Preliminary Geotechnical Engineering Report

TOD Stormwater Site
Orange Avenue and Mary Louis Lane
Kissimmee, Florida

July 2, 2015
Terracon Project No. H1155082

Prepared for:
Deerfield Land Corporation
Orlando, Florida

Prepared by:
Terracon Consultants, Inc.
Winter Park, Florida
July 2, 2015

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

Attn: Mr. Thomas Roehlk
P: [407] 826 4514
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Re: Preliminary Geotechnical Engineering Report
TOD Stormwater Site
Orange Avenue and Mary Louis Lane
Kissimmee, Osceola County, Florida
Terracon Project Number: H1155082

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 PH1150362 dated May 22, 2015.

This report presents the findings of the subsurface exploration and provides preliminary geotechnical recommendations concerning earthwork and feasible foundations, stormwater management parameters, 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

Enclosures
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXECUTIVE SUMMARY</strong></td>
<td>i</td>
</tr>
<tr>
<td><strong>1.0 INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>2.0 PROJECT INFORMATION</strong></td>
<td>1</td>
</tr>
<tr>
<td>2.1 Project Description</td>
<td>1</td>
</tr>
<tr>
<td>2.2 Site Location and Description</td>
<td>2</td>
</tr>
<tr>
<td><strong>3.0 SUBSURFACE CONDITIONS</strong></td>
<td>2</td>
</tr>
<tr>
<td>3.1 Geology</td>
<td>2</td>
</tr>
<tr>
<td>3.1.1 Regional Geology</td>
<td>2</td>
</tr>
<tr>
<td>3.1.2 General Potential for Sinkhole Development</td>
<td>3</td>
</tr>
<tr>
<td>3.2 Soil Survey</td>
<td>4</td>
</tr>
<tr>
<td>3.3 Typical Profile</td>
<td>4</td>
</tr>
<tr>
<td>3.4 Muck Probing</td>
<td>5</td>
</tr>
<tr>
<td>3.5 Groundwater</td>
<td>5</td>
</tr>
<tr>
<td><strong>4.0 PRELIMINARY RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION</strong></td>
<td>6</td>
</tr>
<tr>
<td>4.1 Site Preparation</td>
<td>6</td>
</tr>
<tr>
<td>4.2 Fill Placement</td>
<td>7</td>
</tr>
<tr>
<td>4.3 Roadway and Pavements</td>
<td>8</td>
</tr>
<tr>
<td>4.4 Preliminary Stormwater Management Parameters</td>
<td>9</td>
</tr>
<tr>
<td><strong>5.0 GENERAL COMMENTS</strong></td>
<td>10</td>
</tr>
</tbody>
</table>

**APPENDIX A – FIELD EXPLORATION**

- Exhibit A-1 Topographic Vicinity Map
- Exhibit A-2 U.S.D.A. Soils Map
- Exhibit A-3 Soil Survey Descriptions
- Exhibit A-4 Boring Location Plan
- Exhibit A-5 to A-7 Muck Probe Results
- Exhibit A-8 to A-55 Boring Logs
- Exhibit A-56 Field Exploration Description
- Exhibit A-57 Basin and Pond Location

**APPENDIX B – SUPPORTING INFORMATION**

- Exhibit B-1 Laboratory Testing

**APPENDIX C – SUPPORTING DOCUMENTS**

- Exhibit C-1 General Notes
- Exhibit C-2 Unified Soil Classification System
EXECUTIVE SUMMARY

A preliminary geotechnical exploration has been performed for the proposed development planned to be constructed at south of the intersection of Orange Avenue and Mary Louis Lane in Kissimmee, Osceola County, Florida. Forty-eight (48) borings, designated B-1 through B-44 and HA-1 through HA-4, have been performed to depths of between 2 and 25 feet below the existing ground surface in the proposed pond areas and overall site. Twelve (12) piezometers were installed to better understand the groundwater conditions. In addition, muck probing was performed within the wetland areas to delineate muck thickness and extent.

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 development consisted of five basins: Basin 401 (Pond 401), 704 (Pond 704), 901 (Pond 901), 904 (Pond 904), and WET-1. A location plan shows the locations of the basins and the ponds is included in Exhibit A-57 in Appendix A.

- The shallow in-place sands appear suitable for re-use as general engineered fill. Due to the shallow groundwater table elevation, the site is expected to be filled in the order of 5 feet.

- The subsoil conditions is considered suitable to adequately support the anticipated buildings on typical shallow foundations in the form of spread and continuous footings supported on site soil or structural fill. Bearing pressures in the order of 3000 to 4000 psf are feasible with minimum footing width of 36 inches and minimum embedment depth of 3 feet assuming the 24 inches below the foundation level are compacted to 98% of modified Proctor Density.

- A detailed table that shows the estimated seasonal high and average normal wet water levels at each boring location is included in Exhibit B-2 in Appendix B.

- The provided plan information indicated five (5) on-site stormwater management systems within the proposed development. Recommendations for preliminary stormwater design parameters are presented later in this report.

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 development planned to be constructed at south of the intersection of Orange Avenue and Mary Louis Lane in Kissimmee, Osceola County, Florida as shown on the Topographic Vicinity Map included as Exhibit A-1 in Appendix A. Forty-eight (48) borings, designated B-1 through B-44 and HA-1 through HA-4, have been performed to depths of between 2 and 25 feet below the existing ground surface in the proposed pond areas and overall site. Twelve (12) piezometers were installed to better understand the groundwater conditions. In addition, muck probing was performed within the wetland areas to delineate muck thickness. 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
- groundwater conditions
- anticipated foundation types
- preliminary stormwater management parameters
- 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 development includes approximately 120 acres land. The sites will have a mix of retail, office, and residential developments. Developments near the Sunrail station will be 6 to 8 story buildings.</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>unknown</td>
</tr>
<tr>
<td><strong>Grading</strong></td>
<td>Moderate fill – estimated more than 2 feet</td>
</tr>
</tbody>
</table>
### Assumed Design traffic

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Duty Pavement</td>
<td>Assumed loads of 30,000 equivalent 18-kip single axle loads (E₁₈SALs)</td>
</tr>
<tr>
<td>Limited Heavy Duty</td>
<td>Assumed loads of 50,000 E₁₈SALs</td>
</tr>
<tr>
<td>Pavement Design Life</td>
<td>20 years</td>
</tr>
</tbody>
</table>

### Stormwater Management

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five (5) ponds have been identified on the site plan with areas ranging from 3.4 to 5.2 acres. We anticipate the ponds to be wet detention pond.</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 south of the intersection of Orange Avenue and Mary Louis Lane in Kissimmee, Florida.</td>
</tr>
<tr>
<td>Existing improvements</td>
<td>The site is mainly covered with grass, trees, and wetlands.</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>
</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.

During our limited shallow evaluation, we did not encounter traditional signs associated with potential sinkhole development including loss of drilling fluids, obvious raveled zones, surface depressions, etc. However, this evaluation was not planned to specifically address sinkhole potential. The risk of sinkhole occurrence at most sites is small even in areas known to have a higher than average risk of sinkhole occurrence.
If the sinkhole potential of the site is to be evaluated, additional site-specific data must be obtained. This might include using geophysical methods such as Electrical Resistivity tests and additional geotechnical tests such as Cone Penetrometer Test (CPT) soundings, dilatometer (DMT) soundings, and/or more/deeper Standard Penetration Test borings. Interpretation of the test data should be done by a professional geologist/engineer familiar with the use of these tests under local conditions. However, it should be noted that even if indicators of sinkhole activity are found, it is impossible to predict if, when or precisely where a sinkhole may occur. If requested, Terracon can assist in assessing the sinkhole potential of the location of the proposed construction.

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:

- Basinger Fine Sand (5)
- Basinger Fine Sand, depressional (6)
- Delray Loamy Fine Sand (10)
- Myakka Fine Sand (22)
- Placid Fine Sand (32)
- Samsula Muck (40)
- Smyrna Fine Sand (42)

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.

3.3 Typical Profile

Based on the results of the 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>10 (termination depth) to 23.5</td>
<td>Fine sand (SP) to fine sand with silt (SP-SM) to silty fine sand (SM) to clayey sand (SC)</td>
<td>Very loose to medium dense</td>
</tr>
</tbody>
</table>
Stratum | Approximate Depth to Bottom of Stratum (feet) | Material Description | Consistency/Density
--- | --- | --- | ---
2 | 25 (boring termination depth) | Clayey sand (SC) to sandy clay to clay (CH) | Loose to medium dense / medium stiff to very stiff

Please noted that due to the wet ground condition within the wetland areas and the limitation for wetland clearing, few borings were performed shallower that proposed boring depth. 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-56 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 Muck Probing

As shown on Exhibit A-4, Soil Boring Location Plan, a small wetland is located at northeastern corner of Basin 704 and another wetland is located at southern portion. The eastern portion of Basin 901 is also a wetland area. In addition, Basin WET-1 is also a wetland. Muck probing was performed at these wetland areas to delineate muck thickness and extent. The table below summarizes our findings. Exhibits A-5, A-6, and A-7 present the water depth and the muck thickness at the approximate probed locations “at time of probing”.

