



**Capital Projects & Purchasing Department  
113 Mable T. Willis Blvd.  
Walterboro, SC 29488  
843.539.1968**

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**BID: CTC-13 2018 Dirt Road Paving  
Durango Lane, Dakota Circle, and Angler Lane**

**BID DUE: Tuesday, December 11, 2018 @ 11:00am**

**ADDENDUM 1**

**DATED: DECEMBER 4, 2018**

The following questions have been submitted for clarification:

- 1) Is there a bidder's list available? **Answer:** NO
- 2) Can the bid date be changed to 12/12 due to the SCDOT letting on 12/11?  
**Answer:** NO. Bid date will remain December 11, 2018 at 11am.
- 3) Is a CAD file available prior to bidding? **Answer:** NO
- 4) There are moving items 1&2 listed on the bid from, but I did not see anywhere that identified what the items were. What are these items? **Answer:** See Sheet 4, General Notes #18 and #19.
- 5) Will DBE & WBE suppliers count toward the DBE goals? If so, will they count 100%?  
**Answer:** Yes, these will count as long as they are on the SCDOT approved list of DBE/WBE's. All dollars paid directly to the DBE/WBE will be counted towards the goal.
- 6) What pay item will the GABC mucking detail on sheet 4 of both plans be paid under? Maintenance stone? Or will it need to be included in muck excavation? **Answer:** Include stone noted in the detail in the MUCK EXCAVATION bid line item.
- 7) Please confirm that we are to clear to the right of way line for both projects per the bid forms. In some areas the Ex. Property Line = R/W line is outside of the NPDES line and way outside of the area needed to install the roadway and ditches. **Answer:** All clearing will be within the NPDES line which generally follows the ROW line. It should also be noted in most locations; the existing ROW is clear and the proposed centerline typically follows the existing and is centered in the ROW.
- 8) Is the borrow material quantity to be used for build-up of the centerline or shoulders? It does not appear as though the quantity is warranted. **Answer:** Centerline build-up will be necessary in locations as shown on the drawings. The unclassified excavation material may be suitable for shoulders as well as the roadway; however, will be determined during construction. Attached to this addendum is the geotechnical report for your use.

# Geotechnical Engineering Report

Colleton County Dirt Road Paving Project  
Colleton County, South Carolina

July 20, 2018

Terracon Project No. 73175080

Prepared for:

Mead & Hunt, Inc.

Lexington, South Carolina

Prepared by:

Terracon Consultants, Inc.

Columbia, South Carolina

Offices Nationwide  
Employee-Owned

Established in 1965  
[terracon.com](http://terracon.com)

# Terracon

July 20, 2018



Mead & Hunt, Inc.  
878 South Lake Drive  
Lexington, South Carolina 29072

Attn: Mr. Zack Haney, P.E.

Re: Geotechnical Engineering Report  
Colleton County Dirt Road Paving Project  
Colleton County, South Carolina  
Terracon Project No. 73175080

Dear Mr. Haney:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our Proposal No. P73175080, dated May 23, 2017 and authorized on April 11, 2018.

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

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

Sincerely,  
**Terracon Consultants, Inc.**

Joseph D.M. Fredendall, E.I.T.  
Staff Engineer

Phillip A. Morrison, P.E.  
Geotechnical Department Manager  
SC Registration No. 17275

Attachments:

Copies: Addressee (1 via email)  
File (1)



Terracon Consultants, Inc. 521 Clemson Road Columbia, South Carolina 29229

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Geotechnical



Environmental



Construction Materials



Facilities

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# GEOTECHNICAL ENGINEERING REPORT COLLETON COUNTY DIRT ROAD PAVING PROJECT COLLETON COUNTY, SOUTH CAROLINA

Terracon Project No. 73175080  
July 20, 2018

## 1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the planned paving of Durango Lane, Dakota Circle, Angler Lane, and Honor Lane in Colleton County, South Carolina. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- pavements
- earthwork

Our geotechnical engineering scope of work for this project included advancing nineteen soil test borings to an approximate depth of 5 feet below the existing roadway surface. Logs of the borings, the Site Location Map and the Boring Location Plan are included in Appendix A of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in Appendix B of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices.

## 2.0 PROJECT DESCRIPTION

### 2.1 Project Description

Item	Description
<b>Pavements</b>	The project will include the surfacing of Durango Lane, Dakota Circle, Angler Lane, and Honor Lane in Colleton County, South Carolina. Honor Lane, Dakota Circle, and Angler Lane have no outlets, Durango Lane serves as access for Dakota Circle, Angler Lane, and Mackerel Court.
<b>Grading</b>	Minimal grading is expected to reshape the existing roadway surface for paving, likely less than 1 foot.
<b>Cut and fill slopes</b>	Assumed to be no steeper than 3H:1V (Horizontal to Vertical)
<b>Traffic data</b>	We were provided with the following traffic data for the pavement thickness determination: <ul style="list-style-type: none"> <li>■ Traffic count: 400 to 600 vehicles per day (use 500 vehicles for analysis)</li> <li>■ Truck percentage: 6%</li> </ul>

