formation is the thickest towards the western portion of the county and thins out to less than 5-feet in the eastern portion of the county. The formation contains solution pipes, many of which are in-filled with fine to coarse, quartz or phosphatic sand and light green clay.

The Ocala Group is of Late Eocene or Jackson Age. It consists of three different limestone formations of similar character. From oldest to youngest, they are the Inglis, Williston, and the Crystal River Formations. The limestone of the Ocala Group varies from a porous, cream to white loose coquina of large foraminifers and shells, to a brown, solution-riddled, echinoid-rich limestone. Locally, the top of the limestone has been replaced by chert. The Ocala Group is the principal source of potable groundwater in Columbia County.

The Avon Park Limestone formation is of late Middle Eocene or Claiborne Age. The formation consists of a creamy, chalky limestone that generally has a distinctive and abundant fauna consisting mostly of Foraminifera (a common marine plankton species). In some areas of the formation, the limestone is non-fossiliferous. The Avon Park Limestone is a permeable and porous part of the Floridan aquifer.

6.2 Karst Risk Assessment

The desk-top assessment considers the above geologic information, and mapped sinkholes and "karst features" in the area surrounding the site. The data utilized in the evaluation are based upon the sinkholes reported in the Florida Geologic Survey Database (1975-2010). Note that the FGS database only includes reported incidents and is not necessarily all surface collapses.

The relative karst risk for a site is quantified using a classification system developed by Ardaman's John E. Garlanger, Ph.D., P.E. The method is statistically based upon the number of known and reported sinkholes within a moveable 4-square mile area overlapping the site, within which the maximum number of features is encompassed. The *Sinkhole Potential* classification system is shown in the following table:

Sinkhole Potential	Annual Frequency (sinkholes per square mile)
Extremely High	>1.0
High	0.1 to 1.0
Moderate	0.01 to 0.1
Low	0.001 to 0.01
Extremely Low	<0.001

The Florida Geologic Survey database does not indicate any reported sinkholes within the movable 4-square mile area. The closest reported sinkhole was near Alligator Lake, approximately 5 to 6-miles west-southwest of the site. Therefore, the calculated Annual Frequency for sinkhole development at the site is (number of sinkholes/square miles/number of years) 0/4/35=0.0. According to the above table, this annual frequency equates to an "Extremely Low" sinkhole potential. However, sinkholes tend to go un-reported or un-noticed in rural areas, such as the site location.

During review of site area topography, Ardaman inventoried circular water bodies near the site, which are often indicative of sinkhole formations. Water bodies were observed east and west of the site. To the west, near Lake City, the water bodies include: Watertown Lake; Lake DeSoto; Lake Montgomery; Harper Lake; and Alligator Lake. To the east, they include: Ocean Pond; Palestine Lake; and Fisher Lake. In summary, none of these features alter the calculated sinkhole potential. Very few water bodies are apparent nearby to the north and south of the site, and the ponded area in muck probe zone H could be a lower portion of a stream bed.

It is our opinion that lineament patterns exist east and west of the site, but none appear to cross the site, indicating low sinkhole potential. **However**, based upon our site observations, and subsequent engineering evaluations of the deep test holes performed at the site, we believe the above analysis indicating an "Extremely Low" to "Low" sinkhole potential may not be conservative enough. Out of the eight deep borings performed, five of them encountered very soft zones, with extents indicating somewhat elevated potential for sinkhole/karst activity.

Therefore, in summary, it is Ardaman's present opinion, based upon available data, that the sinkhole potential for the catalyst site is "Low" to "Moderate". These opinions are valid for the dates of observations and locations and depths explored.

7.0 CLOSURE

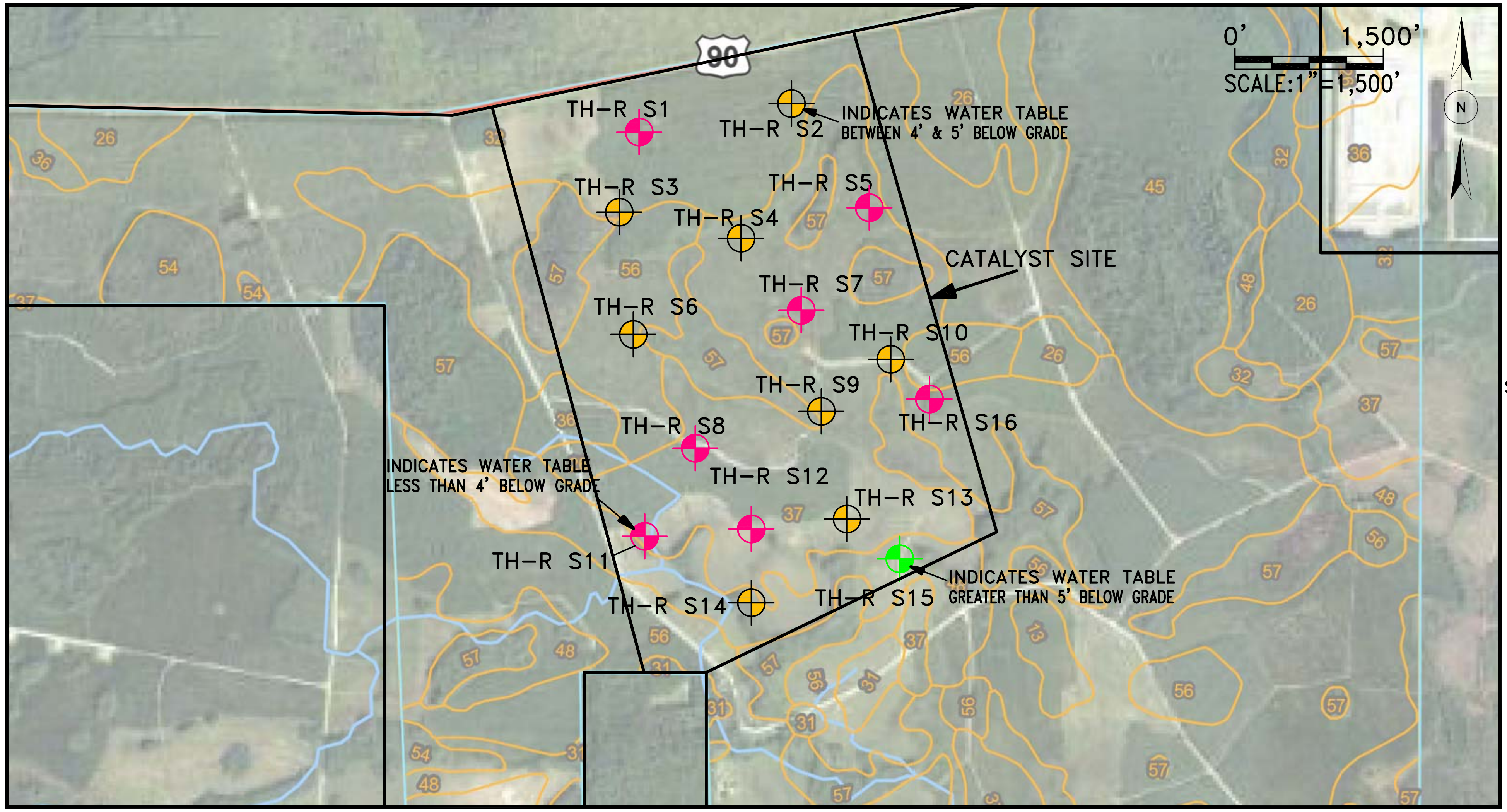
The recommendations submitted in this report are based upon the limited data obtained from the soil borings and Piezometers presented on the attached Figures 1 through 4. This report does not reflect any variations which may occur between the borings. The nature and extent of variations between the borings may not become evident until construction. If site or soil variations appear evident, it will be necessary to reevaluate the recommendations of this report after performing further on-site observations during the construction period and noting the characteristics of such variations.