<table>
<thead>
<tr>
<th>Wetland</th>
<th>Depth of Standing Water</th>
<th>Thickness of Organic Soil/Muck (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At northeastern corner of Basin 704</td>
<td>0 feet</td>
<td>0 feet</td>
</tr>
<tr>
<td>At southern portion of Basin 704</td>
<td>0 feet</td>
<td>0 to 1.5 feet</td>
</tr>
<tr>
<td>At eastern portion of Basin 901</td>
<td>0 to 2 feet</td>
<td>0 to 3 feet</td>
</tr>
<tr>
<td>WET-1</td>
<td>0 to 3.5 feet</td>
<td>0.5 to 2 feet</td>
</tr>
</tbody>
</table>

### 3.5 Groundwater

The boreholes were observed during drilling for the presence and level of groundwater. Groundwater was observed in almost all of the borings, varying from depths of 2.5 feet standing water to 6.5 feet below existing grade. Twelve (12) piezometers were installed to better define groundwater conditions at the site. A Boring Location Diagram (Exhibit A-4) is included in
Appendix A of this report and a table for encountered water table elevation, piezometer water readings, estimated normal wet elevation, and the estimated seasonal high water table elevation is presented as Exhibit B-2 in Appendix B.

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.

The 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 our 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 on typical shallow foundations in the form of spread and continuous footings supported on site soil or structural fill. Bearing pressures in the order of 3000 to 4000 psf are feasible with minimum footing width of 36 inches and minimum embedment depth of 3 feet assuming the 24 inches below the foundation level are compacted to 98% of modified Proctor Density.

4.1 Site Preparation

The engineered fill should be placed as outlined in Section 4.2, Fill Placement, of this report. 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 seasonal high water table was estimated at elevation +83 feet to +84.5 feet. A minimum separation of 2 feet between pavement section and the seasonal high water table is required; hence, the site will need to be filled to raise grades. Assuming the site will be filled to proper grades; both conventional flexible and rigid pavement sections may be utilized.

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 Course</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</td>
<td>PCC</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>6.0</td>
<td>18.0</td>
</tr>
</tbody>
</table>
### Typical Pavement Section (inches)

<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 Course(^{1,2,3})</th>
<th>Portland Cement Concrete</th>
<th>Free Draining Subgrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Driveways, Areas Accessed by Truck Traffic</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.

### 4.4 Preliminary Stormwater Management Parameters

Based on the soil type from USDA soil maps, our site exploration and laboratory results, table below presents the expected values for the stormwater design parameters for each pond:

<table>
<thead>
<tr>
<th>Stormwater Parameter</th>
<th>Pond 401 in Basin 401</th>
<th>Pond 704 in Basin 704</th>
<th>Pond 901 in Basin 901</th>
<th>Pond 904 in Basin 904</th>
<th>Pond in Basin WET-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Depth to Confining Layer</td>
<td>5 feet</td>
<td>3 feet</td>
<td>3 feet</td>
<td>13 feet</td>
<td>1 feet</td>
</tr>
<tr>
<td>Estimated Normal Wet Water Table Elevation</td>
<td>+83.5 feet</td>
<td>+83 feet</td>
<td>+83.5 feet</td>
<td>+82 feet</td>
<td>+83 feet</td>
</tr>
<tr>
<td>Estimated Seasonal High Water Table Elevation</td>
<td>+84.5 feet</td>
<td>+83.5 feet</td>
<td>+84 feet</td>
<td>+82.5 feet</td>
<td>+83.5 feet</td>
</tr>
<tr>
<td>Unsaturated Vertical Infiltration Rate</td>
<td>2 feet/day @ 3 feet</td>
<td>2 feet/day @ 9 feet</td>
<td>7 to 13 feet/day @ 6 to 8 feet</td>
<td>2 to 25 feet/day @ 3 to 5 feet</td>
<td>6 to 15 feet/day @ 3.5 to 10 feet</td>
</tr>
<tr>
<td>Horizontal Saturated Hydraulic Conductivity</td>
<td>4 feet/day @ 3 feet</td>
<td>4 feet/day @ 9 feet</td>
<td>15 to 25 feet/day @ 6 to 8 feet</td>
<td>4 to 40 feet/day @ 3 to 5 feet</td>
<td>12 to 30 feet/day @ 3.5 to 10 feet</td>
</tr>
<tr>
<td>Fillable Porosity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
</tr>
</tbody>
</table>
5.0 GENERAL COMMENTS

The preliminary 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.

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.
APPENDIX A
FIELD EXPLORATION
SCALE 1" = 2000'

U.S.D.A. SOIL SURVEY FOR OSCEOLA COUNTY, FLORIDA
ISSUED: 1979

SECTION: 2, 3
TOWNSHIP: 25 SOUTH
RANGE: 29 EAST

U.S.D.A. SOILS MAP
GEOTECHNICAL ENGINEERING EVALUATION
TOD STORMWATER SITE
ORANGE AVENUE AND MARY LOUIS LANE
KISSIMMEE, OSCEOLA COUNTY, FLORIDA

EXHIBIT A-2
Soil Survey Descriptions

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.

6 – *Basinger fine sand, depressional*. This soil type is nearly level and poorly drained. It is typically found in shallow depressions and poorly defined drainageways in the flatwoods. In its natural state, water stands on the surface of this soil type for 6 to 12 months during most years. This soil type is predominantly sandy throughout the defined profile of 80 inches (6.7 feet).

10 – *Delray loamy fine sand*. This soil type is nearly level and very poorly drained. It is typically found in depressions at the edges of large lakes that have fluctuating water levels. In its natural state, groundwater is ponded atop this soil type for 2 to 6 months of years with normal rainfall, and within 10 inches (0.8 feet) of the surface for 6 to 9 months. This soil type is predominantly sandy to a typical depth of 44 inches (3.7 feet). Thereafter, it is composed of silty sand to clayey sand (USCS Classification symbol SM to SC).

22 – *Myakka fine sand*. This soil type is nearly level and poorly drained. It is typically found in broad areas 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 more than 40 inches (3.3 feet) during the dry season. Myakka fine sand is generally predominantly sandy throughout the defined depth of 82 inches (6.8 feet). Between typical depths of 7 and 27 inches (0.5 and 2.2 feet), Myakka soil exhibits mottling. Between typical depths of 27 and 37 inches (2.3 and 3.1 feet), Myakka soil is weakly cemented with organic matter; typical organic contents of this layer are on the order of 3.5 percent.

32 – *Placid fine sand*. This soil type is nearly level and very poorly drained. It is typically found in low, wet depressions and swamps in the flatwoods. In its natural state, groundwater is ponded atop this soil type for 6 to 9 months of years with normal rainfall. This soil type is sometimes associated with a surficial organic surface layer, extending to a depth of 24 inches (2.0 feet), with typical organic contents approaching 7 percent.

40 – *Samsula muck*. This soil type is nearly level and very poorly drained. It is typically found in freshwater marshes and swamps. In its natural state, groundwater is at or above the surface of this soil type except during extended dry periods. This soil type exists as muck to a typical depth of 22 inches (1.8 feet); typical organic contents of this muck layer range from approximately 32 to 47 percent. Thereafter, to the maximum defined depth of 80 inches (6.7 feet), this soil type is sand to silty sand (USCS classification SP to SM).

42 – *Smyrna fine sand*. This soil type is nearly level and poorly drained. It is typically found in broad flat areas in the flatwoods. In its natural state and during years of normal precipitation,
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 40 inches (0.8 and 3.3 feet). At a typical depth of 14 inches (1.2 feet), this soil type has a weakly cemented, black to dark reddish brown layer of sand with silt to silty sand (USCS Classification symbol SP-SM to SM). This soil type has a similar, though typically uncemented layer at a depth of 56 inches. In between is relatively clean, less silty sand.
**BORING LOG NO. B-1**

**PROJECT:** TOD Stormwater Site

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

**CLIENT:** Deerfield Land Corporation

---

**LOCATION**  
See Exhibit A-4

**GRAPHIC LOG**

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>WATER LEVEL OBSERVATIONS</th>
</tr>
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**SAND (SP):** fine grained, light gray to brown, loose to medium dense

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<tr>
<th>DEPTH (Ft.)</th>
<th>WATER CONTENT (%)</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>ATTERBERG LIMITS</th>
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<tbody>
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<td>15</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.

