Preliminary Geotechnical Engineering Report
Trailside North
Orange Blossom Trail and Centerview Blvd.
Kissimmee, Florida

June 23, 2015
Terracon Project No. H1155073

Prepared for:
Deerfield Land Corporation
Orlando, Florida

Prepared by:
Terracon Consultants, Inc.
Winter Park, Florida
June 23, 2015

Deerfield Land Corporation
14901 S. Orange Blossom Trail
Orlando, Florida  32806

Attn:  Mr. Thomas Roehlk
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E:  tomroehlk@tupperware.com

Re:  Preliminary Geotechnical Engineering Report
Trailside North
Orange Blossom Trail and Centerview Boulevard
Kissimmee, Osceola County, Florida
Terracon Project Number: H1155073

Dear Mr. Roehlk:

Terracon Consultants, Inc. (Terracon) has completed the preliminary geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal number PH1150310 dated May 5, 2015.

This report presents the findings of the subsurface exploration and provides preliminary geotechnical recommendations concerning earthwork and the design and construction of foundations and pavements for the proposed development.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.
Certificate of Authorization Number 8830

Xuebing Zheng, E.I.
Staff Geotechnical Engineer

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EXECUTIVE SUMMARY

A preliminary geotechnical exploration has been performed for the proposed Trailside North development planned to be constructed at northwest corner of the intersection of Orange Blossom Trail and Centerview Boulevard in Kissimmee, Osceola County, Florida. Fourteen (14) borings and four (4) Cone Penetration Soundings (CPT), designated B-1 through B-14 and CPT-1 through CPT-4, have been performed to depths of between 10 and 106 feet below the existing ground surface in the proposed building and pavement areas.

Based on the information obtained from our geotechnical exploration, it appears that the site can be developed for the proposed project. The following geotechnical considerations were identified:

- The proposed structures may be supported on shallow foundation system bearing on the existing site soil or on newly placed engineered fill.

- Assuming proper site preparation is performed, total and differential settlement should be within tolerable limits.

- The in-place sands appear suitable for re-use as general engineered fill.

- The provided plan information does not indicate inclusion of on-site stormwater management system within the proposed development. We assume that stormwater runoff will be routed to surrounding ponds.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled GENERAL COMMENTS should be read for an understanding of the report limitations.
1.0 INTRODUCTION

A preliminary geotechnical exploration has been performed for the proposed Trailside North development planned to be constructed at northwest corner of the intersection of Orange Blossom Trail and Centerview Boulevard in Kissimmee, Osceola County, Florida as shown on the Topographic Vicinity Map included as Exhibit A-1 in Appendix A. Fourteen (14) borings and four (4) Cone Penetration Soundings (CPT), designated B-1 through B-14 and CPT-1 through CPT-4, have been performed to depths of between 10 and 106 feet below the existing ground surface in the proposed building and pavement areas. Logs of the borings along with a Boring Location Diagram (Exhibit A-4) are included in Appendix A of this report. Laboratory testing procedures are included in Exhibit B-1 in Appendix B.

The purpose of these services is to provide information and preliminary geotechnical engineering recommendations relative to:

- subsurface soil conditions
- preliminary foundation design
- groundwater conditions
- preliminary pavement design

2.0 PROJECT INFORMATION

2.1 Project Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td>The proposed Trailside North development includes a single-story restaurant and a five-story hotel.</td>
</tr>
<tr>
<td><strong>Building Construction</strong></td>
<td>Steel/Concrete/Brick Veneer (assumed).</td>
</tr>
<tr>
<td><strong>Finished floor elevation</strong></td>
<td>+90.5 feet</td>
</tr>
<tr>
<td><strong>Maximum loads (assumed)</strong></td>
<td>Proposed Restaurant:</td>
</tr>
<tr>
<td></td>
<td>Columns: 50 to 100 kips</td>
</tr>
<tr>
<td></td>
<td>Walls: 4 to 6 kips/ft</td>
</tr>
<tr>
<td></td>
<td>Slab: 150 psf</td>
</tr>
<tr>
<td></td>
<td>Proposed Hotel:</td>
</tr>
<tr>
<td></td>
<td>Columns: 400 to 500 kips</td>
</tr>
<tr>
<td></td>
<td>Walls: 4 to 6 kips/ft</td>
</tr>
<tr>
<td></td>
<td>Slab: 150 psf</td>
</tr>
</tbody>
</table>
2.2 Site Location and Description

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>The proposed project site is located at northwest corner of the intersection of Orange Blossom Trail and Centerview Boulevard in Kissimmee, Florida.</td>
</tr>
<tr>
<td>Current ground cover</td>
<td>The site is currently cleared with approximately 2 to 6 feet in-place fill.</td>
</tr>
<tr>
<td>Existing topography</td>
<td>The site is relatively flat, the natural ground elevation is approximately at elevation +85 feet.</td>
</tr>
<tr>
<td>Surface Water</td>
<td>Aerial views of the proposed project site from Google Earth and the provided site plan indicated there is an existing pond to the west of the project site, and an another one to the southwest of the site.</td>
</tr>
</tbody>
</table>

3.0 SUBSURFACE CONDITIONS

The geology of the site is presented in the following report section. A discussion of subsurface conditions encountered in our borings follows the geology section.

3.1 Geology

3.1.1 Regional Geology
The geology of Osceola County can be broadly divided into three layers. The lowermost and the oldest layer is the Limestone layer. The Floridan Aquifer, the primary source of potable water in Osceola County, is located within the Limestone layer. The Limestone layer can be subdivided into Avon Park Formation and Ocala Formation. Ocala Formation lies unconformably on top of Avon Park Formation.
Above the Ocala Formation lies the Hawthorn Group. The Hawthorn Group acts as a confining layer, maintaining the Floridan Aquifer beneath it and separating it from the surficial unconfined aquifer. The highly variable, diverse, lithologic character of the Hawthorn Group includes interbedded and interfingering sand, clayey sand, sandy clay, phosphatic sediment, dolomite, and limestone. The carbonate part generally occurs in the lower Hawthorn Group and contains highly variable amounts of sand, clay, and phosphorite or sand and clay. Sedimentary deposits of the Hawthorn Group underlie the entire county except in scattered areas where these deposits have been removed by erosion prior to deposition of younger units.

Above the Hawthorn Group, unconsolidated sand blankets the county. This sand consists of medium to fine sand and silt and does not contain clay or shell fragments. The surface expression of this lithologic type is generally flat to slightly undulating.

The site is located in a flat area of Osceola County which is referred to as the Osceola Plain. The Osceola Plain is bounded on the west and northwest by the higher land of the east side of the Lake Wales Ridge and the southern ends of the Mount Dora and Orlando Ridges. On the northeast, east and south it is bounded by the an outward-facing scarp which look out onto lower ground which for the most part is the solution-reduced beach ridge plain at about 25 feet elevation which is known as the solution part of the Eastern Valley.

The extreme elevation of the Osceola Plain is about 90 to 95 feet. This elevation is reached near its northern edge where it rises gradually but with increasing local relief toward the southern edge of the Orlando Ridge. Although the various parts of the Osceola Plain show little recognizable difference in relief, there is nonetheless a notable distinction in the terrain east and west of a line running approximately parallel with the axis of the Peninsula.

3.1.2 General Potential for Sinkhole Development
Sinkhole development occurs in Florida and varies geographically from areas with almost no potential or a very low potential to areas with a high potential where sinkholes occur frequently. The subject property is located in Area II on the United States Geological Survey map entitled “Sinkhole Type, Development, and Distribution in Florida”. The cover (over limestone bedrock) in Area II is between 30 to 200 feet thick and is predominantly sandy. Sinkholes are few, shallow, and of small diameter and develop gradually in Area II. The risk of sinkhole occurrence at most sites is small even in areas known to have a higher than average risk of sinkhole occurrence.

A review of the Florida Geologic Survey’s sinkhole database (updated March 4, 2014) reveals one reported sinkhole within three mile of the subject site. It should be noted that the number of sinkholes is based on information reported to the FGS and does not necessarily reflect the number of sinkholes confirmed by public or private industry.
Relatively consistent conditions were observed within the hotel area except for Boring B-2, in which, very loose silty sands with “weight-of-hammer” penetration resistance was encountered at a depth of about 50 feet and extended to about 68 feet. To further explore the possibility of raveling conditions, four (4) additional CPT soundings were performed at and around the location of Boring B-2. The results of CPT-2 and CPT-3 soundings showed clays with average tip resistance of 15 tsf extended from 30 to 35 feet to about 50 to 55 feet. The results of CPT-1 and CPT-4 soundings showed similar clays with average tip resistance of 15 tsf extended deeper to depths of 70 feet. The silty to clayey soils beginning at depth of 50 to 70 feet are clearly the Hawthorn Group soils. It is a frequent observation in Central Florida that these soils are typically loose/soft at the top of the Hawthorn. These conditions are typically described as depositional conditions and the loose conditions most of the time not associated with sinkhole activity.

It is our opinion that the loose conditions encountered at all of the deep SPT borings and CPT soundings is typical for the general site area and should not be considered an indicative of an active sinkhole activity on site. After the hotel loads are received and based on the foundation type selected, a limited deep soil treatment, in the form of compaction grouting or similar technique, might be needed at the general area of Boring B-2 and Sounding CPT-4.