Eight (8) shallow Piezometers were installed by Ardaman at the site. Notably, when the piezometers are no longer needed, they must be properly abandoned by a licensed Water Well Contractor engaged by the property owner, in accordance with Title XXVII, Florida Statutes Chapter 373, and Water Management District requirements. The Statutes are available online at: (http://www.leg.state.fl.us/statutes/). Abandonment fees are not included in Ardaman's present scope of services.

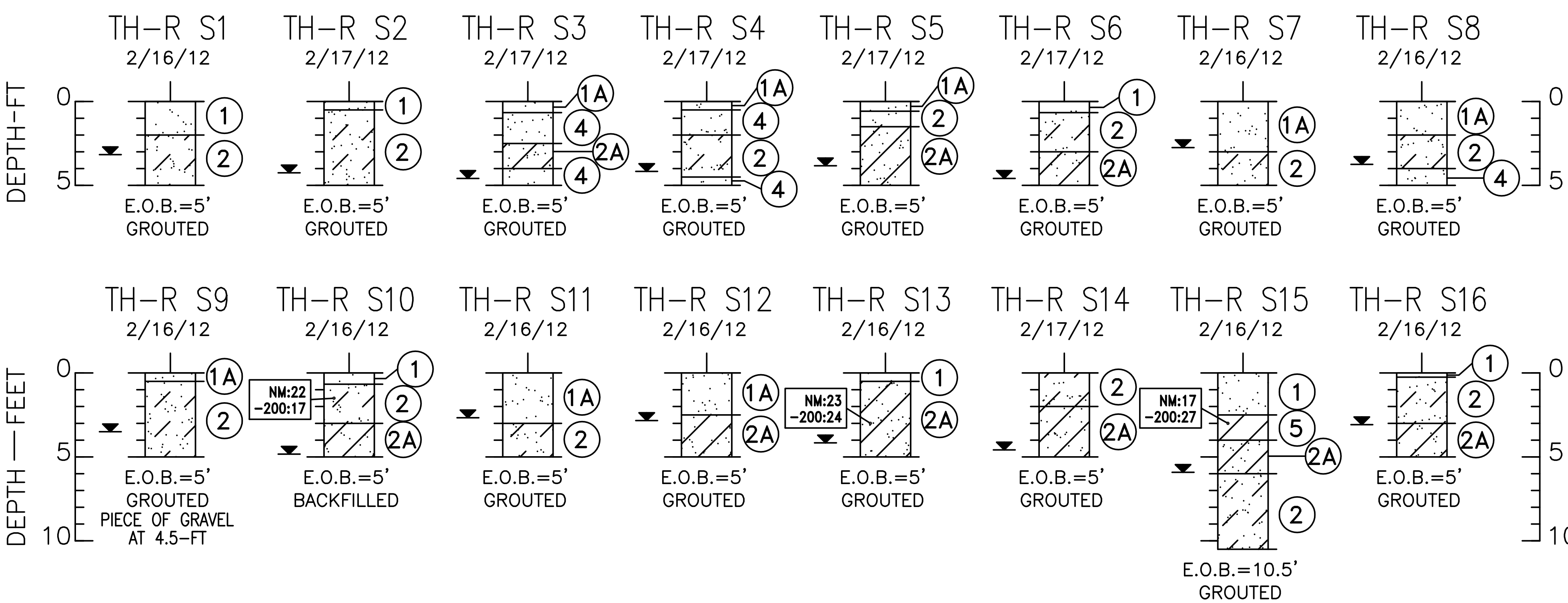
This report has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

End of Report

TEST BORING LOCATION PLAN



SOIL BORING PROFILES



LEGEND

TH	STANDARD PENETRATION TEST (SPT) OR AUGER BORING LOCATION
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT (ASTM D-1586)
50/3	50 BLOWS FOR 3-INCHES PENETRATION INTO SOIL
(pink)	VERY SOFT ZONE IN SUBSTRATA
EOB	END OF BORING
▼	APPROXIMATE DEPTH TO GROUNDWATER ON DATE DRILLED
NM	NATURAL MOISTURE CONTENT IN PERCENT (ASTM D-2216)
-200	PERCENT PASSING NO. 200 SIEVE SIZE (PERCENT FINES)(ASTM D-1140)
LL	LIQUID LIMIT (ASTM D-4318)
PI	PLASTICITY INDEX (ASTM D-4318)
ORG	ORGANIC CONTENTS (PERCENT ORGANIC)(ASTM D-2974)
WOH	SAMPLER ADVANCED BY STATIC WEIGHT OF HAMMER AND RODS ONLY
WOR	SAMPLER ADVANCED BY STATIC WEIGHT OF RODS ONLY
FF	DRILL ROD STRING FELL FREELY THROUGH INDICATED DEPTH ZONE
SP-SM,SM,SC	UNIFIED SOIL CLASSIFICATION SYSTEM
A-3,A-2-4	AASHTO SOIL CLASSIFICATION SYSTEM
DRILLERS:	JDA, BH, KM, JK