**WATER LEVEL OBSERVATIONS**

**Groundwater Initially Encountered at 3'**

---

**Notes:**

- Project No.: H1155082  
  Exhibit: A-8  
  Boring Started: 6/1/2015  
  Boring Completed: 6/1/2015  
  Drill Rig: D-50  
  Driller: R.F.
### BORING LOG NO. B-2

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

#### LOCATION
See Exhibit A-4

#### GRAPHIC LOG

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<th>DESCRIPTION</th>
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<td>9.0</td>
<td>SILTY SAND (SM), fine grained, light brown, loose to medium dense</td>
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<td>SAND (SP), fine grained, brown, medium dense</td>
<td>4-5-5-6 N=10</td>
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*Boring Terminated at 10 Feet*

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<th>DEPTH (Ft)</th>
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<th>VERTICAL PERMEABILITY (feet/day)</th>
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**Notes:**

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

---

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**PROJECT ACCOMPLISHMENT:** Boring Terminated at 10 Feet

---

**Boring Terminated at 10 Feet**

---

**FIELD TEST RESULTS**

- **PERCENT FINES**
- **WATER CONTENT (%)**
- **ATTERBERG LIMITS**

---

**WATER LEVEL OBSERVATIONS**

- **Groundwater Initially Encountered at 5’**

---

**Terracon**

1675 Lee Road  
Winter Park, Florida

**Project No.: H1155082**

**Exhibit:** A-9
**BORING LOG NO. B-3**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

---

**GRAPHIC LOG**

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<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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<td>3.0</td>
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**Boring Terminated at 10 Feet**

---

**Notes:**

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

**WATER LEVEL OBSERVATIONS**

- **Groundwater Initially Encountered at 5’**

---

**Water Content (%)**

- **Atterberg Limits**
- **Percent Finer**

---

**Project No.: H1155082**  
**Exhibit: A-10**

---

**Boring Started:** 6/1/2015  
**Boring Completed:** 6/1/2015

---

**1675 Lee Road**  
**Winter Park, Florida**
### BORING LOG NO. B-4

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane, Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

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<td>WATER LEVEL OBSERVATIONS</td>
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<table>
<thead>
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<td>Depth (Ft.)</td>
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<table>
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<th>CLAYEY SAND (SC), fine grained, grayish-brown, loose</th>
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<table>
<thead>
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<th>SILTY SAND (SM), fine grained, light grayish-brown, loose to medium dense</th>
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<td>Depth (Ft.)</td>
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</tr>
<tr>
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**Boring Terminated at 10 Feet**

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

**Hammer Type:** Automatic

### FIELD TEST RESULTS

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<th>SAMPLE TYPE</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
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<tbody>
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**PERCENT FINES**

Refer to 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.

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

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 2.5’

**Notes:**

- Project No.: H1155082
- Exhibit: A-11
- Boring Started: 6/1/2015
- Boring Completed: 6/1/2015
- Drill Rig: D-50
- Driller: R.F.
**BORING LOG NO. B-5**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

**LOCATION**  
See Exhibit A-4

<table>
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<th>DEPTH (FT.)</th>
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<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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</thead>
<tbody>
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<td>10.0</td>
<td><strong>SAND WITH SILT (SP-SM),</strong> fine grained, gray to brown, very loose to loose</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:**

- Project No.: H1155082
- Drill Rig: D-50
- Driller: R.F.
- Boring Started: 6/1/2015
- Boring Completed: 6/1/2015
- Exhibit: A-12

**FIELD TEST RESULTS**

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<td>1-2-3-3</td>
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**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 3'
**BORING LOG NO. B-6**

**PROJECT:** TOD Stormwater Site

**SITE:** Orange Avenue and Mary Louis Lane
Kissimmee, FL

**CLIENT:** Deerfield Land Corporation

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**LOCATION** See Exhibit A-4

**DEPTH**

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<th>VERTICAL PERMEABILITY (feet/day)</th>
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<th>PERCENT FINES</th>
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<tbody>
<tr>
<td>0.0</td>
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<tr>
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**GEOLOGICAL PROFILE**

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

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**Boring Terminated at 10 Feet**

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**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 2’

---

**Notes:**

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

---

**FIELD TEST RESULTS**

- Sample Type: Water level

---

**WATER LEVEL OBSERVATIONS**

- Boring Started: 6/1/2015
- Boring Completed: 6/1/2015
- Drill Rig: D-50
- Driller: R.F.
- Project No.: H1155082
- Exhibit: A-13
**BORING LOG NO. B-7**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

**LOCATION**  
See Exhibit A-4

<table>
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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.

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 3'

**Notes:**

Boring Started: 6/1/2015  
Boring Completed: 6/1/2015  
Drill Rig: D-50  
Driller: R.F.  
Project No.: H1155082  
Exhibit: A-14
**LOCATION**  
See Exhibit A-4

**DEPTH**

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<tr>
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<td>fine grained, brown, medium dense</td>
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<tr>
<td></td>
<td><strong>Boring Terminated at 10 Feet</strong></td>
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**SAND (SP)**: fine grained, light brown to dark brown, loose to medium dense, with surface organics

**SILTY SAND (SM)**: fine grained, brown, medium dense

**WATER LEVEL OBSERVATIONS**

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<th>VERTICAL PERMEABILITY (feet/day)</th>
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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.: H1155082
- Drill Rig: D-50
- Driller: R.F.
- Boring Started: 6/1/2015
- Boring Completed: 6/1/2015
- Exhibit: A-15

---

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.

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**Teraccon**
1675 Lee Road
Winter Park, Florida

---

Groundwater Initially Encountered at 3'
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.

Water Level Observations

- Groundwater Initially Encountered at 3.7'

Notes:

Boring Started: 6/1/2015
Boring Completed: 6/1/2015
Drill Rig: D-50
Driller: R.F.
**BORING LOG NO. B-10**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane, Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

**LOCATION**  
See Exhibit A-4

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**SAND TO SAND WITH SILT (SP/SP-SM), fine grained, gray to brown**

**Boring Terminated at 7 Feet**

---

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

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

**FIELD TEST RESULTS**

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<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>VERTICAl PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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<tr>
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---

**GROUNDWATER INITIALLY ENCOUNTERED AT 3’**

---

**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 Started:** 6/4/2015  
**Boring Completed:** 6/4/2015

**Drill Rig:**  
Driller: R.F.

**Project No.: H1155082  
Exhibit: A-17**
### BORING LOG NO. B-11

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
**Kissimmee, FL**  

**CLIENT:** Deerfield Land Corporation  

<table>
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<th>DEPTH</th>
<th>GRAPHIC LOG</th>
<th>DESCRIPTION</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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<tbody>
<tr>
<td>5.5</td>
<td></td>
<td>SAND WITH SILT (SP-SM), fine grained, gray to dark brown, loose to medium dense</td>
<td>2-3-3-4 N=6</td>
<td>55-6-8 N=3</td>
<td>45</td>
<td>100-27-73</td>
<td>92</td>
</tr>
<tr>
<td>5.5</td>
<td></td>
<td>SILTY SAND (SM), fine grained, light brown, loose to medium dense</td>
<td>5-6-7 N=11</td>
<td>55-6-10 N=11</td>
<td>45</td>
<td>100-27-73</td>
<td>92</td>
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<tr>
<td>7.0</td>
<td></td>
<td>SAND WITH SILT (SP-SM), fine grained, dark brown, medium dense</td>
<td>1-2-4-6 N=6</td>
<td>6-6-8-8 N=14</td>
<td>45</td>
<td>100-27-73</td>
<td>92</td>
</tr>
<tr>
<td>9.0</td>
<td></td>
<td>CLAYEY SAND (SC), fine grained, light brown, medium dense</td>
<td>5-6-7 N=13</td>
<td>6-6-8-8 N=14</td>
<td>45</td>
<td>100-27-73</td>
<td>92</td>
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<tr>
<td>13.5</td>
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<td>SAND WITH SILT (SP-SM), fine grained, light brown, medium dense</td>
<td>2-2-3 N=5</td>
<td>5-5-6-8 N=3</td>
<td>45</td>
<td>100-27-73</td>
<td>92</td>
</tr>
<tr>
<td>18.5</td>
<td></td>
<td>CLAY (CH), fine grained, gray, medium stiff to stiff</td>
<td>2-4-5 N=9</td>
<td>12-2-8 N=3</td>
<td>45</td>
<td>100-27-73</td>
<td>92</td>
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<tr>
<td>25.0</td>
<td></td>
<td>Boring Terminated at 25 Feet</td>
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Stratification lines are approximate. In-situ, the transition may be gradual.  
Hammer Type: Automatic  

**LOCATION:** Orange Avenue and Mary Louis Lane  
**SITE:** Kissimmee, FL  

**PROJECT:** TOD Stormwater Site  

**CLIENT:** Deerfield Land Corporation  

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

**WATER LEVEL OBSERVATIONS**  

- Groundwater Initially Encountered at 3'  

**Notes:**  

**Boring Started:** 6/2/2015  
**Boring Completed:** 6/2/2015  
**Drill Rig:** D-50  
**Driller:** R.F.  
**Project No.:** H1155082  
**Exhibit:** A-18
### BORING LOG NO. B-12

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane, Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>DEPTH</td>
<td>FIELD TEST RESULTS</td>
</tr>
</tbody>
</table>
| SAND WITH SILT (SP-SM), fine grained, gray to dark brown, loose to medium dense | 2-3-3-3  
N=6 |
| | 2-5-6-6  
N=11 |
| | 1-2-2-1  
N=4 |
| | 2-2-3-4  
N=5 |
| | 3-4-5-6  
N=9 |

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>WATER CONTENT (%)</th>
</tr>
</thead>
</table>
| SAND WITH SILT (SP-SM), fine grained, gray, medium dense | 5-4-3  
N=7 |
| | 2-3-5  
N=8 |
| | 4-6-8  
N=14 |

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>PERCENT FINES</th>
</tr>
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<tbody>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, gray, medium dense</td>
<td>9.5</td>
</tr>
<tr>
<td>SILTY SAND (SM), fine grained, gray, medium dense</td>
<td>13.5</td>
</tr>
<tr>
<td>CLAY (CH), fine grained, bluish-gray to grayish-brown, stiff</td>
<td>23.5</td>
</tr>
<tr>
<td>SAND WITH SILT (SP-SM), fine grained, gray, medium dense</td>
<td>25.0</td>
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</table>