### 3.2 Soil Survey

The Soil Survey of Osceola County Area, Florida as prepared by the United States Department of Agriculture (USDA), Soil Conservation Service (SCS; later renamed the Natural Resource Conservation Service - NRCS), identifies the soil type at the subject site as Arents (4), Basinger Fine Sand (5), and Water (99). It should be noted that the Soil Survey is not intended as a substitute for site-specific geotechnical exploration; rather it is a useful tool in planning a project scope in that it provides information on soil types likely to be encountered. Boundaries between adjacent soil types on the Soil Survey maps are approximate (included in Appendix as Exhibit A-2). Descriptions of the mapped soil units are included in Appendix A as Exhibit A-3. It should be noted that it appears that the site was previously filled, which covers the soils shown on the SCS maps.

### 3.3 Typical Profile

Based on the results of the SPT borings, subsurface conditions on the project site can be generalized as follows:

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Approximate Depth to Bottom of Stratum (feet)</th>
<th>Material Description</th>
<th>Consistency/Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28.5 to 38.5</td>
<td>Fine sand (SP) to fine sand with silt (SP-SM) to silty fine sand (SM)</td>
<td>Loose to dense</td>
</tr>
</tbody>
</table>
### Conditions encountered at each boring location and results of laboratory testing are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs in Appendix A of this report. Descriptions of our field exploration are included as Exhibit A-5 in Appendix A. Descriptions of our laboratory testing procedures are included as Exhibit B-1 in Appendix B. General notes for SPT borings can be found in Exhibit C-1. A more detailed description of the Unified Soil Classification System (USCS) is included as Exhibit C-2 in Appendix C.

#### 3.4 Groundwater

The boreholes were observed during drilling for the presence and level of groundwater. Groundwater was observed in six (6) of the borings, varies from depths of 7.5 to 8.5 feet below existing grade. Longer term monitoring in cased holes or piezometers, possibly installed to greater depths than explored under this project scope, would be required to better define groundwater conditions at the site.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the boring was performed. In addition, perched water can develop within higher permeability soils overlying less permeable soils. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the boring logs.

We estimate that during the normal wet season (typically June through October) with rainfall and recharge at a maximum, groundwater levels will be perched at ground surface to approximately 8 feet below the existing grade. Our estimates of the seasonal groundwater conditions are based on the USDA Soil Survey, available survey data, the encountered soil types, recent weather conditions, and the encountered water levels. The estimated normal seasonal high groundwater tables are included in the following table:

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Approximate Depth to Bottom of Stratum (feet)</th>
<th>Material Description</th>
<th>Consistency/Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>38.5 to 53.5</td>
<td>Clay (CH)</td>
<td>Soft to very stiff</td>
</tr>
<tr>
<td>3</td>
<td>68.5</td>
<td>Silty sand (SM) to clayey sand (SC)</td>
<td>Very loose to medium dense</td>
</tr>
<tr>
<td>4</td>
<td>70 (termination)</td>
<td>Weathered Limestone</td>
<td>---</td>
</tr>
<tr>
<td>Boring No.</td>
<td>Approximate depth to encountered water table</td>
<td>Approximate depth to estimated average seasonal wet groundwater table</td>
<td>Approximate depth to estimated seasonal high groundwater table</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>B-1</td>
<td>6.5 feet</td>
<td>5.5 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>B-2</td>
<td>5.5 feet</td>
<td>4.5 feet</td>
<td>4 feet</td>
</tr>
<tr>
<td>B-3</td>
<td>3.5 feet</td>
<td>3.5 feet</td>
<td>3.5 feet</td>
</tr>
<tr>
<td>B-4</td>
<td>4.5 feet</td>
<td>4 feet</td>
<td>4 feet</td>
</tr>
<tr>
<td>B-5</td>
<td>7 feet</td>
<td>5.5 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>B-6</td>
<td>6.5 feet</td>
<td>5.5 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>B-7</td>
<td>7 feet</td>
<td>5.5 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>B-8</td>
<td>4.5 feet</td>
<td>4 feet</td>
<td>4 feet</td>
</tr>
<tr>
<td>B-9</td>
<td>7 feet</td>
<td>Perched at 1 feet (5.5 feet if clayey sand are over-excavated)</td>
<td>Perched at 1 feet (5 feet if clayey sand are over-excavated)</td>
</tr>
<tr>
<td>B-10</td>
<td>7 feet</td>
<td>6.5 feet</td>
<td>6 feet</td>
</tr>
<tr>
<td>B-11</td>
<td>6.5 feet</td>
<td>5.5 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>B-12</td>
<td>9.5 feet</td>
<td>Perched at 1 feet (7 feet if clayey sand are over-excavated)</td>
<td>Perched at 1 feet (6 feet if clayey sand are over-excavated)</td>
</tr>
<tr>
<td>B-13</td>
<td>6.5 feet</td>
<td>5.5 feet</td>
<td>5 feet</td>
</tr>
<tr>
<td>B-14</td>
<td>8 feet</td>
<td>6 feet</td>
<td>4 feet</td>
</tr>
</tbody>
</table>

These seasonal water table estimates do not represent the temporary rise in water table that occurs immediately following a storm event, including adjacent to other stormwater management facilities. This is different from static groundwater levels in wet ponds and/or drainage canals which can affect the design water levels of new, nearby ponds. The seasonal high water table may vary from normal when affected by extreme weather changes, localized or regional flooding, karst activity, future grading, drainage improvements, or other construction that may occur on or around the site following the date of this report.

## 4.0 PRELIMINARY RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The following preliminary evaluations and recommendations are based on the project characteristics previously described, the data obtained during our field explorations, and our experience with similar subsurface conditions, proposed development, and construction methods. The performed borings showed consistent subsurface soil profile that is typical for the project area. The subsoil conditions described above, together with the proposed development, is considered suitable to adequately support the anticipated buildings.
4.1 Shallow Foundation and Site Preparation

Shallow spread footings bearing on natural sands or engineered fill are recommended for support of the proposed hotel and restaurant buildings. The engineered fill should be placed as outlined in Section 4.2, Fill Placement, of this report.

Based on the assumed column loads for the restaurant and hotel, our preliminary settlement estimations are in the order of 1 inch and is expected to be mostly elastic that is anticipated to occur during construction. The clay layer may cause some time dependent settlement; however, the amount of time dependent settlement is expected to be minimal. Differential settlements between footings are expected to be less than ½ inches between columns or over 40 feet of the walls.

Bearing pressures in the order of 3000 and 4000 psf are feasible for the restaurant and Hotel buildings, respectively for a minimum footing width of 3 feet and a minimum embedment depth of 3 feet.

Areas that will support footings, floors, pavements or new engineered fill must be properly prepared. All topsoil and unsuitable materials should be removed to a distance of 5 feet beyond the perimeter of construction. Unsuitable materials include topsoil, asphaltic concrete, buried structures, any soft unstable material and miscellaneous (non-soil) fill.

Prior to construction or placement of new engineered fill, if needed, the Geotechnical Engineer should evaluate the exposed subgrade. The evaluation should include proofrolling of the exposed subgrade. If unsuitable materials are disclosed, the Geotechnical Engineer would recommend appropriate remedial measures at that time. The proofrolling may consist of rolling all areas with ten passes of a static roller with a minimum static weight of 20,000 pounds or any equivalent. The latter five passes should be at right angles to previous passes. Any areas that yield excessively under the proofrolling operations should be removed and replaced by a suitable fill material as noted later in this report.

Proofrolling should be continued until soils to a minimum depth of 24 inches below foundation levels have achieved a minimum density of 95 percent of the maximum dry density as determined by ASTM D 1557 (Modified Proctor). In-place density tests should be conducted by a qualified Geotechnical Engineering Technician working under the direction of a registered Geotechnical Engineer. Careful moisture control may be necessary to achieve compaction. If water is added, it should be done in a way that will not promote erosion.

Care should be exercised during grading and fill placement operations. The combination of heavy construction equipment traffic and excess surface moisture can cause pumping and deterioration of the near surface soils. The severity of this potential problem depends to a great extent on the weather conditions prevailing during construction. The Contractor should exercise
discretion when selecting equipment sizes and also make a concerted effort to control surface water while the subgrade soils are exposed. If such problems do arise, the operations in the affected area should be halted and the Geotechnical Engineer should be contacted to evaluate the condition.

4.2 Fill Placement

After the site has been prepared as described above and accepted by the Geotechnical Engineer, fill required to bring the site to final grade may be placed and properly compacted as follows:

- Fill should be inorganic, non-plastic, granular soil (clean sands). Preferably it should have less than 10 percent passing a No. 200 sieve. The suitability of specific soils as fill material would be based on the results from classification and compaction tests and subject to approval of the Geotechnical Engineer.

- The fill should be placed in level lifts not to exceed 12 inches loose thickness if a large roller or heavy equipment is used to compact the fill.

- The fill should be compacted to a minimum of 95 percent of the soil's modified Proctor maximum dry density as determined by ASTM Specification D-1557.