SOIL LEGEND

1	DARK GRAY TO LIGHT GRAY MEDIUM TO FINE SAND W/ SILT AND SURFICIAL ROOTS; TOPSOIL (SP-SM W/ PT; A-3 W/ A-8)
1A	DARK GRAY SILTY FINE SAND W/ TRACE ORGANICS (SM W/ PT; A-2-4 W/ A-8)
2	BROWN TO TAN MEDIUM TO FINE SAND, SOMETIMES W/ INCLUSIONS OF CLAY (SP-SM TO SM-SC; A-3 TO A-2-4)
2A	BROWN TO TAN TO TANNISH-ORANGE SILTY FINE SAND W/ LIGHT GRAY SANDY FAT CLAY (=5 TO 20%)(SM W/ CH; A-2-4 W/ A-7)
3	GREENISH-GRAY MEDIUM TO FINE PHOSPHATIC SAND W/ SILT, SOMETIMES CLAYEY (SP-SM TO SM-SC; A-3 TO A-2-4)
4	DARK BROWN TO DARK REDDISH-BROWN STAINED MEDIUM TO FINE SAND W/ SILT AND SOMETIMES W/ TRACE ORGANICS (SP-SM; A-3 W/ TR A-8)
5	MARBLED BROWN, TAN, AND ORANGE SILTY, CLAYEY TO VERY CLAYEY FINE SAND (SC; A-2-6 TO A-6)
6	GRAY TO BROWN SLIGHTLY SANDY TO SANDY FAT CLAY TO ELASTIC SILT, SOMETIMES PHOSPHATIC (CH TO MH; A-7)
6A	GRAY TO BROWNISH-GRAY VERY CLAYEY FINE SAND TO VERY SANDY LEAN CLAY (SC TO CL; A-6 TO A-7)
7	TAN MEDIUM TO FINE SAND, SOMETIMES W/ TRACE OF WHITE FAT CLAY (SP-SM W/ TR CH; A-3 W/ TR A-7)
7A	GRAY MEIDUM TO FINE SAND W/ SILT (SP-SM; A-3)
8	TAN TO WHITE LIMESTONE W/ CALCAREOUS CLAY

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE.

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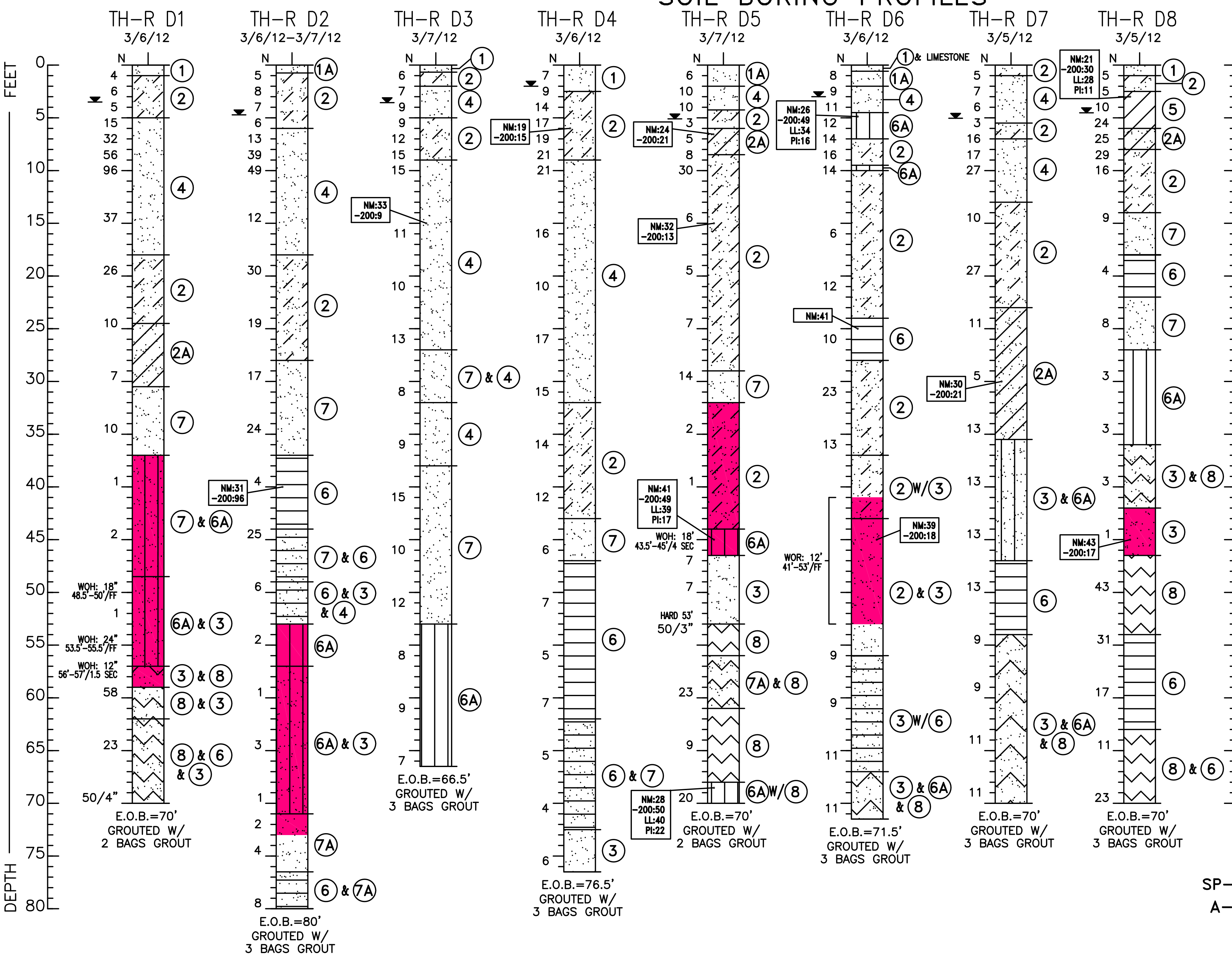
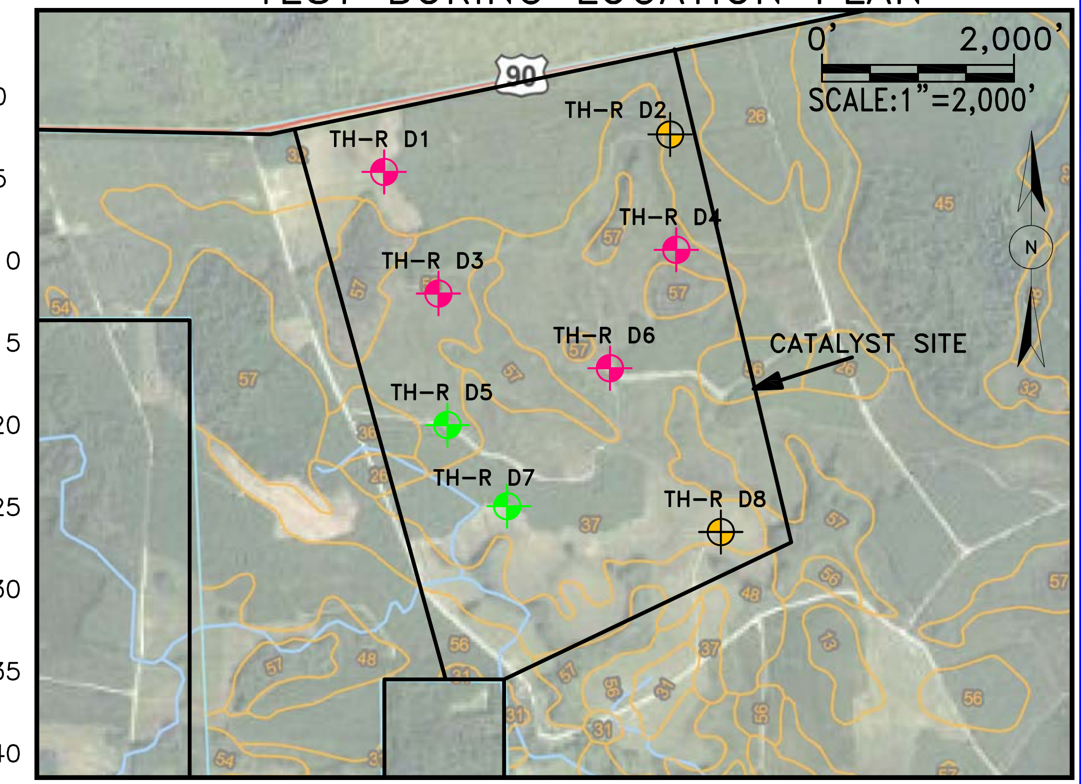
SHEET TITLE:
PRELIMINARY SUBSURFACE SOIL EXPLORATION
500 ACRE PLUM CREEK NORTH CENTRAL
RACEC CATALYST SITE
LAKE CITY, COLUMBIA COUNTY, FLORIDA