**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**
- **Groundwater Initially Encountered at 3.5'**

**Boring Terminated at 25 Feet**

**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.**

**Project No.: H1155082**  
**Exhibit: A-19**

**Boring Started:** 6/2/2015  
**Boring Completed:** 6/2/2015

**Drill Rig:** D-50  
**Driller:** R.F.
### BORING LOG NO. B-13

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
**Kissimmee, FL**

**CLIENT:** Deerfield Land Corporation

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

**DEPTH** | **FIELD TEST RESULTS** | **WATER LEVEL OBSERVATIONS** | **VERTICAL PERMEABILITY (feet/day)** | **WATER CONTENT (%)** | **ATTERBERG LIMITS** | **PERCENT FINES** |
<table>
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<tbody>
<tr>
<td>3.0</td>
<td>3-3-3-3</td>
<td>N=6</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5.0</td>
<td>3-5-4-1</td>
<td>N=9</td>
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<tr>
<td>7.0</td>
<td>2-2-1-3</td>
<td>N=3</td>
<td>4-6-5</td>
<td>N=11</td>
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<tr>
<td>10.0</td>
<td>2-2-2-2</td>
<td>N=4</td>
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<tr>
<td>15.0</td>
<td>2-2-3-4</td>
<td>N=5</td>
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<tr>
<td>20.0</td>
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</tr>
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<td>25.0</td>
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</table>

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

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

**SANDY CLAY (CH),** fine grained, bluish-gray, stiff

**CLAYEY SAND (SC),** fine grained, grayish-brown, medium dense

*Boring Terminated at 25 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.

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 3’**

Notes:
- Project No.: H1155082  
- Drill Rig: D-50  
- Driller: R.F.

1675 Lee Road  
Winter Park, Florida

Boring Started: 6/2/2015  
Boring Completed: 6/2/2015  
Exhibit: A-20
**BORING LOG NO. B-14**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

**CLIENT:** Deerfield Land Corporation

**LOCATION**  
See Exhibit A-4

**DEPTH (FT.)**  
**WATER LEVEL OBSERVATIONS**  
**SAMPLE TYPE**  
**FIELD TEST RESULTS**  
**VERTICAL PERMEABILITY (feet/day)**  
**WATER CONTENT (%)**  
**PERCENT FINES**  
**ATTERBERG LIMITS**  
**DEPTH (FT.)**

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>Sample Type</th>
<th>Field Test Results</th>
<th>Vertical Permeability (feet/day)</th>
<th>Water Content (%)</th>
<th>Per Cent Fin</th>
<th>Atterberg Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>SAND TO SAND WITH SILT (SP/SP-SM), fine grained, gray to dark brown, loose</td>
<td>2-3-3-4 N=6</td>
<td>3-4-6-4 N=10 15 NP 27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>SILTY SAND (SM), fine grained, brown, medium dense</td>
<td>1-4-7-10 N=11</td>
<td>8-7-7-9 N=14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>CLAY (CH), fine grained, gray, medium stiff, varved with layers of sand at 23.5'</td>
<td>5-6-8 N=14</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>25.0</td>
<td>Boring Terminated at 25 Feet</td>
<td>1-2-3 N=5</td>
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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**

- Groundwater Initially Encountered at 3’

**Drill Rig:** D-50  
**Driller:** R.F.  
**Project No.:** H1155082  
**Exhibit:** A-21

Boring Started: 6/2/2015  
Boring Completed: 6/2/2015
Boring Terminated at 25 Feet

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

<table>
<thead>
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<th>LOCATION</th>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
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<tr>
<td></td>
<td>2-2-3-4 N=5</td>
<td></td>
<td></td>
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<td></td>
<td>3-4-3-2 N=7</td>
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<td>4</td>
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<tr>
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<td>1-1-1-1 N=2</td>
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<td>1-1-1-2 N=2</td>
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<td>27</td>
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<td>1-2-2-2 N=4</td>
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<td>5-6-7 N=13</td>
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SILTY SAND (SM), fine grained, light brown, medium dense

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<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>PERCENT FINES</th>
<th>ATTERBERG LIMITS</th>
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<tr>
<td></td>
<td>4-5-7 N=12</td>
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CLAY WITH SAND (CH), fine grained, gray, stiff

<table>
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<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
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<th>ATTERBERG LIMITS</th>
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<tbody>
<tr>
<td></td>
<td>2-4-6 N=10</td>
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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 3’
SAND WITH SILT (SP-SM), fine grained, brown

CLAYEY SAND (SC), fine grained, dark brown

SILTY SAND (SM), fine grained, brown

Boring Terminated at 10 Feet

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

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.

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

WATER LEVEL OBSERVATIONS
Groundwater Not Encountered to a Depth of 10'

CONTACTS
Terracon 1675 Lee Road
Winter Park, Florida

1875 Lee Road
Winter Park, Florida

Boring Completed: 6/4/2015
Drill Rig:
Driller: R.F.

Project No.: H1155082
Exhibit: A-23
### Field Test Results

<table>
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<th>Depth (Ft.)</th>
<th>Sample Type</th>
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<th>Vertical Permeability (feet/day)</th>
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<th>Atterberg Limits</th>
<th>Percent fines</th>
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### WATER LEVEL OBSERVATIONS

- Groundwater Initially Encountered at 6.5'

---

**Advancement Method:**

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

**Notes:**

- Boring Completed: 6/4/2015
- Drill Rig: Terracon
- Driller: R.F.
- Project No.: H1155082
- Exhibit: A-24
**BORING LOG NO. B-18**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

---

**LOCATION**  
See Exhibit A-4

**DEPTH**  

<table>
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<tr>
<th>DEPTH (FT.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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</table>

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

**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.

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 3'**

---

**NOTES:**

Project No.: H1155082  
Drill: R.F.  
Drill Rig: D-50  
Boring Completed: 6/4/2015  
Exhibit: A-25
**BORING LOG NO. B-19**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
**Location:** Kissimmee, FL

<table>
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<tr>
<th>Location/Depth</th>
<th>Sample Type</th>
<th>Observation</th>
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<th>Vertical Permeability (feet/day)</th>
<th>Water Content (%)</th>
<th>Atterberg Limits</th>
<th>Percent Fines</th>
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<tbody>
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<td>5.0</td>
<td></td>
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<td>2-3-4-4 N=7</td>
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<tr>
<td>10.0</td>
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<td></td>
<td>6-7-6-5 N=13</td>
<td>2</td>
<td>17</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td>5-4-3-4 N=7</td>
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<td></td>
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</tr>
<tr>
<td>20.0</td>
<td>4-3-3-3 N=6</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:**

- Boring Completed: 6/4/2015  
- Drill Rig: D-50  
- Driller: R.F.  
- Project No.: H1155082  
- Exhibit: A-26

---

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 5'

---

**PROJECT:  TOD Stormwater Site**

**SITE:** Orange Avenue and Mary Louis Lane  
**Location:** Kissimmee, FL

**LOCATION** See Exhibit A-4

<table>
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<th>Depth (Ft.)</th>
<th>Water Level Observations</th>
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<td>10</td>
<td>6-6-6-6 N=12</td>
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<tr>
<td>15</td>
<td>6-7-6-5 N=13</td>
</tr>
<tr>
<td>20</td>
<td>5-4-3-4 N=7</td>
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<tr>
<td>25</td>
<td>4-3-3-3 N=6</td>
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**Teraccon**
1675 Lee Road  
Winter Park, Florida

---

**LOCATION**
See Exhibit A-4

**DEPTH**

**GRAPHIC LOG**
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 LOG NO. B-20

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

<table>
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**GRAPHIC LOG**

**DEPTH**

<table>
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<tr>
<th>DEPTH/STRAIN</th>
<th>DEPTH (Ft.)</th>
<th>WATER LEVE OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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<tbody>
<tr>
<td>7.0</td>
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</table>

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

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

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>DEPTH (Ft.)</th>
<th>PERCENT FINES</th>
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<tbody>
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<td>2.0</td>
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**WATER LEVEL OBSERVATIONS**

Groundwater Initially Encountered at 3

---

**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.

**PROJECT:** TOD Stormwater Site

Boring Started: 6/3/2015  
Boring Completed: 6/3/2015

Drill Rig: D-50  
Driller: R.F.