- In-place density tests should be performed on each lift by an experienced Engineering Technician working under the direction of a registered Geotechnical Engineer to verify that the recommended degree of compaction has been achieved.

- Fill should extend a minimum of 5 feet beyond building lines to prevent possible erosion or undermining of footing bearing soils. Further, fill slopes should not be steeper than 2 horizontal to 1 vertical (2H:1V).

- Fill placed in utility trenches and adjacent to footings beneath slabs on grade should also be properly placed and compacted to the specifications stated above. However, in these restricted working areas, compaction should be accomplished with lightweight, hand-guided compaction equipment and lift thicknesses should be limited to a maximum of 6 inches loose thickness.

4.3 Roadway and Pavements

The near surface soil throughout the site consisted of clean fine sands to fine sand with silt, which is suitable as subgrade for conventional pavement sections. The groundwater table was encountered at depth of 7.3 to 8.5 feet below existing ground surface and the seasonal high water table was estimated to be perched at ground surface to about 8 feet below. It is
recommended to have a minimum separation of 18 inches between pavement section and the seasonal high water table.

Given the above subsoil and groundwater conditions, it is our opinion that conventional flexible or rigid pavement sections may be utilized. The subsoil and groundwater conditions encountered at the project site appear to pose appreciable limitations to pavement design and construction.

The following table provides preliminary pavement section based on the assumptions made for traffic and subgrade strength. Final pavement design should be performed after traffic data becomes available.

<table>
<thead>
<tr>
<th>Traffic Area</th>
<th>Alternative</th>
<th>Asphalt Concrete Surface Course</th>
<th>Limerock, Soil-Cement or Crushed Concrete Base Course</th>
<th>Stabilized Subbase Course¹,²,³</th>
<th>Portland Cement Concrete</th>
<th>Free Draining Subgrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Duty – Passenger Cars Only</td>
<td>PCC</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>5.0</td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td>AC</td>
<td>1.5</td>
<td>6.0</td>
<td>12.0</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Heavy Duty – Driveways, Areas Accessed by Truck Traffic</td>
<td>PCC</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>6.0</td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td>AC</td>
<td>2.0</td>
<td>8.0</td>
<td>12.0</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

1. Often referred to as Stabilized Subgrade.
2. Use coarse granular materials such as recycled crushed concrete, shell, or gravel when seasonal high groundwater is within 4 feet of the profile grade. Clay stabilization is acceptable with deeper seasonal high groundwater.
3. Some municipalities do not require stabilized subbase beneath soil-cement base.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.
APPENDIX A
FIELD EXPLORATION
Osceola County Soil Map Index

- 4  Arents, 0 to 5 percent slopes
- 5  Basinger fine sand, 0 to 2 percent slopes
- 99 Water
Soil Survey Descriptions

4 – Arents, 0 to 5 percent slopes. This soil group consists of somewhat poorly drained, nearly level to gently sloping soils that have been reworked and shaped by earthmoving equipment. Arents are located throughout the county in both urban and rural areas. Most areas are low and adjacent to the ponds or canals from which the soil material was excavated. Arents have no orderly sequence of layers, and consist primarily of sandy mineral material and are highly variable over short distances. The groundwater table is typically between depths of 20 and 60 inches (1.7 and 5.0 feet).

5 – Basinger fine sand. This soil type is nearly level and poorly drained. It is typically found on low, broad flats and sloughs in the flatwoods. In its natural state, during years of normal rainfall, this soil type has a seasonal high water table within 10 inches (0.8 feet) of the surface, receding to a depth of between 10 and 30 inches (0.8 and 2.5 feet) during the dry season.
Field Exploration Description

The boring locations were laid out at the project site by Terracon personnel. The locations indicated on the attached diagram are approximate and were measured by a GPS. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

Standard Penetration Testing
The SPT soil borings were drilled with a CME automatic hammer. The boreholes were advanced with a cutting head and stabilized with the use of bentonite (drillers' mud). Soil samples were obtained by the split spoon sampling procedure in general accordance with the Standard Penetration Test (SPT) procedure. In the split spoon sampling procedure, the number of blows required to advance the sampling spoon the last 12 inches of an 18-inch penetration or the middle 12 inches of a 24-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N). This value is used to estimate the in-situ relative density of cohesionless soils and the consistency of cohesive soils. The sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the boring logs.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Portions of the samples from the borings were sealed in glass jars to reduce moisture loss, and then the jars were taken to our laboratory for further observation and classification. Upon completion, the boreholes were backfilled with the site soil.

Field logs of each boring were prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation of the samples.

Cone Penetration Testing
The CPT hydraulically pushes an instrumented cone through the soil while nearly continuous readings are recorded to a portable computer. The cone is equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60° and an area of 10 cm². Digital data representing the tip resistance, friction resistance, pore water pressure, and probe
inclination angle are recorded about every 2 centimeters while advancing through the ground at a rate between 1½ and 2½ centimeters per second. These measurements are correlated to various soil properties used for geotechnical design. No soil samples are gathered through this subsurface investigation technique.

CPT testing is conducted in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils."

Upon completion, the data collected were downloaded and processed by the Project Engineer.
### BORING LOG NO. B-1

**PROJECT:** Trailside North  
**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
**CLIENT:** Deerfield Land Corporation

**LOCATION**  
See Exhibit A-4

**GRAPHIC LOG**  
See Exhibit A-4

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE: North of Orange Blossom Tr. and Centerview Blvd. Kissimmee, Florida</td>
<td>See Exhibit A-4</td>
</tr>
</tbody>
</table>

**ADVANCEMENT METHOD:** Mud Rotary  
**ABANDONMENT METHOD:** Borings backfilled with soil cuttings upon completion.

**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>PERCENT FINES</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-2-2-3</td>
<td>N=4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-6-7-9</td>
<td>N=13</td>
<td>13</td>
<td>11</td>
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<td>10-14-14-17</td>
<td>N=28</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>13-13-11-11</td>
<td>N=24</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3-3-4-5</td>
<td>N=7</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4-4-6</td>
<td>N=10</td>
<td></td>
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</tr>
<tr>
<td>3-3-5</td>
<td>N=8</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

**WATER LEVEL OBSERVATIONS**

- Groundwater initially encountered at 6.5'

**Notes:**

- Project No.: H1155073  
- Drill Rig: D-50  
- Driller: John F.  
- Exhibit: A-6

**Hammer Type:** Automatic

**Stratification lines are approximate. In-situ, the transition may be gradual.**
### Field Test Results

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>Water Content (%)</th>
<th>Field Test Results</th>
<th>Water Content (%)</th>
<th>Atterberg Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td>4-4-4-7 N=8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>7-10-14-12 N=24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>7-10-9-7 N=19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>2-2-2-2 N=4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>2-4-6-10 N=10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SAND WITH SILT (SP-SM)**: fine grained, grayish-brown to reddish-brown, loose to medium dense

- with roots at 2.5'
- with dominate roots at 7.0'
- trace 1 big piece of root at 10'

**SILTY SAND (SM)**: fine grained, light brown to grayish-brown, medium dense

- Groundwater Initially Encountered at 5.5'
**BORING LOG NO. B-2**

**PROJECT:** Trailside North

**CLIENT:** Deerfield Land Corporation

**SITE:** North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

---

**LOCATION**

See Exhibit A-4

---

**DEPTH**

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Silty Sand (SM),** fine grained, light brown to grayish-brown, medium dense

(continued)

**Sandy Elastic Silt (SP),** fine grained, light gray, medium dense

---

**Clay (CH),** fine grained, gray to dark greenish-gray, soft to medium stiff

---

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

---

**.advancement Method:** Mud Rotary

**Abandonment Method:** Borings backfilled with soil cuttings upon completion.

---

**Notes:**

---

**Project No.:** H1155073

**Driller:** John F.

**Drill Rig:** D-50

**Boring Started:** 5/26/2015

**Boring Completed:** 5/26/2015

**Exhibit:** A-7
### BORING LOG NO. B-2

**PROJECT:** Trailside North  
**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
**CLIENT:** Deerfield Land Corporation  
**LOCATION:** See Exhibit A-4  
**DEPT:** See Exhibit A-4

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>DESCRIPTION</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.5</td>
<td>CLAY (CH), fine grained, gray to dark greenish-gray, soft to medium stiff (continued)</td>
<td>WOH-WOH-WOH N=0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.5</td>
<td>SILTY SAND (SM), fine grained, greenish-gray, very loose</td>
<td>WOH-WOH-WOH N=0</td>
<td>33</td>
<td>NP</td>
<td>10</td>
</tr>
<tr>
<td>63.5</td>
<td>SAND WITH SILT (SP-SM), fine grained, greenish-gray, very loose</td>
<td>1-WOH-WOH N=0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68.5</td>
<td>SILTY SAND (SM), fine grained, greenish-gray, very loose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70.0</td>
<td>WEATHERED LIMESTONE, with shell, fine grained, light gray, medium dense</td>
<td></td>
<td>5-8-9 N=17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Boring Terminated at 70 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

**Hammer Type:** Automatic  
**Advancement Method:** Mud Rotary  
**Abandonment Method:** Borings backfilled with soil cuttings upon completion.