DRAWN BY: JMC | CHECKED BY: WSJ | DATE: APRIL 12, 2012
FILE NO. 113-12-40-1037 | APPROVED BY: W.S. JORDAN, P.E. | FIGURE 1

SOIL BORING PROFILES



TEST BORING LOCATION PLAN



LEGEND

TH	STANDARD PENETRATION TEST (SPT) OR AUGER BORING LOCATION
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT (ASTM D-1586)
50/3	50 BLOWS FOR 3-INCHES PENETRATION INTO SOIL
(red fill)	VERY SOFT ZONE IN SUBSTRATA
EOB	END OF BORING
▼	APPROXIMATE DEPTH TO GROUNDWATER ON DATE DRILLED
NM	NATURAL MOISTURE CONTENT IN PERCENT (ASTM D-2216)
-200	PERCENT PASSING NO. 200 SIEVE SIZE (PERCENT FINES)(ASTM D-1140)
LL	LIQUID LIMIT (ASTM D-4318)
PI	PLASTICITY INDEX (ASTM D-4318)
ORG	ORGANIC CONTENTS (PERCENT ORGANIC)(ASTM D-2974)
WOH	SAMPLER ADVANCED BY STATIC WEIGHT OF HAMMER AND RODS ONLY
WOR	SAMPLER ADVANCED BY STATIC WEIGHT OF RODS ONLY
FF	DRILL ROD STRING FELL FREELY THROUGH INDICATED DEPTH ZONE
SP-SM,SM,SC	UNIFIED SOIL CLASSIFICATION SYSTEM
A-3,A-2-4	AASHTO SOIL CLASSIFICATION SYSTEM
DRILLERS:	JDA, BH, KM, JK

SOIL LEGEND

(1)	DARK GRAY TO LIGHT GRAY MEDIUM TO FINE SAND W/ SILT AND SURFICIAL ROOTS; TOPSOIL (SP-SM W/ PT; A-3 W/ A-8)
(1A)	DARK GRAY SILTY FINE SAND W/ TRACE ORGANICS (SM W/ PT; A-2-4 W/ A-8)
(2)	BROWN TO TAN MEDIUM TO FINE SAND W/ SILT, SOMETIMES W/ INCLUSIONS OF CLAY (SP-SM TO SM-SC; A-3 TO A-2-4)
(2A)	BROWN TO TAN TO TANNISH-ORANGE SILTY FINE SAND W/ LIGHT GRAY SANDY FAT CLAY (=5 TO 20%)(SM W/ CH; A-2-4 W/ A-7)
(3)	GREENISH-GRAY MEDIUM TO FINE PHOSPHATIC SAND W/ SILT, SOMETIMES CLAYEY (SP-SM TO SM-SC; A-3 TO A-2-4)
(4)	DARK BROWN TO DARK REDDISH-BROWN STAINED MEDIUM TO FINE SAND W/ SILT AND SOMETIMES W/ TRACE ORGANICS (SP-SM; A-3 W/ TR A-8)
(5)	MARBLED BROWN, TAN, AND ORANGE SILTY, CLAYEY TO VERY CLAYEY FINE SAND (SC; A-2-6 TO A-6)
(6)	GRAY TO BROWN SLIGHTLY SANDY TO SANDY FAT CLAY TO ELASTIC SILT, SOMETIMES PHOSPHATIC (CH TO MH; A-7)
(6A)	GRAY TO BROWNISH-GRAY VERY CLAYEY FINE SAND TO VERY SANDY LEAN CLAY (SC TO CL; A-6 TO A-7)
(7)	TAN MEDIUM TO FINE SAND, SOMETIMES W/ TRACE OF WHITE FAT CLAY (SP-SM W/ TR CH; A-3 W/ TR A-7)
(7A)	GRAY MEDIUM TO FINE SAND W/ SILT (SP-SM; A-3)
(8)	TAN TO WHITE LIMESTONE W/ CALCAREOUS CLAY

ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	>50

II COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, QU, TSF	BLOW COUNT "N"
VERY SOFT	<1/4	0 TO 2
SOFT	1/4 TO 1/2	2 TO 4
MEDIUM STIFF	1/2 TO 1	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	>4	>30

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE.