Project No.: H1155082  
Exhibit: A-27

---

**Terracon**

1875 Lee Road  
Winter Park, Florida
**BORING LOG NO. B-21**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>GRAPHIC LOG</th>
<th>DEPTH (Ft.)</th>
<th>WATERSHED OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>PERCENT FINES</th>
<th>ATTERBERG LIMITS</th>
</tr>
</thead>
</table>
|          |             | 7.0         | SAND TO SAND WITH SILT (SP/SP-SM), fine grained, gray to brown, loose to medium dense | 2-3-3-3  
N=6 | | | |
|          |             | 10.0        | CLAYEY SAND (SC), fine grained, grayish-brown, loose to medium dense | 4-5-6-7  
N=11 | | | |
|          |             | 15.0        | | 5-4-4-4  
N=8 | | | |
|          |             | 20.0        | | 4-3-3-4  
N=6 | | | |
|          |             | 25.0        | | 3-4-5-4  
N=9 | | | |

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 3'  

**Notes:**

- Project No.: H1155082  
- Drill Rig: D-50  
- Driller: R.F.  
- Boring Started: 6/3/2015  
- Boring Completed: 6/3/2015  
- Exhibit: A-28
## BORING LOG NO. B-22

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
**CLIENT:** Deerfield Land Corporation  
**LOCATION:** See Exhibit A-4

### GRAPHIC LOG

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<th>DEPTH</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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</thead>
<tbody>
<tr>
<td>13.5</td>
<td>SAND WITH SILT (SP-SM), fine grained, gray to dark brown, loose</td>
<td>2-2-2-2 N=4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18.5</td>
<td>SILTY SAND (SM), fine grained, light brown, medium dense</td>
<td>2-3-3-4 N=6</td>
<td>22</td>
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<tr>
<td>23.5</td>
<td>SAND (SP), fine grained, light brown, medium dense</td>
<td>3-4-3-2 N=7</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>25.0</td>
<td>CLAYEY SAND (SC), fine grained, light brown, loose</td>
<td>2-2-1-1 N=3</td>
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<th>FIELD TEST RESULTS</th>
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<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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</thead>
<tbody>
<tr>
<td>13</td>
<td>SAND WITH SILT (SP-SM), fine grained, gray to dark brown, loose</td>
<td>2-2-2-2 N=4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>SILTY SAND (SM), fine grained, light brown, medium dense</td>
<td>2-3-3-4 N=6</td>
<td>22</td>
<td></td>
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<tr>
<td>23</td>
<td>SAND (SP), fine grained, light brown, medium dense</td>
<td>3-4-3-2 N=7</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>25</td>
<td>CLAYEY SAND (SC), fine grained, light brown, loose</td>
<td>2-2-1-1 N=3</td>
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</table>

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

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

**Notes:**

- Boring Started: 6/3/2015  
- Boring Completed: 6/3/2015  
- Drill Rig: D-50  
- Driller: R.F.

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 2.5'

**Terracon**

1675 Lee Road  
Winter Park, Florida  
Project No.: H1155082  
Exhibit: A-29
SAND WITH SILT (SP-SM), fine grained, brown to dark brown, loose to medium dense

SILTY SAND (SM), fine grained, light brown, medium dense

CLAYEY SAND (SC), fine grained, light brown to grayish-brown, loose to medium dense

Boring Terminated at 25 Feet

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

Hammer Type: Automatic

FIELD TEST RESULTS

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>PERCENT FINES</th>
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<tbody>
<tr>
<td>2-2-2-3 N=4</td>
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<tr>
<td>3-4-5-5 N=9</td>
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<td>4-5-2-3 N=7</td>
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<td>3-2-1-3 N=3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-4-5-4 N=9</td>
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</tr>
<tr>
<td>4-5-7 N=12</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>3-4-5 N=9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-4-4 N=8</td>
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</table>

WATER LEVEL OBSERVATIONS

Groundwater Initially Encountered at 2.5'

PROJECT: TOD Stormwater Site

SITE: Orange Avenue and Mary Louis Lane

Kissimmee, FL

CLIENT: Deerfield Land Corporation

LOCATION See Exhibit A-4

DEPTH

GEO LOG-DEPTH TO BOTTOM OF PAGE H1155082-BORINGS.GPJ TERRACON2012.GDT 7/1/15

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.

DRILL RIG: D-50

DRILLER: R.F.

BORING LOG NO. B-23

PROJECT:  TOD Stormwater Site

CLIENT: Deerfield Land Corporation

SITE: Orange Avenue and Mary Louis Lane

Kissimmee, FL

LOCATION See Exhibit A-4

DEPTH

FIELD TEST RESULTS

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>PERCENT FINES</th>
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<tr>
<td>3-4-5-5 N=9</td>
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<tr>
<td>4-5-2-3 N=7</td>
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<td>4-5-7 N=12</td>
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<tr>
<td>3-4-4 N=8</td>
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WATER LEVEL OBSERVATIONS

Groundwater Initially Encountered at 2.5'

1875 Lee Road
Winter Park, Florida

Project No.: H1155082
Exhibit: A-30

Boring Started: 6/3/2015
Boring Completed: 6/3/2015
**BORING LOG NO. B-24**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

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<tr>
<td></td>
<td>SILTY SAND (SM): fine grained, gray, medium dense</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CLAYEY SAND (SC): fine grained, gray, loose to medium dense</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boring Terminated at 25 Feet</td>
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</table>

**FIELD TEST RESULTS**

<table>
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<th>WATER LEVEL OBSERVATIONS</th>
<th>SAMPLE TYPE</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
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<th>LL-PL-PI</th>
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<tr>
<td>10</td>
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<td>3-4-4-4</td>
<td>N=8</td>
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<td>4-3-3-1</td>
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<td>1-1-1-3</td>
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**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 3'

**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.**

**Boring Started:** 6/3/2015  
**Boring Completed:** 6/3/2015

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

**Project No.:** H1155082  
**Exhibit:** A-31
SAND TO SAND WITH SILT (SP/SP-SM), fine grained, brown to dark brown, loose to medium dense

CLAYEY SAND (SC), fine grained, light brown to grayish-brown, loose to medium dense

Boring Terminated at 25 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.

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 3'


Drill Rig: D-50 Driller: R.F.

Project No.: H1155082 Exhibit: A-32
**BORING LOG NO. B-26**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

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<tbody>
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### 3.5

**SAND TO SAND WITH SILT (SP/SP-SM),** fine grained, brown to orangish-brown, loose, trace cementation at 1.5'

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<th>FIELD TEST RESULTS</th>
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<th>LL-PL-PI</th>
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<tr>
<td>2-3-4-5</td>
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### 7.0

**SILTY SAND (SM),** fine grained, gray, loose to medium dense

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<tbody>
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<td>4-5-4-4</td>
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<td></td>
<td>20</td>
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<td>N=9</td>
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### 10.0

**CLAYEY SAND (SC),** fine grained, gray, loose to medium dense

<table>
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<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
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<td>3-4-3-3</td>
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<td>7</td>
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<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
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<tbody>
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<td>3-4-5-5</td>
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<td>9</td>
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<th>LL-PL-PI</th>
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**Boring Terminated at 10 Feet**

<table>
<thead>
<tr>
<th>WATER LEVEL OBSERVATIONS</th>
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</thead>
<tbody>
<tr>
<td>Groundwater Initially Encountered at 3.5'</td>
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</table>

**Notes:**

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

**Terrain:** SAND TO SAND WITH SILT (SP/SP-SM), fine grained, brown to orangish-brown, loose, trace cementation at 1.5'

**PROJECT:** TOD Stormwater Site

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

**LOCATIONS:** See Exhibit A-4

**DEPTH:**

- **3.5:** SAND TO SAND WITH SILT (SP/SP-SM), fine grained, brown to orangish-brown, loose, trace cementation at 1.5'
- **7.0:** SILTY SAND (SM), fine grained, gray, loose to medium dense
- **10.0:** CLAYEY SAND (SC), fine grained, gray, loose to medium dense

**FIELD TEST RESULTS:**

- 2-3-4-5 (N=7)
- 4-5-4-4 (N=9)  
  - Water Content: 20%
  - LL-PL-PI: 15

- 3-4-3-3 (N=7)
- 3-4-5-5 (N=9)
- 4-3-4-5 (N=7)

**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:**

- Groundwater Initially Encountered at 3.5'

**TERRA CON**

1675 Lee Road
Winter Park, Florida

**Boring Started:** 6/4/2015  
**Boring Completed:** 6/4/2015

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

**Project No.:** H1155082  
**Exhibit:** A-33
Boring Log No. B-27

Project: TOD Stormwater Site

Client: Deerfield Land Corporation

Site: Orange Avenue and Mary Louis Lane
        Kissimmee, FL

Location: See Exhibit A-4

Graphical Log: See Exhibit A-4

Depth: 9.0 feet

Sand (SP): fine grained, brown, loose to medium dense

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.

Water Level Observations:
- Groundwater Initially Encountered at 1.5'

Water Level Observations Table:

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<tr>
<th>Depth (Ft.)</th>
<th>Sample Type</th>
<th>Field Test Results</th>
<th>Vertical Permeability (feet/day)</th>
<th>Water Content (%)</th>
<th>Atterberg Limits</th>
<th>Percent Fine</th>
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<tbody>
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<tr>
<td>3</td>
<td>3-3-4-5 N=7</td>
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<tr>
<td>4</td>
<td>4-3-3-3 N=6</td>
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<td></td>
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</tr>
<tr>
<td>3</td>
<td>4-3-5-6 N=9</td>
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<td>4-4-4-4 N=8</td>
<td>13</td>
<td>18</td>
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Notes:
- Project No.: H1155082
- Drill Rig: D-50
- Driller: R.F.
- Boring Completed: 6/4/2015
- Exhibit: A-34
- Terracon 1675 Lee Road
        Winter Park, Florida

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.
LOCATION: See Exhibit A-4

GROUNDWATER INITIALLY ENCOUNTERED AT 3'

Field Test Results

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>Water Level Observations</th>
<th>Sample Type</th>
<th>Vertical Permeability (feet/day)</th>
<th>Water Content (%)</th>
<th>Atterberg Limits</th>
<th>Percent Fines</th>
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<tbody>
<tr>
<td>2</td>
<td>2-3-4-4 N=7</td>
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</tr>
<tr>
<td>3</td>
<td>3-4-3-3 N=7</td>
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<td></td>
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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.: H1155082

1675 Lee Road
Winter Park, Florida

Boring Completed: 6/4/2015
Drill Rig: D-50
Driller: R.F.