**WATER LEVEL OBSERVATIONS**

- **Groundwater Initially Encountered at 5.5'**
- **Water Level Observations**

- **Boring Started:** 5/26/2015  
- **Boring Completed:** 5/26/2015  
- **Drill Rig:** D-50  
- **Driller:** John F.  
- **Project No.:** H1155073  
- **Exhibit:** A-7
**BORING LOG NO. B-3**

**PROJECT:** Trailside North  
**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
**CLIENT:** Deerfield Land Corporation  

**LOCATION**  
See Exhibit A-4

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DEPTH</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULT</th>
<th>PERCENT FINES</th>
<th>WATER CONTENT</th>
<th>ATTERBERG LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, brown to dark reddish-brown, medium dense</td>
<td>5'</td>
<td>5-8-8-8</td>
<td>N=16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10'</td>
<td>6-7-7-7</td>
<td>N=14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15'</td>
<td>6-7-7-9</td>
<td>N=14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20'</td>
<td>3-4-5-9</td>
<td>N=9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25'</td>
<td>6-8-7-8</td>
<td>N=15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SILTY SAND (SM), fine grained, brown, loose</td>
<td>13.5'</td>
<td>3-4-4</td>
<td>N=8</td>
<td>23</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20'</td>
<td>2-3-3</td>
<td>N=6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, light brown, medium dense</td>
<td>23.5'</td>
<td>4-4-10</td>
<td>N=14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stratification lines are approximate. In-situ, the transition may be gradual.

**Hammer Type:** Automatic

**Notes:**

- **Advance Method:** Mud Rotary
- **Abandonment Method:** Borings backfilled with soil cuttings upon completion.

**WATER LEVEL OBSERVATIONS**

- **Groundwater Initially Encountered at 3.5’**

**Exhibit:** A-8

**Drill Rig:** D-50  
**Driller:** John F.  
**Project No.:** H1155073  
**Boring Started:** 5/22/2015  
**Boring Completed:** 5/22/2015

**1675 Lee Road**  
**Winter Park, Florida**
### BORING LOG NO. B-3

**PROJECT:** Trailside North  
**CLIENT:** Deerfield Land Corporation  
**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
**Kissimmee, Florida**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>See Exhibit A-4</th>
</tr>
</thead>
</table>

#### GRAPHIC LOG

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAND WITH SILT (SP-SM), fine grained, light brown, medium dense (continued)</th>
<th>CLAY (CH), fine grained, gray to greenish-gray, soft to very stiff</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>CLAYEY SAND (SC), with phosphates, fine grained, greenish-gray, medium dense</th>
<th>SILTY SAND (SM), with shell, fine grained, greenish-gray, medium dense</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Boring Terminated at 50 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

**Hammer Type:** Automatic

### WATER LEVEL OBSERVATIONS

- **Groundwater Initially Encountered at 3.5'**

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
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<td>45</td>
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</tr>
<tr>
<td>50</td>
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</tbody>
</table>

**Notes:**

- Advancement Method: Mud Rotary  
- Abandonment Method: Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.  
See Appendix B for description of laboratory procedures and additional data (if any).  
See Appendix C for explanation of symbols and abbreviations.

---

**Driller:** John F.  
**Drill Rig:** D-50  
**Project No.:** H1155073  
**Exhibit:** A-8  
**Boring Started:** 5/22/2015  
**Boring Completed:** 5/22/2015
**BORING LOG NO. B-4**

PROJECT: Trailside North

CLIENT: Deerfield Land Corporation

SITE: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

**LOCATION**
See Exhibit A-4

**GRAPHIC LOG**

**DEPTH**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DEPTH (Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, grayish-brown to dark brown, loose to medium dense</td>
<td>5.5</td>
</tr>
<tr>
<td>with trace clayey sand at 3.0'</td>
<td></td>
</tr>
<tr>
<td>SILTY SAND (SM), fine grained, grayish-brown, medium dense</td>
<td>9.5</td>
</tr>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, dark brown, medium dense</td>
<td>13.5</td>
</tr>
<tr>
<td>SILTY SAND (SM), fine grained, light grayish-brown to brown, loose</td>
<td></td>
</tr>
</tbody>
</table>

**WATER LEVEL OBSERVATIONS**

<table>
<thead>
<tr>
<th>DEPTH (Ft)</th>
<th>WATER LEVEL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
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<td>25</td>
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</table>

**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>DEPTH (Ft)</th>
<th>FIELD TEST SAMPLE TYPE</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
<th>PERCENT FINE</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>1-1-3-6 N=4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>9-8-9-13 N=17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>10-10-9-11 N=19</td>
<td></td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>9-8-11-12 N=19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>8-8-6-7 N=14</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**PERCENT FINES**

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Mud Rotary

Abandonment Method: Borings backfilled with soil cuttings upon completion.

**NOTES:**

- Project No.: H1155073
- Drill Rig: D-50
- Driller: John F.
- Exhibit: A-9

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 4.5'

**Boring Started:** 5/22/2015
**Boring Completed:** 5/22/2015

**SITE:**
North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

**CLIENT:**
Deerfield Land Corporation

**PROJECT:**
Trailside North

**LOCATION:**
See Exhibit A-4

**GRAPHIC LOG**

**DEPTH**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DEPTH (Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, grayish-brown to dark brown, loose to medium dense</td>
<td>5.5</td>
</tr>
<tr>
<td>with trace clayey sand at 3.0'</td>
<td></td>
</tr>
<tr>
<td>SILTY SAND (SM), fine grained, grayish-brown, medium dense</td>
<td>9.5</td>
</tr>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, dark brown, medium dense</td>
<td>13.5</td>
</tr>
<tr>
<td>SILTY SAND (SM), fine grained, light grayish-brown to brown, loose</td>
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</table>

**WATER LEVEL OBSERVATIONS**

<table>
<thead>
<tr>
<th>DEPTH (Ft)</th>
<th>WATER LEVEL OBSERVATIONS</th>
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</thead>
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<tr>
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**FIELD TEST RESULTS**

<table>
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<tr>
<th>DEPTH (Ft)</th>
<th>FIELD TEST SAMPLE TYPE</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
<th>PERCENT FINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1-1-3-6 N=4</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>9-8-9-13 N=17</td>
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</tr>
<tr>
<td>15</td>
<td>10-10-9-11 N=19</td>
<td></td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>9-8-11-12 N=19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>8-8-6-7 N=14</td>
<td></td>
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</tr>
</tbody>
</table>

**PERCENT FINES**

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Mud Rotary

Abandonment Method: Borings backfilled with soil cuttings upon completion.

**NOTES:**

- Project No.: H1155073
- Drill Rig: D-50
- Driller: John F.
- Exhibit: A-9

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 4.5'

**Boring Started:** 5/22/2015
**Boring Completed:** 5/22/2015
**BORING LOG NO. B-4**

**PROJECT:** Trailside North  
**CLIENT:** Deerfield Land Corporation

**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
Kissimmee, Florida

---

**LOCATION**  See Exhibit A-4

<table>
<thead>
<tr>
<th>GRAPHIC LOG</th>
<th>DEPTH</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SILTY SAND (SM), fine grained, light grayish-brown to brown, loose (continued)</strong></td>
<td>28.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SAND (SP), fine grained, gray, dense</strong></td>
<td>33.5</td>
<td></td>
<td>12-15-18</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLAY (CH), fine grained, gray, medium stiff to stiff</strong></td>
<td>43.5</td>
<td></td>
<td>2-3-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLAYEY SAND (SC), with phosphates, fine grained, gray, loose</strong></td>
<td>45.0</td>
<td></td>
<td></td>
<td>2-2-2</td>
<td>56</td>
</tr>
<tr>
<td><strong>SILTY SAND (SM), with shell, fine grained, greenish-gray, medium dense</strong></td>
<td>68.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Boring Terminated at 50 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

**Hammer Type:** Automatic

---

**Notes:**

- **Advancement Method:** Mud Rotary
- **Abandonment Method:** Borings backfilled with soil cuttings upon completion.
- **See Exhibit A-3 for description of field procedures.**
- **See Appendix B for description of laboratory procedures and additional data (if any).**
- **See Appendix C for explanation of symbols and abbreviations.**

---

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 4.5'

---

**Boring Started:** 5/22/2015  
**Boring Completed:** 5/22/2015

**Drill Rig:** D-50  
**Driller:** John F.

**Project No.: H1155073**  
**Exhibit:** A-9
**BORING LOG NO. B-5**

**PROJECT:** Trailside North  
**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
**CLIENT:** Deerfield Land Corporation

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>See Exhibit A-4</th>
</tr>
</thead>
</table>

**DEPTH**  
<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>2-1-2-1 N=3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1-1-1-1 N=2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-2-3-3 N=6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-2-3-3 N=6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-3-6-6 N=9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-5-9-10 N=14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SAND WITH SILT (SP-SM):** fine grained, light grayish-brown to brown, very loose to medium dense  
**Boring Terminated at 10 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

**Hammer Type:** Automatic  
**Stratification lines are approximate. In-situ, the transition may be gradual.**

**Advancement Method:** Mud Rotary  
**Abandonment Method:** Borings backfilled with soil cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
- Groundwater Initially Encountered at 7'

**Notes:**
- Project No.: H1155073  
- Drill Rig: D-50  
- Driller: John F.  
- Boring Started: 5/27/2015  
- Boring Completed: 5/27/2015  
- Exhibit: A-10  
- 1675 Lee Road  
  Winter Park, Florida
Boring Terminated at 10 Feet

SAND WITH SILT (SP-SM), fine grained, light brown to brown, loose to medium dense

Groundwater Initially Encountered at 6.5'

Notes:

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Drill Rig: D-50
Driller: John F.