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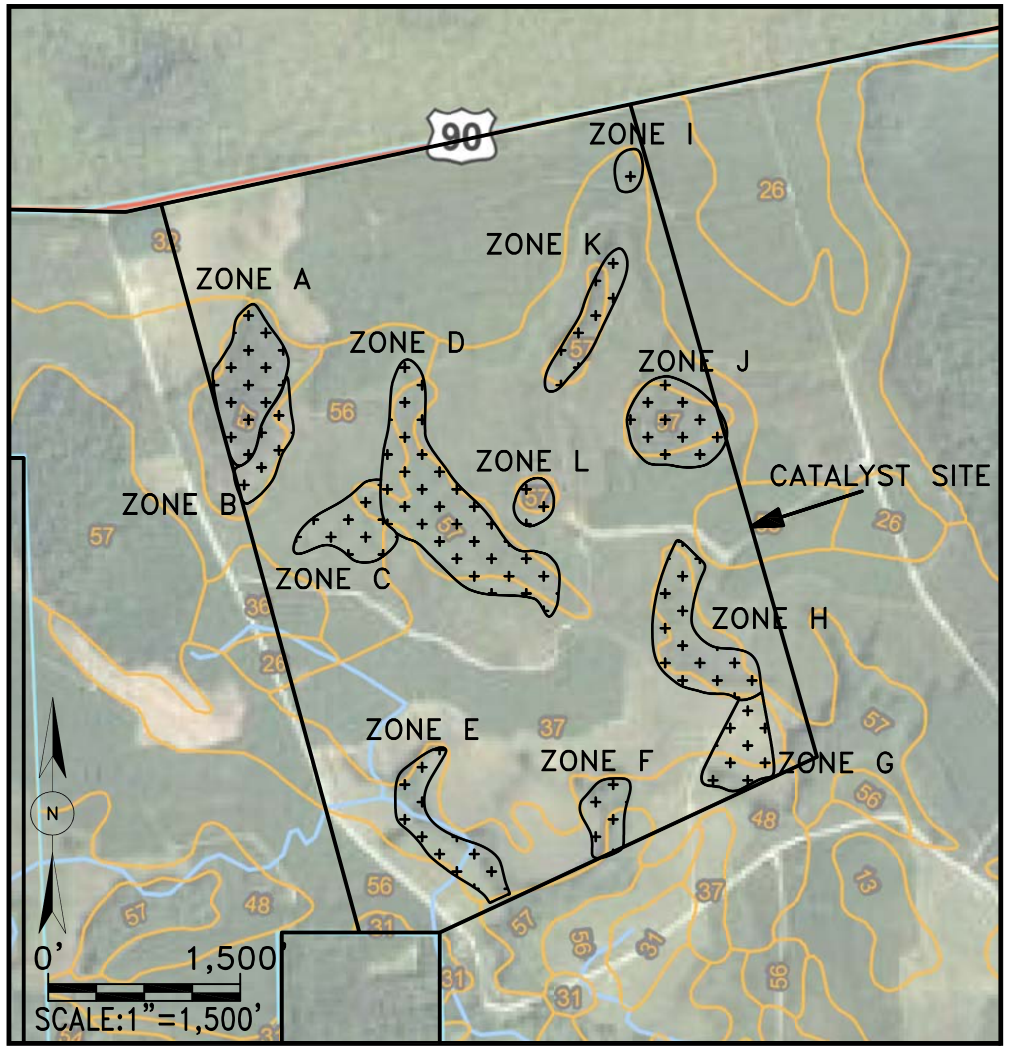
LAKE CITY, COLUMBIA COUNTY, FLORIDA

DRAWN BY: JMC | CHECKED BY: WSJ | DATE: APRIL 12, 2012

FILE NO. 113-12-40-1037 | APPROVED BY: W.S. JORDAN, P.E. | FIGURE 2

MUCK PROBE ZONES



ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS

DESCRIPTION	SPT "N"	DIAL READING "P"
VERY LOOSE	0 TO 4	0 TO 7
LOOSE	4 TO 10	7 TO 15
MEDIUM DENSE	10 TO 30	15 TO 27
DENSE	30 TO 50	>27
VERY DENSE	>50	

II COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, QU, TSF	SPT "N"	DIAL READING "P"
VERY SOFT	<1/4	0 TO 2	0 TO 2
SOFT	1/4 TO 1/2	2 TO 4	2 TO 3
MEDIUM STIFF	1/2 TO 1	4 TO 8	3 TO 5
STIFF	1 TO 2	8 TO 15	5 TO 9
VERY STIFF	2 TO 4	15 TO 30	9 TO 18
HARD	>4	>30	>18

LABORATORY TEST RESULTS FOR MUCK PROBES

ZONE	MP#	DEPTH RANGE	NM	-200	%ORG
A	2	4"-30"	31	34	6
B	1	0'-4"	88	49	29
G	1	0"-6"	197	63	24
G	2	0"-9"	--	--	38
H	1	0"-4"	61	64	39
I	1	0"-24"	31	35	15
J	1	6"-22"	61	49	18

MUCK PROBE INFORMATION

ZONE	MP#	DEPTH OF SIGNIFICANT ORGANICS (OR TOPSOIL)	AVERAGE SCP "P" VALUE IN ORGANIC LAYER	AVERAGE SCP "P" VALUE IN UNDERLYING SOIL	DEPTH TO WATER TABLE	DEPTH OF BORING
*A	1	5"	6	8	1'-10"	30"
	*2	30"	1	7	GNE	42"
*B	*1	4"	3	5	1'-10"	30"
	2	3"	5	7	GNE	36"
C	1	9"	5	7	GNE	36"
D	1	8"	4	8	GNE	36"
	2	12"	3	9	GNE	36"
E	1	15"	3	8	GNE	36"
	2	10"	4	8	GNE	36"
F	1	8"	4	9	GNE	36"
*G	*1	6"	<1	6	1'-7"	30"
	*2	9"	2	7	GNE	30"
*H	*1	4"	<1	8	1"	24"
	2	5"	2	9	GNE	30"
	3	8"	3	8	GNE	30"
*I	*1	24"	<1	3 TO 4'	GNE	36"
*J	*1	22"	2	6	2'-7"	42"
	2	7"	3	7	1'-7"	30"
K	1	18"	2	7	2'-1"	36"
	2	12"	4	7	GNE	36"
L	1	17"	4	7	1'-11"	36"
	2	10"	5	7	2'-1"	36"

*PLEASE SEE LABORATORY TEST RESULTS FOR NATURAL MOISTURE, PERCENT PASSING U.S. No. 200 SIEVE, AND PERCENT ORGANICS

LEGEND

P	STATIC CONE PENETRATION RESISTANCE DIAL READING
GNE	GROUNDWATER NOT ENCOUNTERED
NM	NATURAL MOISTURE CONTENT IN PERCENT (ASTM D-2216)
-200	PERCENT PASSING NO. 200 SIEVE (PERCENT FINES)(ASTM D-1140)
ORG	ORGANIC CONTENTS (PERCENT ORGANICS)(ASTM D-2974)
DRILLERS:	JDA, BH