Exhibit: A-35
**BORING LOG NO. B-29**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

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<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMENABILITY (feet/day)</th>
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SAND TO SAND WITH SILT (SP/SP-SM), fine grained, gray to brown  
with roots at 3'

Boring Terminated at 5 Feet

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

**Notes:**
- Project No.: H1155082
- Drill Rig: Andrew R.
- Boring Started: 6/8/2015
- Boring Completed: 6/8/2015
- Driller: Andrew R.
- Exhibit: A-36

---

**FIELD TEST RESULTS**

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**GROUNDWATER INITIALLY ENCOUNTERED AT 3.5'**

---

**Terrecon**  
1675 Lee Road  
Winter Park, Florida
### BORING LOG NO. B-30

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

#### LOCATION
See Exhibit A-4

#### DEPTH

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

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

**Boring Terminated at 10 Feet**

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

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

**Notes:**

- Project No.: H1155082  
- Drill Rig: D-50  
- Driller: John F.

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 3'

**Terracon**  
1675 Lee Road  
Winter Park, Florida

**Boring Started:** 6/3/2015  
**Boring Completed:** 6/3/2015  
**Exhibit:** A-37
**BORING LOG NO. B-31**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

---

**LOCATION**  
See Exhibit A-4

---

**DEPTH**  
**FIBEROUS PEAT (PT), dark brown**  
**SAND TO SAND WITH SILT (SP/SP-SM), fine grained, loose to medium dense**

---

**DEPTH (Ft.)**  
**WATER LEVEL OBSERVATIONS**  
**SAMPLE TYPE**  
**FIELD TEST RESULTS**  
**VERTICAL PERMEABILITY (feet/day)**  
**WATER CONTENT (%)**  
**ATTERBEG LIMITS**  
**PERCENT FINES**

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<th>FIELD TEST RESULTS</th>
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<th>WATER CONTENT (%)</th>
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<th>PERCENT FINES</th>
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</table>

---

**Silty Sand (SM), fine grained, medium dense**

**Boring Terminated at 10 Feet**

---

**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 1.5'

---

**Hammer Type:** Automatic

---

**PROJECT:** TOD Stormwater Site  
**LOCATION:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

---

**LOCATION**  
See Exhibit A-4

---

**DEPTH**  
**FIBEROUS PEAT (PT), dark brown**  
**SAND TO SAND WITH SILT (SP/SP-SM), fine grained, loose to medium dense**

---

**DEPTH (Ft.)**  
**WATER LEVEL OBSERVATIONS**  
**SAMPLE TYPE**  
**FIELD TEST RESULTS**  
**VERTICAL PERMEABILITY (feet/day)**  
**WATER CONTENT (%)**  
**ATTERBEG LIMITS**  
**PERCENT FINES**

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---

**Silty Sand (SM), fine grained, medium dense**

**Boring Terminated at 10 Feet**

---

**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 1.5'

---

**Hammer Type:** Automatic

---

**PROJECT:** TOD Stormwater Site  
**LOCATION:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

---

**LOCATION**  
See Exhibit A-4

---

**DEPTH**  
**FIBEROUS PEAT (PT), dark brown**  
**SAND TO SAND WITH SILT (SP/SP-SM), fine grained, loose to medium dense**

---

**DEPTH (Ft.)**  
**WATER LEVEL OBSERVATIONS**  
**SAMPLE TYPE**  
**FIELD TEST RESULTS**  
**VERTICAL PERMEABILITY (feet/day)**  
**WATER CONTENT (%)**  
**ATTERBEG LIMITS**  
**PERCENT FINES**

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---

**Silty Sand (SM), fine grained, medium dense**

**Boring Terminated at 10 Feet**

---

**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 1.5'

---

**Hammer Type:** Automatic

---

**PROJECT:** TOD Stormwater Site  
**LOCATION:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

---

**LOCATION**  
See Exhibit A-4

---

**DEPTH**  
**FIBEROUS PEAT (PT), dark brown**  
**SAND TO SAND WITH SILT (SP/SP-SM), fine grained, loose to medium dense**

---

**DEPTH (Ft.)**  
**WATER LEVEL OBSERVATIONS**  
**SAMPLE TYPE**  
**FIELD TEST RESULTS**  
**VERTICAL PERMEABILITY (feet/day)**  
**WATER CONTENT (%)**  
**ATTERBEG LIMITS**  
**PERCENT FINES**

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---

**Silty Sand (SM), fine grained, medium dense**

**Boring Terminated at 10 Feet**

---

**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 1.5'

---

**Hammer Type:** Automatic
**BORING LOG NO. B-32**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

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<th>VERTICL PERMEABILITY (feet/day)</th>
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**Boring Terminated at 5 Feet**

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

---

**Advancement Method:**  
See Exhibit A-3 for description of field procedures.

**Abandonment Method:**  
Borings backfilled with soil cuttings upon completion.  
See Appendix B for description of laboratory procedures and additional data (if any).

**Notes:**

---

**WATER LEVEL OBSERVATIONS**

Groundwater Initially Encountered at 2.5'

---

**GEO LOG-DEPTH TO BOTTOM OF PAGE**  
**H1155082-BORINGS.GPJ**  
**TERRACON2012.GDT**  
**7/1/15**

---

**Boring Started:** 6/5/2015  
**Boring Completed:** 6/5/2015  
**Drill Rig:**  
**Driller:** John F.  
**Project No.:** H1155082  
**Exhibit:** A-39
**FIBEROUS PEAT (PT), dark brown**

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

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

**CLAY (CH), fine grained, bluish-gray, stiff**

**CLAYEY SAND (SC), fine grained, light brown, medium dense**

**CLAY WITH SAND (CH), fine grained, gray, very stiff**

**Boring Terminated at 25 Feet**

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

Hammer Type: Automatic

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<th>See Exhibit A-4</th>
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**Notes:**

Project No.: H1155082

Drill Rig: D-50

Driller: John F.

Drilling Started: 6/3/2015

Drilling Completed: 6/3/2015

Exhibit: A-40

---

**Location:** Orange Avenue and Mary Louis Lane

**Client:** Deerfield Land Corporation

**Site:** Kissimmee, FL

**Advancement Method:** Mud Rotary

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

**Water Level Observations:**

- Groundwater Initially Encountered at 2'
**BORING LOG NO. B-34**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

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**SAND TO SAND WITH SILT (SP/SP-SM),** fine grained, brown to dark brown

**Boring Terminated at 4 Feet**

<table>
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<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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Stratification lines are approximate. In-situ, the transition may be gradual.

**Advancement Method:**

- 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.

**Abandonment Method:**

- Borings backfilled with soil cuttings upon completion.

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 1'

**NOTES:**

- Boring Started: 6/5/2015  
- Boring Completed: 6/5/2015  
- Drill Rig:  
- Driller: John F.

**TERRACON**

1675 Lee Road  
Winter Park, Florida

Project No.: H1155082  
Exhibit: A-41
<table>
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<tr>
<td>9.0</td>
<td>SAND TO SAND WITH SILT (SP/SP-SM), fine grained, light grayish-brown to dark brown, very loose to medium dense</td>
</tr>
<tr>
<td>18.5</td>
<td>SILTY SAND (SM), fine grained, light grayish-brown, medium dense</td>
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<tr>
<td>23.5</td>
<td>CLAY (CH), fine grained, bluish-gray, stiff</td>
</tr>
<tr>
<td>25.0</td>
<td>CLAYEY SAND (SC), fine grained, grayish-brown</td>
</tr>
</tbody>
</table>

Boring Terminated at 25 Feet

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

Hammer Type: Automatic

Field Test Results

<table>
<thead>
<tr>
<th>Depth (Ft.)</th>
<th>Water Level Observations</th>
<th>Sample Type</th>
<th>Vertical Permeability (feet/day)</th>
<th>Water Content (%)</th>
<th>Atterberg Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-3-6-6</td>
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<td>N=9</td>
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<td>5-5-7-7</td>
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<td>2-0-0-0</td>
<td>2-0-0-0</td>
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<td>4-5-5-6</td>
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<td>5-7-7</td>
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<td>49</td>
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</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.

Water Level Observations:

- Groundwater Initially Encountered at 1.5'
- Water Level Not Observed Below 25 Feet

Boring Started: 6/3/2015
Boring Completed: 6/3/2015
Drill Rig: D-50
Driller: John F.
Project No.: H1155082
Exhibit: A-42
### BORING LOG NO. B-36

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
**Kissimmee, FL**

**LOCATION**  
See Exhibit A-4

<table>
<thead>
<tr>
<th>DEPTH (FT.)</th>
<th>STRATIFICATION</th>
<th>DESCRIPTION</th>
<th>SAMPLE TYPE</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td></td>
<td>FIBEROUS PEAT (PT), dark brown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td></td>
<td>SILTY SAND (SM), fine grained, dark brown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td></td>
<td>SAND WITH SILT (SP-SM), fine grained, light brown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Boring Terminated at 2.5 Feet**

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

**Notes:**
- **Project No.:** H1155082  
- **Exhibit:** A-43

---

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

**Abandonment Method:**
- Borings backfilled with soil cuttings upon completion.
- See Appendix B for description of laboratory procedures and additional data (if any).