Boring Started: 5/27/2015
Boring Completed: 5/27/2015

Project No.: H1155073
Exhibit: A-11

LOCATIONS

DEPTH

FIELD TEST RESULTS

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

WATER CONTENT (%)

PERCENT FINES

NOTES:

PROJECT: Trailside North

CLIENT: Deerfield Land Corporation

SITE: North of Orange Blossom Tr. and Centerview Blvd.

Kissimmee, Florida

LOCATION: See Exhibit A-4

GRAPHIC LOG

FIELD TEST RESULTS

WATER LEVEL

OBSERVATIONS

SAMPLE TYPE

WATER CONTENT (%)

PERCENT FINES

Attenuation Limits

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic
## SAND WITH SILT (SP-SM)
Fine grained, light grayish-brown, loose to medium dense

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-2-4-3</td>
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<td>3-2-3-3</td>
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<td>3-4-5-9</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6-8-8-8</td>
<td>N=16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-6-7-7</td>
<td>N=13</td>
<td>18</td>
<td>17</td>
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</table>

Boring Terminated at 10 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

### WATER LEVEL OBSERVATIONS
- Groundwater Initially Encountered at 7'

### Notes:
- Project No.: H1155073
- Drill Rig: D-50
- Driller: John F.
- Boring Started: 5/27/2015
- Boring Completed: 5/27/2015
- Exhibit: A-12
**BORING LOG NO. B-8**

**PROJECT:** Trailside North  
**CLIENT:** Deerfield Land Corporation

**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
Kissimmee, Florida

**LOCATION**  
See Exhibit A-4

**DEPTH**  
GROUND WATER OBSERVATIONS

<table>
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<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5</td>
<td>Groundwater Initially Encountered at 4.5'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SAND WITH SILT (SP-SM),** fine grained, grayish-brown to dark brown, medium dense

Boring Terminated at 10 Feet

**Stratification lines are approximate. In-situ, the transition may be gradual.**

**Hammer Type:** Automatic

**Notes:**

- Advancement Method: Mud Rotary
- Abandonment Method: Borings backfilled with soil cuttings upon completion.

**WATER LEVEL OBSERVATIONS**

- **4-4-6-8**  
  - N=10
- **8-8-9-11**  
  - N=17
- **8-8-9-8**  
  - N=17
- **11-11-11-12**  
  - N=22
- **8-8-9-13**  
  - N=17

- **Exhibit A-3** for description of field procedures.
- **Exhibit A-4** for description of laboratory procedures and additional data (if any).
- **Exhibit A-13** for explanation of symbols and abbreviations.

**Boring Started:** 5/27/2015  
**Boring Completed:** 5/27/2015

**Drill Rig:** D-50  
**Driller:** John F.

**Project No.:** H1155073  
**Exhibit:** A-13

**Terracon**  
1675 Lee Road  
Winter Park, Florida
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>GRAPHIC LOG</th>
<th>DEPTH</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
<td>4-4-4-4</td>
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<td>N=8</td>
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<tr>
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<td></td>
<td>3.5</td>
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<td>4-5-10-16</td>
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<td>N=15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.5</td>
<td></td>
<td>12-12-13-13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.5</td>
<td></td>
<td>4-7-6-4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N=13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.0</td>
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<td>6-10-10-17</td>
<td></td>
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</tr>
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<td></td>
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<td>N=20</td>
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Boring Terminated at 10 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Mud Rotary

Abandonment Method: Borings backfilled with soil cuttings upon completion.

Notes:

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater Initially Encountered at 7'

Drill Rig: D-50
Driller: John F.

Boring Started: 5/27/2015
Boring Completed: 5/27/2015

Project No.: H1155073
Exhibit: A-14
**BORING LOG NO. B-10**

**PROJECT:** Trailside North

**CLIENT:** Deerfield Land Corporation

**SITE:** North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>See Exhibit A-4</th>
</tr>
</thead>
</table>

**DEPHT**

<table>
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<th>WATER LEVEL OBSERVATIONS</th>
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</thead>
<tbody>
<tr>
<td>7.5</td>
<td>2-2-2-2 N=4</td>
</tr>
<tr>
<td>10.0</td>
<td>3-4-4-6 N=8</td>
</tr>
<tr>
<td>12.5</td>
<td>11-13-10-19 N=23</td>
</tr>
<tr>
<td>15.0</td>
<td>12-11-9-7 N=20</td>
</tr>
<tr>
<td>20.0</td>
<td>4-10-16-22 N=26</td>
</tr>
</tbody>
</table>

**SAND WITH SILT (SP-SM), fine grained, light brown, loose to medium dense**

**SILTY SAND (SM), fine grained, dark brown, dense**

**Boring Terminated at 10 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

**Notes:**

- Advancement Method: Mud Rotary
- Abandonment Method: Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 7'

**GEOLOGIC DEPTH TO BOTTOM OF PAGE**

**THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEOLOGIC DEPTH TO BOTTOM OF PAGE.**

**1675 Lee Road Winter Park, Florida**

**TERRACON**

**Boring Started: 5/27/2015**

**Boring Completed: 5/27/2015**

**Drill Rig: D-50**

**Driller: John F.**

**Project No.: H1155073**

**Exhibit: A-15**
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SAND WITH SILT (SP-SM), fine grained, brown, loose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>1-2-5-5 N=7</td>
</tr>
<tr>
<td>5.5</td>
<td>6-5-5-4 N=10</td>
</tr>
<tr>
<td>10.0</td>
<td>9-12-12-10 N=24</td>
</tr>
<tr>
<td>SILTY SAND (SM), fine grained, grayish-brown, loose to medium dense</td>
<td></td>
</tr>
<tr>
<td>5.5</td>
<td>3-1-4-10 N=5</td>
</tr>
<tr>
<td>10.0</td>
<td>6-6-8-8 N=14</td>
</tr>
</tbody>
</table>

**Boring Terminated at 10 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>SAMPLE TYPE</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2-5-5</td>
<td>N=7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-5-5-4</td>
<td>N=10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-12-12-10</td>
<td>N=24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-1-4-10</td>
<td>N=5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-6-8-8</td>
<td>N=14</td>
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<td></td>
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</tbody>
</table>

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 6.5'

**PROJECT**: Trailside North

**SITE**: North of Orange Blossom Tr. and Centerview Blvd.

**CLIENT**: Deerfield Land Corporation

**LOCATION**: See Exhibit A-4

**DEPTH**: 2.5

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 6.5'
### BORING LOG NO. B-12

**PROJECT:** Trailside North  
**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
**CLIENT:** Deerfield Land Corporation

#### WATER LEVEL OBSERVATIONS

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (W)</th>
<th>ATTERBERG LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td><strong>SAND WITH SILT (SP-SM), with trace concrete, fine grained, brown, medium dense</strong></td>
<td>4-6-10-11 N=16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td><strong>CLAYEY SAND (SC), fine grained, grayish-brown, medium dense</strong></td>
<td>8-10-12-13 N=22</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>7.0</td>
<td><strong>SAND WITH SILT (SP-SM), trace silty sand, fine grained, grayish-brown, medium dense</strong></td>
<td>8-8-9-7 N=17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td><strong>SILTY SAND (SM), fine grained, dark brown, loose to medium dense trace organics at 7.0'</strong></td>
<td>6-3-6-5 N=9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hammer Type:** Automatic  
**Stratification lines are approximate. In-situ, the transition may be gradual.**

**Advancement Method:** Mud Rotary  
**Abandonment Method:** Borings backfilled with soil cuttings upon completion.

**GROUNDWATER INITIALY ENCOUNTERED AT 9.5'**

**Notes:**

- See Exhibit A-3 for description of field procedures.
- See Appendix B for description of laboratory procedures and additional data (if any).
- See Appendix C for explanation of symbols and abbreviations.

**Boring Terminated at 10 Feet**

**Boring Started:** 5/27/2015  
**Boring Completed:** 5/27/2015  
**Drill Rig:** D-50  
**Driller:** John F.

**Project No.: H1155073  
Exhibit: A-17**
**BORING LOG NO. B-13**

**PROJECT:** Trailside North  
**CLIENT:** Deerfield Land Corporation

**SITE:** North of Orange Blosson Tr. and Centerview Blvd.  
Kissimmee, Florida

<table>
<thead>
<tr>
<th>GRAPHIC LOG</th>
<th>LOCATION</th>
<th>See Exhibit A-4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULT</th>
<th>WATE R CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**SAND WITH SILT (SP-SM):** fine grained, light brown to dark brown, medium dense to dense, trace rocks at 0'

- trace silty sand at 4'
- trace rocks at 5'

**Boring Terminated at 10 Feet**

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULT</th>
<th>WATE R CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-7-13-15</td>
<td>N=20</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>12-11-12-13</td>
<td>N=23</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10-10-10-9</td>
<td>N=20</td>
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</tr>
<tr>
<td>6-4-5-8</td>
<td>N=9</td>
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<td>10-12-16-16</td>
<td>N=28</td>
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</table>

Stratification lines are approximate. In-situ, the transition may be gradual.