NOTE: WITH THE EXCEPTION OF THE SEVEN (7) TESTED LOCATIONS, THE "ORGANIC" LAYER GENERALLY CONSISTED OF THE TOPSOIL LAYER WHERE THE ORGANICS PRIMARILY CONSISTED OF SURFICIAL ROOTS (ESTIMATED 5% ORGANICS)

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

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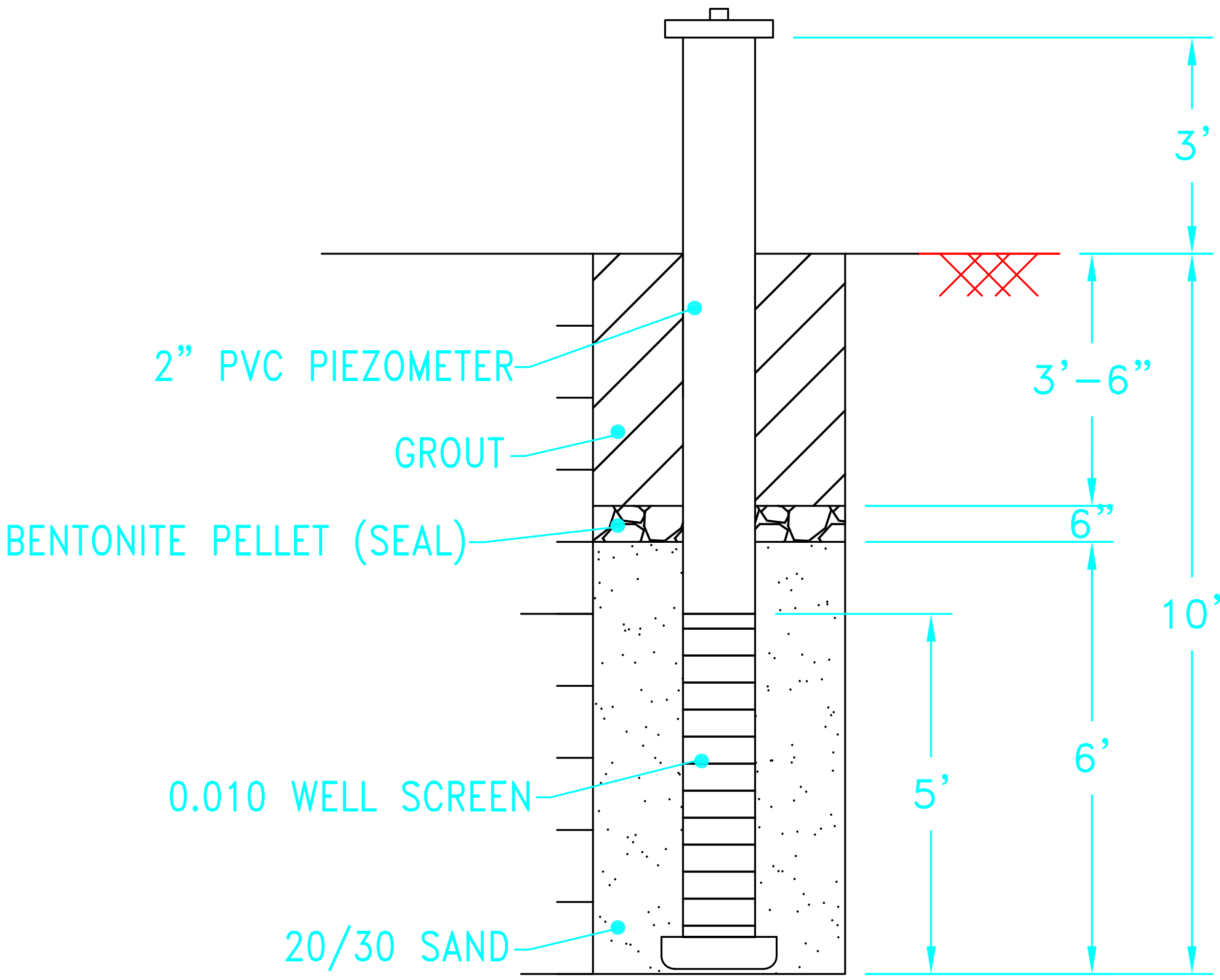
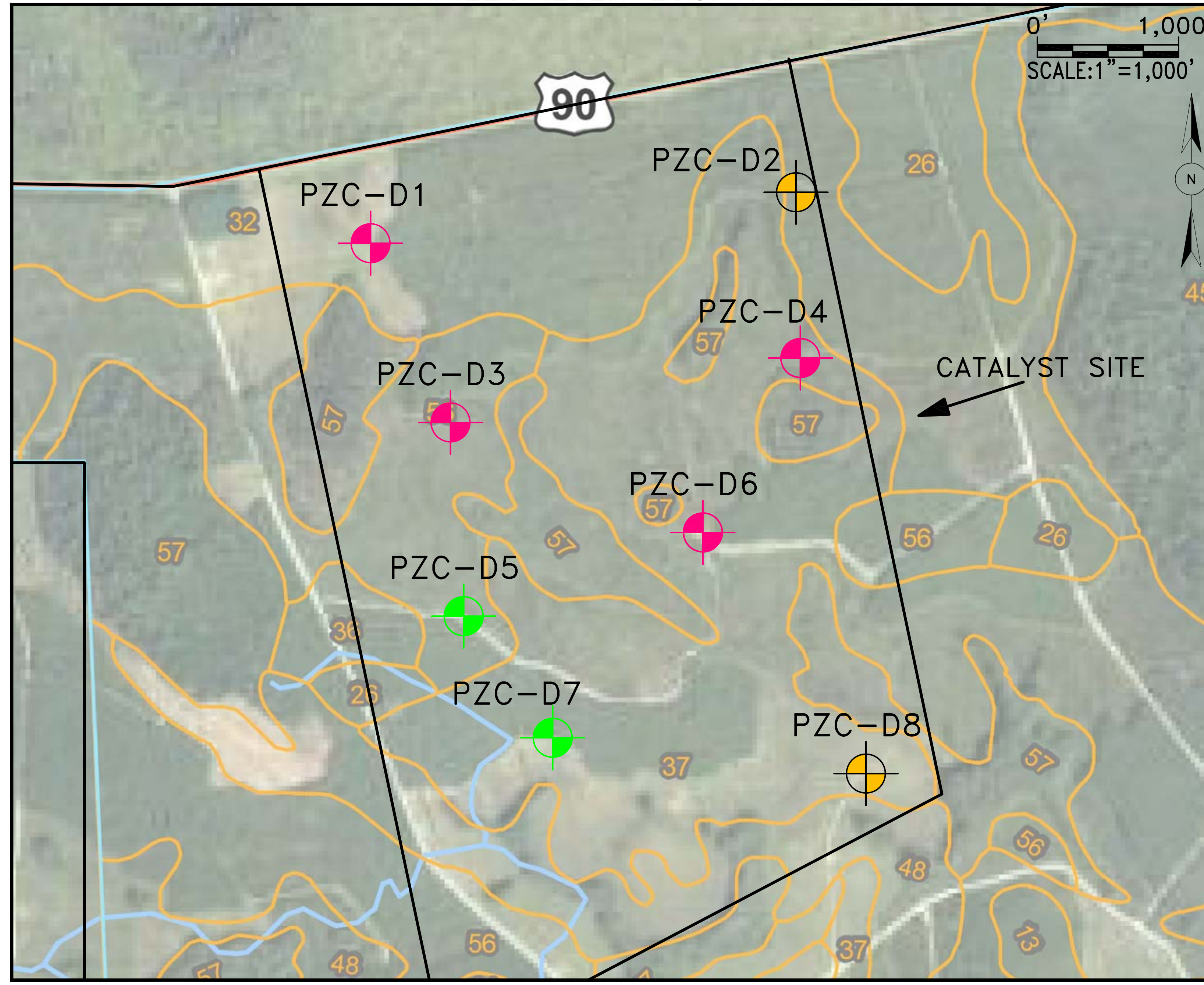
FILE NO. 113-12-40-1037 | APPROVED BY: W.S. JORDAN, P.E. | FIGURE 3