**WATER LEVEL OBSERVATIONS**
- Groundwater Initially Encountered at surface

**TERRACON**  
1675 Lee Road  
Winter Park, Florida

**Notes:**
- Boring Started: 6/5/2015  
- Boring Completed: 6/5/2015  
- Drill Rig:  
- Driller: John F.
# BORING LOG NO. B-37

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

---

### FIBEROUS PEAT (PT), dark brown

### SAND (SP), fine grained, light brown

**Boring Terminated at 4 Feet**

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td></td>
<td></td>
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</table>

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

---

**Advancement Method:** 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 1'

**Drill Rig:**

- Driller: John F.

**Project No.: H1155082**

**Boring Started:** 6/5/2015  
**Boring Completed:** 6/5/2015

**Exhibit:** A-44
**BORING LOG NO. B-38**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

### FIELD TEST RESULTS

<table>
<thead>
<tr>
<th>SAMPLE TYPE</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
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<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
</tr>
<tr>
<td>2.0</td>
</tr>
</tbody>
</table>

**FIBEROUS PEAT (PT),** fine grained, dark brown

**SAND WITH SILT (SP-SM),** fine grained, gray

*Boring Terminated at 3 Feet*

---

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

**Notes:**

- Advancement Method: Abandonment Method: Borings backfilled with soil cuttings upon completion.
- See Exhibit A-4 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 0.5'

**Drill Rig:** Driller: John F.

**Project No.: H1155082**

**Exhibit:** A-45
**BOURING LOG NO. B-39**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

---

**LOCATION**  
See Exhibit A-4

**DEPTH**  

<table>
<thead>
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<th>DEPTH (FL.)</th>
<th>WATER OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
<th>PERCENT FINES</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>SAND WITH SILT (SP-SM), trace roots, fine grained, dark brown</td>
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<td></td>
</tr>
<tr>
<td>4.0</td>
<td>CLAYEY SAND (SC), fine grained, brown</td>
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<td></td>
</tr>
</tbody>
</table>

**Boring Terminated at 4 Feet**

---

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

---

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

**Notes:**

---

**WATER LEVEL OBSERVATIONS**

**TERRACON**

1675 Lee Road  
Winter Park, Florida

---

**Drill Rig:**  
**Driller:** Andrew R.

---

**Project No.: H115082**  
**Exhibit:** A-46

---

**Boring Started:** 6/7/2015  
**Boring Completed:** 6/7/2015
**BORING LOG NO. B-40**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation  
**SITE:** Orange Avenue and Mary Louis Lane  
**Kissimmee, FL**

**GRAPHIC LOG**

<table>
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<tr>
<th>DEPTH (FT.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

**WATER**

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

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

**Notes:**

| Project No.: H1155082 | Drill: Andrew R.  
|------------------------|------------------|
| Drill Rig:  
| Exhibit: A-47  

1675 Lee Road  
Winter Park, Florida

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.
2.02.5

WATERSAND (SP), fine grained, gray

Boring Terminated at 2.5 Feet

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

<p>| LOCATION | See Exhibit A-4 |</p>
<table>
<thead>
<tr>
<th>Depths (Ft.)</th>
<th>WATER OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>SAND (SP), fine grained, gray</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Advancement Method: 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**

- Boring Started: 6/7/2015
- Boring Completed: 6/7/2015
- Drill Rig: Driller: Andrew R.
- Project No.: H1155082
- Exhibit: A-48

**Graphic Log**

See Exhibit A-4 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 LOG NO. B-42**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane, Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

---

**GRAPHIC LOG**

<table>
<thead>
<tr>
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<th>LOCATION</th>
<th>BORING TERMINATED AT 2.5 FEET</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>0.0</td>
<td></td>
<td>SAND WITH SILT (SP-SM), fine grained, light brown</td>
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</tbody>
</table>

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**FIELD RESULTS**

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>SAMPLE TYPE</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>LL-PL-PI</th>
<th>ATTERBERG LIMITS</th>
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<tbody>
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<td>0.0</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>1.0</td>
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<td></td>
</tr>
<tr>
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<tr>
<td>2.5</td>
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<td><strong>Boring Terminated at 2.5 Feet</strong></td>
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**NOTES:**

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

Advancement Method: See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any).

Abandonment Method: Borings backfilled with soil cuttings upon completion. See Appendix C for explanation of symbols and abbreviations.

---

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane, Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation

---

**GROUNDWATER INITIAL CONTACT AT SURFACE**

---

**Boring Started:** 6/5/2015  
**Boring Completed:** 6/5/2015  
**Drill Rig:**  
**Driller:** John F.

---

**Project No.:** H1155082  
**Exhibit:** A-49

---

**TERRACON**

1875 Lee Road  
Winter Park, Florida

---

**GEOLOGIC FEATURES**

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.
**FIBEROUS PEAT (PT), dark brown**

- **LOCATION**
  - See Exhibit A-4

- **DEPTH**
  - 2.0

**SAND (SP), fine grained, light brown**

- **LOCATION**
  - See Exhibit A-5

- **DEPTH**
  - 3.0

**Boring Terminated at 3 Feet**

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

### Notes:
- Advancement Method: Abandonment Method: Borings backfilled with soil cuttings upon completion.

---

### WATER LEVEL OBSERVATIONS

- **Groundwater Initially Encountered at 0.5'**
**BORING LOG NO. B-44**

**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane, Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation  

**LOCATION**  
See Exhibit A-4

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
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</thead>
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<tr>
<td></td>
<td>SAND TO SAND WITH SILT (SP/SP-SM), fine grained, brown to dark gray, loose to dense with wood debris</td>
<td></td>
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</tr>
<tr>
<td>23.5</td>
<td>SILTY SAND (SM), fine grained, dark grayish-brown, medium dense</td>
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<td>5</td>
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<td>N=8</td>
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<td>9-10-13</td>
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<td>5-6-8</td>
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<tr>
<td></td>
<td><strong>Boring Terminated at 25 Feet</strong></td>
<td></td>
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</table>

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.

**FIELD TEST RESULTS**

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>2-3-3-4</td>
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<td>5</td>
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<td>5-6-8</td>
<td>N=14</td>
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<td></td>
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</tbody>
</table>

Groundwater Initially Encountered at 5.5'  

**Notes:**  
**PROJECT:** TOD Stormwater Site  
**SITE:** Orange Avenue and Mary Louis Lane, Kissimmee, FL  
**CLIENT:** Deerfield Land Corporation  

**LOCATION**  
See Exhibit A-4

<table>
<thead>
<tr>
<th>DEPTH (Ft.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
<th>ATTERBERG LIMITS</th>
<th>PERCENT FINES</th>
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</thead>
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<tr>
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Groundwater Initially Encountered at 5.5'  

**Notes:**

**Boring Started:** 6/4/2015  
**Boring Completed:** 6/4/2015  
**Drill Rig:** D-50  
**Driller:** R.F.  
**Project No.:** H1155082  
**Exhibit:** A-51
**BORING LOG NO. HA-1**

**PROJECT:** TOD Stormwater Site  
**CLIENT:** Deerfield Land Corporation  

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

**LOCATION**  
See Exhibit A-4

**DEPTH**  

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<th>SAMPLE TYPE</th>
<th>WATER CONTENT (%)</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
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**FIELD TEST RESULTS**

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

**ABANDONMENT METHOD:**
Groundwater Initially Encountered at 2'

**WATER LEVEL OBSERVATIONS**

- Groundwater Initially Encountered at 2'

**Exhibit:** A-52  
**Project No.:** H1155082  
**Drill Rig:** Driller: Andrew R.

**NOTES:**

- Advancement Method:
- Abandonment Method:
- 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 LOG NO. HA-2**

**PROJECT:** TOD Stormwater Site

**SITE:** Orange Avenue and Mary Louis Lane

**Kissimmee, FL**

**CLIENT:** Deerfield Land Corporation

---

### Stratification Lines

- **Groundwater initially encountered at 2'**
- **Boring Terminated at 4 Feet**

---

**LOCATION**

See Exhibit A-4

**DEPTH**

- 4.0

---

**SAND TO SAND WITH SILT (SP/SP-SM), fine grained, gray to grayish-brown**

---

**FIELD TEST RESULTS**

- **PERCENT FINES**
- **WATER CONTENT (%)**
- **WATER LEVEL OBSERVATIONS**
- **VERTICAL PERMEABILITY (feet/day)**
- **ATTENBERG LIMITS**
- **LL-PL-PI**
- **PERCENT FINES**

---

**Notes:**

- Advancement Method: See Exhibit A-3 for description of field procedures.
- Abandonment Method: Borings backfilled with soil cuttings upon completion.
- Notes:
  - Boring Started: 6/24/2015
  - Boring Completed: 6/24/2015
  - Drill Rig:
  - Driller: Andrew R.
  - Project No.: H1155082
  - Exhibit: A-53
SAND TO SAND WITH SILT (SP/SP-SM), fine grained, gray to grayish-brown

Boring Terminated at 5 Feet

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

WATER LEVEL OBSERVATIONS

Groundwater Initially Encountered at 2'

**Notes:**


Boring Started: 6/24/2015

Boring Completed: 6/24/2015

Drill Rig: Driller: Andrew R.