**Notes:**

- Advancement Method: Mud Rotary
- Abandonment Method: Borings backfilled with soil cuttings upon completion.
- hammer Type: Automatic

**PROJECT:** Trailside North

**SITE:** North of Orange Blosson Tr. and Centerview Blvd.  
Kissimmee, Florida

**Notes:**

- Project No.: H1155073
- Drill Rig: D-50
- Driller: John F.
- Boring Started: 5/27/2015
- Boring Completed: 5/27/2015
- Exhibit: A-18
PROJECT: Trailside North

CLIENT: Deerfield Land Corporation

SITE: North of Orange Blosson Tr. and Centerview Blvd.
Kissimmee, Florida

LOCATION See Exhibit A-4

GRAPHIC LOG

DEPTH

SAND WITH SILT (SP-SM), fine grained, grayish-brown, medium dense

trace rocks

10.0

Boring Terminated at 10 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

FIELD TEST RESULTS

PERCENT FINES

WATER CONTENT (%)

ATTERBERG LIMITS

SAMPLE TYPE

WATER LEVEL OBSERVATIONS

DEPTH (Ft.)

5

10

20

25

4-6-9-10
N=15

5-8-9-10
N=17

8-8-8-8
N=16

9-9-10-11
N=19

7-7-9-13
N=16

15

11

Groundwater Initially Encountered at 8'

Notes:

Project No.: H1155073
Driller: John F.

Drill Rig: D-50

Boring Started: 5/27/2015
Boring Completed: 5/27/2015

1875 Lee Road
Winter Park, Florida

Exhibit: A-19
**CPT LOG NO. CPT-1**

**PROJECT:** Trailside North

**CLIENT:** Deerfield Land Corporation

**TEST LOCATION:** See Exhibit A-4

**SITE:** North of Orange Blosson Tr. and Centerview Blvd.

**Latitude:** 28.3426°

**Longitude:** -81.40472°

---

**WATER LEVEL OBSERVATION**

- Probe no. DDG1274 with net area ratio of 0.8
- U2 pore pressure transducer location
- Manufactured by Vertek; calibrated 11/5/2013
- Tip and sleeve areas of 10 cm² and 150 cm²

**Tip Resistance, qₜ**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>8</th>
<th>16</th>
<th>24</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tip Resistance, qₜ (tsf)</td>
<td>0.08</td>
<td>0.16</td>
<td>0.24</td>
<td>0.32</td>
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**Sleeve Friction, fs**

<table>
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<th>1.6</th>
<th>2.4</th>
<th>3.2</th>
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<tbody>
<tr>
<td>Sleeve Friction, fs (tsf)</td>
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<td>4</td>
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</table>

**Friction Ratio (%)**

<table>
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<tr>
<th>Depth (ft)</th>
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<tr>
<td>Friction Ratio (%)</td>
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**Hydrostatic Pressure**

<table>
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<tbody>
<tr>
<td>Pore Pressure, U₂ (tsf)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Material Description**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>12345678</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized CPT Soil Behavior Type</td>
<td>Material Description</td>
</tr>
</tbody>
</table>

- 1: Sensitive, fine grained
- 2: Organic soils - clay
- 3: Silt mixtures - clayey silt to silty clay
- 4: Sand mixtures - silty sand to sandy silt
- 5: Sands - clean sand to sandy sand
- 6: Gravely sand to dense sand
- 7: Very stiff fine grained

**CPT Completed:** 6/8/2015

**CPT Sensor Calibration Reports available upon request.**

---

Dead weight of rig used as reaction force.

See Exhibit A-3 for description of field procedures.

See Appendix C for explanation of symbols and abbreviations.
CPT LOG NO.  CPT-1

PROJECT: Trailside North
CLIENT: Deerfield Land Corporation
TEST LOCATION: See Exhibit A-4

SITE: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

Latitude: 28.3426°
Longitude: -81.40472°

WATER LEVEL OBSERVATION
6.25 ft estimated water depth
(used in normalizations and correlations; see Appendix C)

Depth (ft) Tip Resistance, qₜ (tsf) Sleeve Friction, fₛ (tsf) Friction Ratio (%)
0.08 0.16 0.24 0.32

Hydrostatic Pressure
Pore Pressure, U₂ (tsf)

Normalized CPT
Material Description
Soil Behavior Type

CPT Terminated at 101.9 Feet

Dead weight of rig used as reaction force.
CPT sensor calibration reports available upon request.

See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.  CPT REPORT  H1155073-SOUNDINGS.GPJ  TERRACON2012_W INSITU.GDT  6/12/15
CPT LOG NO. CPT-2

PROJECT: Trailside North
CLIENT: Deerfield Land Corporation
TEST LOCATION: See Exhibit A-4

SITE: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Tip Resistance, $q_t$ (tsf)</th>
<th>Sleeve Friction, $f_s$ (tsf)</th>
<th>Friction Ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>0.08</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>0.16</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>24</td>
<td>0.24</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>32</td>
<td>0.32</td>
<td></td>
</tr>
</tbody>
</table>

Hydrostatic Pressure

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Pore Pressure, $U_2$ (tsf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>15</td>
<td>22</td>
</tr>
</tbody>
</table>

Material Description

<table>
<thead>
<tr>
<th>Normalized CPT Soil Behavior Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sensitive, fine grained</td>
</tr>
<tr>
<td>2 Organic soils - clay</td>
</tr>
<tr>
<td>3 Silt mixtures - clayey silt to silty clay</td>
</tr>
<tr>
<td>4 Sand mixtures - silty sand to sandy silt</td>
</tr>
<tr>
<td>5 Sands - clean sand to sandy sand</td>
</tr>
<tr>
<td>6 Gravely sand to dense sand</td>
</tr>
<tr>
<td>7 Very stiff sand</td>
</tr>
<tr>
<td>8 Very stiff fine-grained</td>
</tr>
</tbody>
</table>

Water Level Observation

Probe no. DDG1274 with net area ratio of 0.8
U2 pore pressure transducer location
Manufactured by Vertek; calibrated 11/5/2013
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in

WATER LEVEL OBSERVATION
6.25 ft estimated water depth
(used in normalizations and correlations; see Appendix C)

CPT Started: 6/8/2015
Rig: 835
Project No.: H1155073
Exhibit: A-21

CPT Completed: 6/8/2015
Operator: Doug Mclellan

Latitude: 28.34263°
Longitude: -81.4045°
CPT LOG NO.  CPT-2

PROJECT: Trailside North
CLIENT: Deerfield Land Corporation
TEST LOCATION: See Exhibit A-4

SITE: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

Exhibit: A-21

CLIENT: Deerfield Land Corporation
PROJECT: Trailside North

CPT LOG NO. CPT-2

CLIENT: Deerfield Land Corporation
PROJECT: Trailside North

SITE: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

WATER LEVEL OBSERVATION

6.25 ft estimated water depth
(used in normalizations and correlations; see Appendix C)

Material Description

1. Sensitive, fine grained
2. Organic soils - clay
3. Clay - silty clay to clay
4. Silt mixtures - clayey silt to silty clay
5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
7. Gravelly sand to dense sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in

CPT Terminated at 102 Feet

Tip Resistance, qₜ
Sleeve Friction, fs
Friction Ratio (%)

Pore Pressure, U₂

Hydrostatic Pressure

CPT Terminated at 102 Feet

See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT Started: 6/8/2015
Operator: Doug Mclellan

CPT Completed: 6/8/2015
Operator: Doug Mclellan

Latitude: 28.34263°
Longitude: -81.4045°
**CPT LOG NO. CPT-3**

**PROJECT:** Trailside North  
**CLIENT:** Deerfield Land Corporation  
**TEST LOCATION:** See Exhibit A-4

**SITE:** North of Orange Blosson Tr. and Centerview Blvd.  
Kissimmee, Florida

### Water Level Observation

- **Estimated Water Depth:** 6.25 ft
- **Probe:** DDG1274
- **Tip resistance:** q_t (tsf)
- **Sleeve friction:** f_s (tsf)
- **Friction ratio:** (%)
- **Pore pressure:** U2 (tsf)
- **Hydrostatic pressure**
- **Material description:**
  - Normalized CPT
  - Soil behavior type

### Details
- **CPT Started:** 6/8/2015
- **CPT Completed:** 6/8/2015
- **Operator:** Doug Mclellan
- **Project No.:** H1155073
- **Rig:** 835
- **Latitude:** 28.34244°
- **Longitude:** -81.40475°

### Notes
- Dead weight of rig used as reaction force.
- CPT sensor calibration reports available upon request.
- See Exhibit A-3 for description of field procedures.
- See Appendix C for explanation of symbols and abbreviations.