PIEZOMETER (TYPICAL)



TERMINATION DEPTH=10'

PIEZOMETER LOCATION PLAN



PIEZOMETER NO.	INSTALLATION DATE	DATE OF 1st READING	DEPTH TO WATER FROM GROUND (1st READING)	DATE OF 2nd READING	DEPTH TO WATER FROM GROUND (2nd READING)
PZC-D1	3/8/12	3/9/12	3'-0"	3/28/12	3'-6"
PZC-D2	3/8/12		4'-3"		4'-8"
PZC-D3	3/8/12		3'-11"		3'-10"
PZC-D4	3/8/12		2'-8"		2'-8"
PZC-D5	3/7/12		5'-4"		5'-9"
PZC-D6	3/7/12		3'-4"		3'-9"
PZC-D7	3/8/12		5'-1"		5'-0"
PZC-D8	3/7/12		4'-4"		4'-5"

Ardaman & Associates, Inc.
3175 W. Tharpe Street
Tallahassee, Florida 32303
(850) 576-6131

SHEET TITLE:
PIEZOMETER LOCATION PLAN AND DETAILS
500 ACRE PLUM CREEK NORTH CENTRAL
RACEC CATALYST SITE
LAKE CITY, COLUMBIA COUNTY, FLORIDA

DRAWN BY: JMC | CHECKED BY: WSJ | DATE: APRIL 12, 2012

FILE NO.: 113-12-40-1037 | APPROVED BY: W.S. JORDAN, P.E. | FIGURE: 4

APPENDIX A
SOIL SURVEY EXCERPTS

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

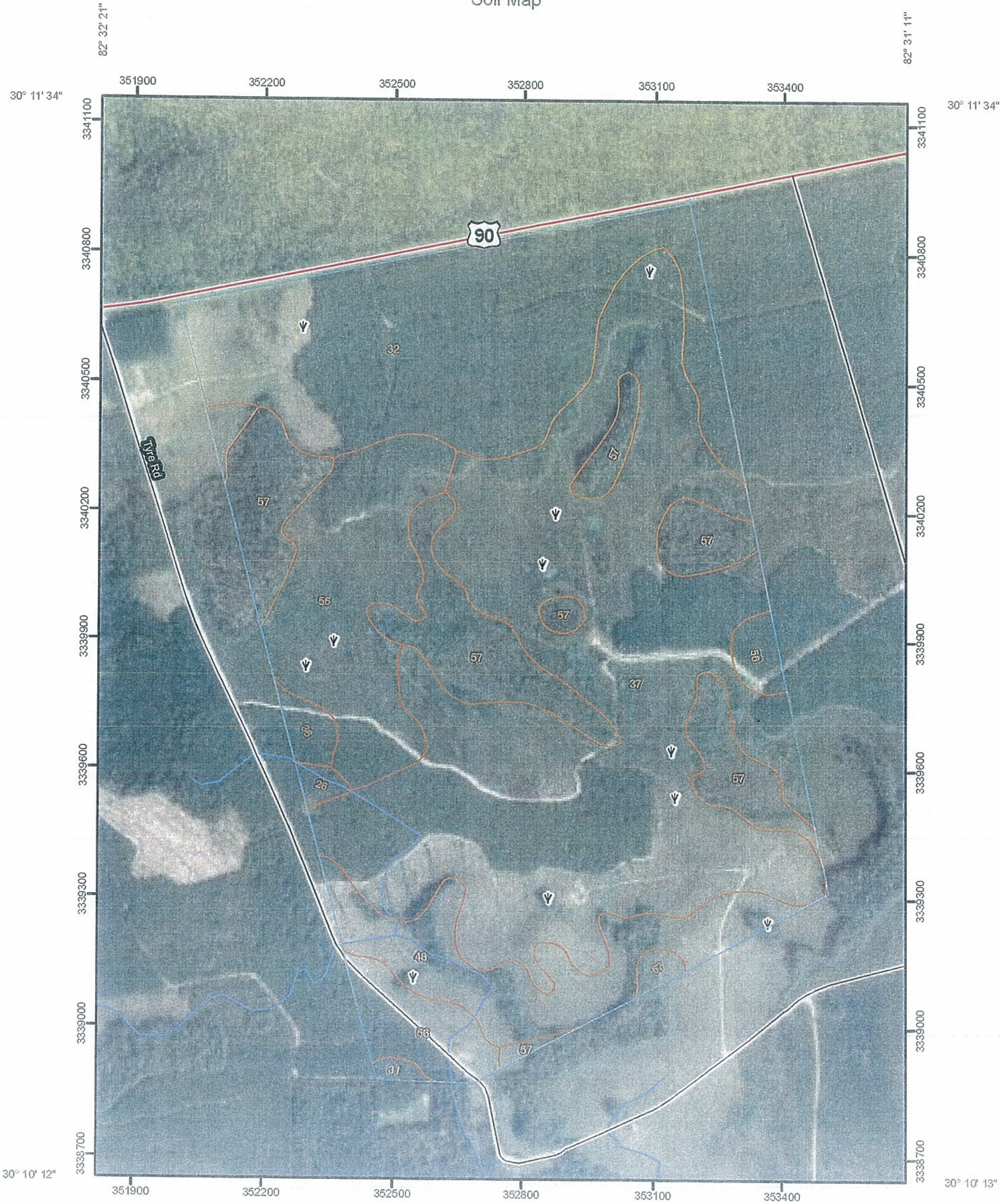
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Columbia County, Florida