Project No.: H1155082 Exhibition: A-54
**BORING LOG NO. HA-4**

**PROJECT:** TOD Stormwater Site

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

**LOCATION**  See Exhibit A-4

**SITE:** Orange Avenue and Mary Louis Lane  
Kissimmee, FL

**GRAPHIC LOG**

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<th>FIELD TEST RESULTS</th>
<th>VERTICAL PERMEABILITY (feet/day)</th>
<th>WATER CONTENT (%)</th>
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<th>PERCENT FINES</th>
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**SAND TO SAND WITH SILT (SP/SP-SM), fine grained, gray to grayish-brown**

**Boring Terminated at 4 Feet**

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

**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.

**Adavancement Method:**

Abandonment Method:

Borings backfilled with soil cuttings upon completion.

**WATER LEVEL OBSERVATIONS**

- **Groundwater Initially Encountered at 2’**

**TERRACON**

1875 Lee Road  
Winter Park, Florida

**Notes:**

Boring Started: 6/24/2015  
Boring Completed: 6/24/2015

Drill Rig:  
Driller: Andrew R.

Project No.: H1155082  
Exhibit: A-55
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 and by pacing distances and estimating right angles, across vegetated/wooded terrain. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The SPT soil borings were drilled 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.
BASIN AND POND LOCATION
TOD STORMWATER SITE
ORANGE AVENUE AND MARY LOUIS LANE
KISSIMMEE, OSCEOLA COUNTY, FLORIDA

1675 Lee Road
Winter Park, FL 32789

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES
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), permeability, 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.
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<th>Encountered Water Elevation (feet)</th>
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<th>5th water reading elevation (feet)</th>
<th>6th water reading elevation (feet)</th>
<th>7th water reading elevation (feet)</th>
<th>8th water reading elevation (feet)</th>
<th>Depth to confining layer (feet)</th>
<th>Elevation to SHWT from Soil Survey (feet)</th>
<th>Estimated NW Elevation by Terracon (feet)</th>
<th>Estimated SHWT by Terracon (feet)</th>
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<td>B-42*</td>
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*Borings not surveyed, approximate seasonal high water table.
APPENDIX C
SUPPORTING DOCUMENTS
### GENERAL NOTES

#### DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>SYMBOLS AND ABBREVIATIONS</th>
<th>EXPLANATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auger Cuttings</td>
<td>Soil samples obtained by augering</td>
</tr>
<tr>
<td>Rock Core</td>
<td>Soil samples obtained by core drilling</td>
</tr>
<tr>
<td>Grab Sample</td>
<td>Soil samples obtained by grabbing</td>
</tr>
<tr>
<td>No Recovery</td>
<td>Soil samples obtained by grab sampling</td>
</tr>
<tr>
<td>Shelby Tube</td>
<td>Soil samples obtained by Shelby tube</td>
</tr>
<tr>
<td>Standard Penetration Test</td>
<td>Soil samples obtained by standard penetration test</td>
</tr>
</tbody>
</table>

#### WATER LEVEL

- **Water Initially Encountered**
- **Water Level After a Specified Period of Time**
- **Water Level After a Specified Period of Time**

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

#### FIELD TESTS

- **(HP)** Hand Penetrometer
- **(T)** Torvane
- **(DCP)** Dynamic Cone Penetrometer
- **(PID)** Photo-Ionization Detector
- **(OVA)** Organic Vapor Analyzer

### 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.

### RELATIVE DENSITY OF COARSE-GRAINED SOILS

(More than 50% retained on No. 200 sieve.)

<table>
<thead>
<tr>
<th>Strength Terms</th>
<th>Automatic Hammer SPT N-Value (Blows/Ft.)</th>
<th>Descriptive Terms</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>

### CONSISTENCY OF FINE-GRAINED SOILS

(50% or more passing the No. 200 sieve.)

Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance.

### GRAIN SIZE TERMINOLOGY

<table>
<thead>
<tr>
<th>Major Component of Sample</th>
<th>Particle Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td>Over 12 in. (300 mm)</td>
</tr>
<tr>
<td>Cobbles</td>
<td>12 in. to 3 in. (300mm to 75mm)</td>
</tr>
<tr>
<td>Gravel</td>
<td>3 in. to #4 sieve (75mm to 4.75 mm)</td>
</tr>
<tr>
<td>Sand</td>
<td>#4 to #200 sieve (4.75mm to 0.075mm)</td>
</tr>
<tr>
<td>Silt or Clay</td>
<td>Passing #200 sieve (0.075mm)</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</td>
<td>15 - 29</td>
</tr>
<tr>
<td>Modifier</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</td>
<td>5 - 12</td>
</tr>
<tr>
<td>Modifier</td>
<td>&gt; 12</td>
</tr>
</tbody>
</table>

### PLASTICITY DESCRIPTION

<table>
<thead>
<tr>
<th>Term</th>
<th>Plasticity Index</th>
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<tr>
<td>Non-plastic</td>
<td>0</td>
</tr>
<tr>
<td>Low</td>
<td>1 - 10</td>
</tr>
<tr>
<td>Medium</td>
<td>11 - 30</td>
</tr>
<tr>
<td>High</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>
**UNIFIED SOIL CLASSIFICATION SYSTEM**

**Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests**

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>Group Symbol</th>
<th>Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Gravels: Less than 5% fines</td>
<td>Cu ≥ 4 and 1 ≤ Cc ≤ 3</td>
<td>GW</td>
</tr>
<tr>
<td>Gravels: More than 5% retained on No. 4 sieve</td>
<td>Cu ≤ 4 and 1 &gt; Cc &gt; 3</td>
<td>GP</td>
</tr>
<tr>
<td>Gravels with Fines: More than 12% fines</td>
<td>Fines classify as ML or MH</td>
<td>GM</td>
</tr>
<tr>
<td></td>
<td>Fines classify as CL or CH</td>
<td>GC</td>
</tr>
<tr>
<td>Gravels: More than 50% coarse fraction retained on No. 4 sieve</td>
<td>Cu ≥ 6 and 1 ≤ Cc ≤ 3</td>
<td>SW</td>
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<tr>
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<td>Cu &lt; 6 and/or 1 &gt; Cc &gt; 3</td>
<td>SP</td>
</tr>
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<td>Fines classify as ML or MH</td>
<td>SM</td>
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<td></td>
<td>Fines classify as CL or CH</td>
<td>SC</td>
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<tr>
<td>Sands: 50% or more of coarse fraction passes No. 4 sieve</td>
<td>Cu ≥ 7 and plots on or above “A” line</td>
<td>CL</td>
</tr>
<tr>
<td></td>
<td>Cu &lt; 4 or plots below “A” line</td>
<td>ML</td>
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<tr>
<td></td>
<td>Liquid limit - oven dried</td>
<td>OL</td>
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<tr>
<td></td>
<td>Liquid limit - not dried</td>
<td>Organic silt</td>
</tr>
<tr>
<td>Inorganic:</td>
<td>PI plots on or above “A” line</td>
<td>CH</td>
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<tr>
<td></td>
<td>PI plots below “A” line</td>
<td>MH</td>
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<td>Organic:</td>
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<td></td>
<td>Liquid limit - not dried</td>
<td>Organic silt</td>
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<td>Silts and Clays: Liquid limit 50 or more</td>
<td>PI plots on or above “A” line</td>
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<td>PI plots below “A” line</td>
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<td>Organic silt</td>
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<tr>
<td>Fine-Grained Soils: 50% or more passes the No. 200 sieve</td>
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<td>PI plots below “A” line</td>
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<td>PI plots below “A” line</td>
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**Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests**

- **Coarse Grained Soils: More than 50% retained on No. 200 sieve**
  - **Gravels:** More than 50% of coarse fraction retained on No. 4 sieve
  - **Clean Gravels:** Less than 5% fines
  - **Gravels with Fines:** More than 12% fines
  - **Clean Sands:** Less than 5% fines
  - **Sands with Fines:** More than 12% fines

- **Fine-Grained Soils:** 50% or more passes the No. 200 sieve
  - **Sils and Clays:** Liquid limit less than 50
  - **Inorganic:** Liquid limit - oven dried
  - **Organic:** Liquid limit - not dried

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

**Equations**

- \( Cu = \frac{D_{60}}{D_{10}} \)
- \( Cc = \frac{(D_{60})^2}{D_{10} \times D_{60}} \)

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

- Equation of “A” - line
  - Horizontal at PL = 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)

**Legend**

- **CL - ML**
- **ML or OL**
- **CH or OH**
- **MH or OH**
- **CL**
- **ML**
- **OL**
- **CH**
- **OH**
- **MH**
- **OL**

**Notes**

- **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** \( Cu = D_{60}/D_{10} \)
- **F** If soil contains ≥ 15% sand, add “with sand” to group name.
- **G** If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.