---

**TERRACON**

1675 Lee Road  
Winter Park, Florida

CPT Started: 6/8/2015  
CPT Completed: 6/8/2015  
Rig: 835  
Operator: Doug Mcellam  
Project No.: H1155073  
Exhibit: A-22
### CPT LOG NO. CPT-3

**PROJECT:** Trailside North  
**CLIENT:** Deerfield Land Corporation  
**TEST LOCATION:** See Exhibit A-4

**SITE:** North of Orange Blossom Tr. and Centerview Blvd.  
Kissimmee, Florida

---

**Depth (ft)** | **Tip Resistance, qt** (tsf) | **Sleeve Friction, fs** (tsf) | **Friction Ratio (%)** | **Pore Pressure, U2** (tsf) | **Hydrostatic Pressure** | **Material Description** | **Normalized CPT** | **Soil Behavior Type** |
--- | --- | --- | --- | --- | --- | --- | --- | ---
8 | 80 | 160 | 240 | 320 | 0.8 | 1.6 | 2.4 | 3.2 | 2 | 4 | 6 | 4 | 10 | 16 | 22 | 1 2 3 4 5 6 7 8
8.5 | 81.62432 | 80 | 160 | 240 | 320 | 0.8 | 1.6 | 2.4 | 3.2 | 2 | 4 | 6 | 4 | 10 | 16 | 22 | 1 2 3 4 5 6 7 8

---

**CPT Terminated at 103.4 Feet**

---

**WATER LEVEL OBSERVATION**  
6.25 ft estimated water depth  
(used in normalizations and correlations; see Appendix C)  
Probe no. DDG1274 with net area ratio of 0.8  
U2 pore pressure transducer location  
Manufactured by Vertek, calibrated 11/5/2013  
Tip and sleeve areas of 10 cm² and 150 cm²  
Ring friction reducer with O.D. of 1.875 in  

---

**CPT Terminated at 103.4 Feet**

---

**FLYING FISH INC.**  
1675 Lee Road  
Winter Park, Florida

---

**CPT Started:** 6/8/2015  
**CPT Completed:** 6/8/2015  
**Operator:** Doug Mcellman  
**Rig:** 835  
**Project No.:** H1155073  
**Exhibit:** A-22

---

**See Exhibit A-3 for description of field procedures.**  
**See Appendix C for explanation of symbols and abbreviations.**
CPT LOG NO. CPT-4

PROJECT: Trailside North
CLIENT: Deerfield Land Corporation
TEST LOCATION: See Exhibit A-4

SITE: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

Latitude: 28.3426°
Longitude: -81.4047°

WATER LEVEL OBSERVATION
Probe no. DDG1274 with net area ratio of 0.8
U2 pore pressure transducer location
Manufactured by Vertek; calibrated 11/5/2013
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in

CPT sensor calibration reports available upon request.

Materials

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Tip Resistance, q, (tsf)</th>
<th>Sleeve Friction, fs (tsf)</th>
<th>Friction Ratio (%)</th>
<th>Pore Pressure, U2 (tsf)</th>
<th>Hydrostatic Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.08</td>
<td>0.16</td>
<td>0.24</td>
<td>0.32</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Material Description

1. Sensitive, fine grained
2. Organic soils - clay
3. Clay - silty clay to clay
4. Silt mixtures - clayey silt to silty clay
5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
7. Gravely sand to dense sand
8. Very stiff fine grained

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT.  CPT REPORT H1155073-SOUNDINGS.GPJ TERRACON2012_W INSITU.GDT 6/12/15

CPT Started: 6/8/2015
Operator: Doug McElhan
Project No.: H1155073
Exhibit: A-23
SITE: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

PROJECT: Trailside North

CLIENT: Deerfield Land Corporation

TEST LOCATION: See Exhibit A-4

Latitude: 28.3426°
Longitude: -81.4047°

Site: North of Orange Blossom Tr. and Centerview Blvd.
Kissimmee, Florida

Depth (ft)

<table>
<thead>
<tr>
<th>Tip Resistance, ( q_t ) (tsf)</th>
<th>Sleeve Friction, ( f_s ) (tsf)</th>
<th>Friction Ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.08</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>0.16</td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td>0.24</td>
<td>6</td>
</tr>
<tr>
<td>32</td>
<td>0.32</td>
<td>8</td>
</tr>
</tbody>
</table>

Hydrostatic Pressure

Pore Pressure, \( U_2 \) (tsf)

Material Description

Normalized CPT

Soil Behavior Type

1  Sensitive, fine grained
2  Organic soils - clay
3  Clay - silty clay to clay
4  Silt mixtures - clayey silt to silty clay
5  Sand mixtures - silty sand to sandy silt
6  Sands - clean sand to sandy sand
7  Gravelly sand to dense sand
8  Very stiff fine grained

WATER LEVEL OBSERVATION

6.25 ft estimated water depth (used in normalizations and correlations; see Appendix C)

Probe no. DDG1274 with net area ratio of 0.8
U2 pore pressure transducer location
Manufactured by Vertek; calibrated 11/5/2013
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in

CPT Started: 6/8/2015
CPT Completed: 6/8/2015
Rig: 835
Operator: Doug Mclellan
Project No.: H1155073
Exhibit: A-3

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT H1155073_SOUNDINGS.GPJ TERRACON IN SITU.GDT 6/12/15

CPT Terminated at 106.3 Feet

Dead weight of rig used as reaction force.
CPT sensor calibration reports available upon request.

See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

8162432
APPENDIX B – LABORATORY TESTING
Laboratory Testing

During the field exploration, a portion of each recovered sample was sealed in a glass jar and transported to our laboratory for further visual observation and laboratory testing. Selected samples retrieved from the borings were tested for moisture (water) content, fines content (soil passing a US standard #200 sieve), and Atterberg’s Limits. Those results are included in this report and on the respective boring logs. The visual-manual classifications were modified as appropriate based upon the laboratory testing results.

The soil samples were classified in general accordance with the appended General Notes and the Unified Soil Classification System based on the material's texture and plasticity. The estimated group symbol for the Unified Soil Classification System is shown on the boring logs and a brief description of the Unified Soil Classification System is included in Appendix B. The results of our laboratory testing are presented in the Laboratory Test Results section of this report and on the corresponding borings logs.
### General Notes

#### Description of Symbols and Abbreviations

<table>
<thead>
<tr>
<th>Sampling</th>
<th>Water Level</th>
<th>Field Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auger Cuttings</td>
<td>Water Initially Encountered</td>
<td>(HP) Hand Penetrometer</td>
</tr>
<tr>
<td>Grab Sample</td>
<td>Water Level After a Specified Period of Time</td>
<td>(T) Torvane</td>
</tr>
<tr>
<td>Shelby Tube</td>
<td>Water Level After a Specified Period of Time</td>
<td>(DCP) Dynamic Cone Penetrometer</td>
</tr>
<tr>
<td>Rock Core</td>
<td></td>
<td>(PID) Photo-Ionization Detector</td>
</tr>
<tr>
<td>No Recovery</td>
<td></td>
<td>(OVA) Organic Vapor Analyzer</td>
</tr>
<tr>
<td>Standard Penetration Test</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Descriptive Soil Classification

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

#### Location and Elevation Notes

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

<table>
<thead>
<tr>
<th>Relative Density of Coarse-Grained Soils</th>
<th>Consistency of Fine-Grained Soils</th>
</tr>
</thead>
<tbody>
<tr>
<td>(More than 50% retained on No. 200 sieve.)</td>
<td>(50% or more passing the No. 200 sieve.)</td>
</tr>
<tr>
<td>Density determined by Standard Penetration Resistance</td>
<td>Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strength Terms</th>
<th>Descriptive Term (Density)</th>
<th>Descriptive Term (Consistency)</th>
<th>Unconfined Compressive Strength Qu (psf)</th>
<th>Automatic Hammer SPT N-Value (Blows/Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>&lt; 3</td>
<td>Very Soft</td>
<td>less than 500</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Loose</td>
<td>3 - 8</td>
<td>Soft</td>
<td>500 to 1,000</td>
<td>1 - 3</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>8 - 24</td>
<td>Medium Stiff</td>
<td>1,000 to 2,000</td>
<td>3 - 6</td>
</tr>
<tr>
<td>Dense</td>
<td>24 - 40</td>
<td>Stiff</td>
<td>2,000 to 4,000</td>
<td>6 - 12</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 40</td>
<td>Very Stiff</td>
<td>4,000 to 8,000</td>
<td>12 - 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hard</td>
<td>&gt; 8,000</td>
<td>&gt; 24</td>
</tr>
</tbody>
</table>

#### Relative Proportions of Sand and Gravel

<table>
<thead>
<tr>
<th>Descriptive Term(s) of other constituents</th>
<th>Percent of Dry Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace</td>
<td>&lt; 15</td>
</tr>
<tr>
<td>With Modifier</td>
<td>15 - 29</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>

#### Relative Proportions of Fines

<table>
<thead>
<tr>
<th>Descriptive Term(s) of other constituents</th>
<th>Percent of Dry Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>With Modifier</td>
<td>5 - 12</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 12</td>
</tr>
</tbody>
</table>