500 Ac Plum Creek North Central RACEC

October 27, 2011

Custom Soil Resource Report
Soil Map



Map Scale: 1:11,900 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1,800 2,700

Map Unit Legend

Columbia County, Florida (FL023)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
26	Hurricane fine sand	2.1	0.4%
31	Leefield fine sand	1.3	0.3%
32	Leon fine sand	108.4	21.0%
36	Mandarin fine sand	4.0	0.8%
37	Mascotte fine sand	221.3	43.0%
48	Pelham fine sand	38.7	7.5%
56	Sapelo fine sand	72.7	14.1%
57	Surrency fine sand	66.5	12.9%
Totals for Area of Interest		**514.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Columbia County, Florida

26—Hurricane fine sand

Map Unit Setting

Elevation: 130 to 660 feet
Mean annual precipitation: 50 to 58 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Hurricane and similar soils: 85 percent
Minor components: 15 percent

Description of Hurricane

Setting

Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 5.97 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 3.3 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 8 inches: Fine sand
8 to 56 inches: Fine sand
56 to 80 inches: Fine sand

Minor Components

Albany

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear

Plummer, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf

Down-slope shape: Convex
Across-slope shape: Linear

Chipley

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Sapelo

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Leon, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

31—Leefield fine sand

Map Unit Setting

Elevation: 260 to 660 feet
Mean annual precipitation: 50 to 58 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Leefield and similar soils: 85 percent
Minor components: 15 percent

Description of Leefield

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 8 inches: Fine sand
8 to 27 inches: Fine sand
27 to 80 inches: Sandy clay loam

Minor Components

Albany

Percent of map unit: 4 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear

Ocilla

Percent of map unit: 4 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Mascotte

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Pelham, hydric

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

32—Leon fine sand

Map Unit Setting

Elevation: 130 to 660 feet
Mean annual precipitation: 50 to 58 inches

Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Leon, non-hydric, and similar soils: 75 percent
Leon, hydric, and similar soils: 10 percent
Minor components: 15 percent

Description of Leon, Non-hydric

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Moderate (about 8.9 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 8 inches: Fine sand
8 to 19 inches: Fine sand
19 to 80 inches: Fine sand

Description of Leon, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum: 4.0
Available water capacity: Moderate (about 8.9 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 8 inches: Fine sand
8 to 19 inches: Fine sand
19 to 80 inches: Fine sand

Minor Components

Plummer, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Hurricane

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Electra variant

Percent of map unit: 3 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Mascotte

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear

Sapelo

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

36—Mandarin fine sand

Map Unit Setting

Elevation: 130 to 660 feet
Mean annual precipitation: 50 to 58 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Mandarin and similar soils: 85 percent
Minor components: 15 percent

Description of Mandarin

Setting

Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 3.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 5 inches: Fine sand
5 to 16 inches: Fine sand
16 to 26 inches: Fine sand
26 to 64 inches: Fine sand
64 to 80 inches: Fine sand

Minor Components

Albany

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, knolls on marine terraces

Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear

Plummer, non-hydric

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Chipley

Percent of map unit: 2 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Hurricane

Percent of map unit: 2 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Mascotte

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Leon, non-hydric

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Pelham, hydric

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Sapelo

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

37—Mascotte fine sand

Map Unit Setting

Elevation: 230 to 660 feet
Mean annual precipitation: 50 to 58 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Mascotte and similar soils: 80 percent
Minor components: 20 percent

Description of Mascotte

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 6 inches: Fine sand
6 to 15 inches: Fine sand
15 to 25 inches: Fine sand
25 to 37 inches: Fine sand
37 to 67 inches: Fine sandy loam
67 to 80 inches: Loamy sand

Minor Components

Ocilla

Percent of map unit: 4 percent
Landform: Rises on marine terraces

Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Sapelo

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Leon, non-hydric

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Pelham, hydric

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Olustee, non-hydric

Percent of map unit: 4 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

48—Pelham fine sand

Map Unit Setting

Elevation: 130 to 660 feet
Mean annual precipitation: 50 to 58 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Pelham, non-hydric, and similar soils: 60 percent
Pelham, hydric, and similar soils: 15 percent
Minor components: 25 percent

Description of Pelham, Non-hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex

Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 6 inches: Fine sand
6 to 31 inches: Fine sand
31 to 66 inches: Sandy clay loam
66 to 80 inches: Fine sandy loam

Description of Pelham, Hydric

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 6 inches: Fine sand
6 to 31 inches: Fine sand
31 to 66 inches: Sandy clay loam
66 to 80 inches: Fine sandy loam

Minor Components

Albany

Percent of map unit: 5 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear

Plummer, non-hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Ocilla

Percent of map unit: 5 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Surrency

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Mascotte

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

56—Sapelo fine sand

Map Unit Setting

Elevation: 230 to 660 feet
Mean annual precipitation: 50 to 58 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Sapelo and similar soils: 85 percent
Minor components: 15 percent

Description of Sapelo

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 4 inches: Fine sand
4 to 11 inches: Fine sand
11 to 17 inches: Fine sand
17 to 50 inches: Fine sand
50 to 80 inches: Sandy clay loam

Minor Components

Mascotte

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Leon, non-hydric

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

Pelham, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

57—Surrency fine sand

Map Unit Setting

Elevation: 130 to 560 feet
Mean annual precipitation: 50 to 58 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 258 to 288 days

Map Unit Composition

Surrency and similar soils: 90 percent
Minor components: 10 percent

Description of Surrency

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water capacity: Low (about 5.9 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 16 inches: Fine sand
16 to 38 inches: Fine sand
38 to 80 inches: Sandy clay loam

Minor Components

Pantego

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Plummer, depressional

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Pelham, non-hydric

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear

END OF ADDENDUM NO. 1

(Please acknowledge receipt of Addendums)