#### Grain Size Terminology

<table>
<thead>
<tr>
<th>Particle Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
</tr>
<tr>
<td>Cobble</td>
</tr>
<tr>
<td>Gravel</td>
</tr>
<tr>
<td>Sand</td>
</tr>
<tr>
<td>Silt or Clay</td>
</tr>
</tbody>
</table>

#### Plasticity Description

<table>
<thead>
<tr>
<th>Plasticity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-plastic</td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>High</td>
</tr>
</tbody>
</table>
### Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests

**Coarse Grained Soils:**
More than 50% retained on No. 200 sieve

<table>
<thead>
<tr>
<th>Gravels:</th>
<th>More than 50% of coarse fraction retained on No. 4 sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clean Gravels:</strong></td>
<td>Less than 5% fines (^c)</td>
</tr>
<tr>
<td></td>
<td>Cu (\geq 4) and (1 \leq Cc \leq 3) (^e)</td>
</tr>
<tr>
<td></td>
<td>Cu (\geq 4) or/and (1 \leq Cc &lt; 3) (^b)</td>
</tr>
</tbody>
</table>

**Gravels with Fines:**
More than 12% fines \(^c\)

| Fines classify as ML or MH |
| GM Silty gravel \(^f,g,h\) |
| Fines classify as CL or CH |
| GC Clayey gravel \(^f,g,h\) |

**Sands:**
50% or more of coarse fraction passes No. 4 sieve

| Clean Sands: | Less than 5% fines \(^d\) |
| Cu \(\geq 6\) and \(1 \leq Cc \leq 3\) \(^e\) |
| Cu \(< 6\) or/and \(1 \leq Cc < 3\) \(^b\) |

**Sands with Fines:**
More than 12% fines \(^d\)

| Fines classify as ML or MH |
| SM Silty sand \(^j,k,l,m\) |
| Fines classify as CL or CH |
| SC Clayey sand \(^j,k,l,m\) |

**Fine-Grained Soils:**
50% or more passes the No. 200 sieve

<table>
<thead>
<tr>
<th>Silts and Clays:</th>
<th>Liquid limit less than 50</th>
</tr>
</thead>
</table>

| Inorganic: | PI \(> 7\) and plots on or above “A” line \(^f\) |
| | CL Lean clay \(^k,l,m\) |
| | PI \(< 4\) or plots below “A” line \(^g\) |
| | ML Silt \(^k,l,m\) |

| Organic: | Liquid limit - oven dried |
| | < 0.75 |
| | OL Organic clay \(^k,l,m,n\) |
| | Liquid limit - not dried |
| | Organic silt \(^k,l,m,o\) |

<table>
<thead>
<tr>
<th>Silts and Clays:</th>
<th>Liquid limit 50 or more</th>
</tr>
</thead>
</table>

| Inorganic: | PI plots on or above “A” line |
| | CH Fat clay \(^k,l,m\) |
| | PI plots below “A” line |
| | MH Elastic Silt \(^k,l,m\) |

| Organic: | Liquid limit - oven dried |
| | < 0.75 |
| | OH Organic clay \(^k,l,m,p\) |
| | Liquid limit - not dried |
| | Organic silt \(^k,l,m,q\) |

**Highly organic soils:**
Primarily organic matter, dark in color, and organic odor

| PT Peat |

---

\(^a\) Based on the material passing the 3-inch (75-mm) sieve

\(^b\) If field sample contained cobbles or boulders, or both, add “with cobbles or boulders, or both” to group name.

\(^c\) Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

\(^d\) Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

\(^e\) Cu = \(\frac{D_{66}}{D_{10}}\) Cc = \(\frac{(D_{66})^2}{D_{10} \times D_{66}}\)

\(^f\) If soil contains \(\geq 15\%\) sand, add “with sand” to group name.

\(^g\) If fines classify as CL-ML, use dual symbol GC-GM, or SC-SC.

\(^h\) If fines are organic, add “with organic fines” to group name.

\(^i\) If soil contains \(\geq 15\%\) gravel, add “with gravel” to group name.

\(^j\) If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

\(^k\) If soil contains 15 to 29% plus No. 200, add “with sand” or “with gravel,” whichever is predominant.

\(^l\) If soil contains \(\geq 30\%\) plus No. 200 predominantly sand, add “sandy” to group name.

\(^m\) If soil contains \(\geq 30\%\) plus No. 200 predominantly gravel, add “gravelly” to group name.

\(^n\) PI \(\geq 4\) and plots on or above “A” line.

\(^o\) PI \(< 4\) or plots below “A” line.

\(^p\) PI plots on or above “A” line.

\(^q\) PI plots below “A” line.

---

For classification of fine-grained soils and fine-grained fraction of coarse-grained soils:

- **Equation of “A” line**
  - Horizontal at PI = LL = 25.5.
  - Then PI = 0.73 (LL-20)

- **Equation of “U” line**
  - Vertical at LL = 16 to PI = 7.
  - Then PI = 0.9 (LL-8)
**DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS**

To be reported per ASTM D5778:
- Uncorrected Tip Resistance, \( q_u \)
- Measured force acting on the cone divided by the cone's projected area
- Corrected Tip Resistance, \( q_c \)
- Cone resistance corrected for porewater and net area ratio effects

\( q_c = q_u + U2(1 - a) \)

Where \( a \) is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

- Pore Pressure, \( U_1/U_2 \)
- Pore pressure generated during penetration
  - \( U_1 \) - sensor on the face of the cone
  - \( U_2 \) - sensor on the shoulder (more common)

- Sleeve Friction, \( f_s \)
- Frictional force acting on the sleeve divided by its surface area

- Normalized Friction Ratio, FR
- The ratio as a percentage of \( f_s \) to \( q_c \), accounting for overburden pressure
  - \( FR = q_s / f_s \)

To be reported per ASTM D7400, if collected:
- Shear Wave Velocity, \( V_s \)
- Measured in a Seismic CPT and provides a direct measure of soil stiffness
- Effective Friction Angle, \( \phi' \)
  - \( \phi' = \tan^{-1}(0.373 \log(q_c/q_s)) + 0.29 \)
- Sensitivity, St
  - \( St = (q_c - q_s) N_u \)

Descriptive of Geotechnical Correlations

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized Tip Resistance, ( q_n )</td>
<td>( q_n = q_c (\phi' q_s/q_c) )</td>
</tr>
<tr>
<td>Over Consolidation Ratio, OCR</td>
<td>( OCR = (q_c - \phi') q_s / \phi' q_c )</td>
</tr>
<tr>
<td>Undrained Shear Strength, ( Su )</td>
<td>( Su = q_c x \phi' / q_s )</td>
</tr>
<tr>
<td>Normalized Friction Ratio, FR</td>
<td>( FR = q_s / q_c )</td>
</tr>
<tr>
<td>Corrected Tip Resistance, ( q_c )</td>
<td>( q_c = q_u + U2(1 - a) )</td>
</tr>
<tr>
<td>Constrained Modulus, ( M )</td>
<td>( M = 0.015 \times 10^{1.998(q_s/q_c)} )</td>
</tr>
<tr>
<td>Relative Density, Dr</td>
<td>( Dr = (q_s / q_c) \times 10^{1.998(q_s/q_c)} )</td>
</tr>
<tr>
<td>Elastic Modulus, ( E_s )</td>
<td>( E_s(1) = 2.67 q_s )</td>
</tr>
</tbody>
</table>

**REPORTED PARAMETERS**

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable).

This minimum data include tip resistance, sleeve resistance, and porewater pressure. Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters.

The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

**RELATIVE RELIABILITY OF CPT CORRELATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Low Reliability</th>
<th>High Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permeability, ( k )</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
<tr>
<td>Constrained Modulus, ( M )</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
<tr>
<td>Unit Weight, UW</td>
<td>Sand</td>
<td>Clay and Silt</td>
</tr>
<tr>
<td>Effective Friction Angle, ( \phi' )</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
<tr>
<td>Sensitivity, St</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
<tr>
<td>Undrained Shear Strength, ( Su )</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
<tr>
<td>Relative Density, Dr</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
<tr>
<td>Over Consolidation Ratio, OCR</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
<tr>
<td>Small Strain Modulus, ( G_0 ) and Elastic Modulus, ( E_s )</td>
<td>Clay and Silt</td>
<td>Sand</td>
</tr>
</tbody>
</table>

**WATER LEVEL**

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be measured or estimated.

Measured - Depth to water directly measured in the field

Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater level will be further defined prior to construction as groundwater level variations will occur over time.

**CONE PENETRATION SOIL BEHAVIOR TYPE**

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (\( q_c \)), friction resistance (\( f_s \)), and porewater pressure (U2). The normalized friction ratio (FR) is used to classify the soil behavior type.

Typically, silts and clays have high FR values and generate large excess penetration porewater pressures; sands have lower FRs and do not generate excess penetration porewater pressures. Negative pore pressure measurements are indicative of fissured fine-grained material. The adjacent graph presents the soil behavior type classification used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.

**REFERENCES**


Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institute of Technology, Atlanta, GA.