## 2.2 Site Location and Description

Item	Description
<b>Location</b>	Durango Lane, Dakota Circle, and Angler Lane are existing rural roads in northeast Colleton County, South Carolina. Honor Lane is an existing rural road in eastern Colleton County. The roadway locations are shown on Exhibits A-1 and A-2 in Appendix A. The approximate road lengths are as follows: <ul style="list-style-type: none"> <li>■ Durango Lane - 4,280 LF</li> <li>■ Dakota Circle - 1,580 LF</li> <li>■ Angler Lane - 1,215 LF</li> <li>■ Honor Lane - 3,430 LF</li> </ul>
<b>Existing Improvements</b>	The subject roadways are two-lane, unpaved roadways. Drainage ditches are present along the shoulders of the roadways.
<b>Current ground cover</b>	Each roadway has a soil surface.
<b>Existing topography</b>	Detailed topography has not been provided. Based on USGS data and our field observations, the topography along each roadway is relatively flat.
<b>Existing roadway condition</b>	At the time of our exploration Durango Lane, Dakota Circle, and Angler Lane had just been regraded and appear to generally in good condition. Honor Lane appears to generally be in fair to good condition with some areas of rutting and potholes near the intersection with State Road S-15-91.
<b>Utilities</b>	Fiber-optic communications lines run within the roadways. An abandoned coaxial cable line was observed in some areas where it had been exposed by previous roadway maintenance. No other utilities were present at the time of our exploration.

## 3.0 SUBSURFACE CONDITIONS

### 3.1 Geology

The site is located in the lower western Coastal Plain physiographic province of South Carolina. The Coastal Plain is a wedge-shaped cross-section of water and wind deposited soil. Its thickness ranges from a featheredge at the surface contact of the Piedmont (Fall Line) to several thousand feet at the present-day coastline. The sediments range in age from the Cretaceous and Tertiary periods at the contact with the bedrock to the recent period at the present coastline. The sediments include clays, silts, sands, and gravels, as well as organics.

### 3.2 Typical Subsurface Profile

Specific conditions encountered at each boring location are indicated on the individual boring logs included in Appendix A of this report. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

#### 3.2.1 Durango Lane, Dakota Circle and Angler Lane (Borings B-1 to B-12)

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Consistency/Density
Stratum 1	1-½ to 3-½	Silty sand	Loose to medium dense
Stratum 2	5 <sup>1</sup>	Clayey sand	Loose to medium dense

1. Maximum depth of exploration

#### 3.2.2 Honor Lane (Borings B-13 to B-19)

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Consistency/Density
Stratum 1	5 <sup>1</sup>	Silty sand	Loose to medium dense

1. Maximum depth of exploration

### 3.3 Groundwater Conditions

Groundwater was not observed in any test boring at the time of field exploration. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

## 4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

### 4.1 General Discussion

The boring data indicates existing subgrade conditions that are generally compatible with the intended construction of a flexible pavement. As the roadway subgrades are loose to medium dense, initial compaction of the subgrades should be planned throughout the length of the roadway. Proofrolling after the completion of the compaction process will aid in identifying areas that additional work. The areas containing the loosest soils may require additional reworking such as partial removal and replacement of the upper portion of the layer may be needed to directly expose the lower portion to compactive effort and fully

compact the layer. The boring data indicates this may be needed in such areas as Borings B-3, B-5 and B15.

In the following sections of this report, we have provided geotechnical engineering recommendations for the pavements. The recommendations contained in this report are based upon the results of data presented herein, engineering analyses, and our current understanding of the proposed project.

## **4.2 Pavements**

### **4.2.1 Pavement Thickness Design**

If the proposed roadway subgrades are prepared as described in this report, a conventional flexible pavement section can be used for the proposed project. In order for pavements to perform satisfactorily, the subgrade soils must have sufficient strength and stability to support construction and design traffic loading.

Based on the laboratory data and considering variations in the soil along the roadway and in moisture content throughout the year, the site soils or new compacted structural fill of similar properties should provide a CBR value of at least 3 (SSV of 1.7) once compacted. This value assumes that the existing subgrade soils have been proofrolled in the presence of a Terracon representative to delineate areas of loose subgrade conditions and that those identified areas are repaired. This also assumes that the upper 12 inches of the pavement subgrade will be compacted to at least 95 percent of the material's standard Proctor maximum dry unit weight. Finally, it presumes that the civil design will provide adequate drainage to avoid the saturation of the pavement subgrades.

The following pavement sections are based on the provided traffic loading, frequencies, and pavement design life provided to us. The information provided to us includes the following:

- Design load: 500 vehicles per day
- Percentage of trucks: 6%
- Design period: 20 years

Based on our field observations of the existing site development (predominately rural residential), we have used Road Group C to characterize the truck traffic. Should development conditions of the area served by the subject roads be modified, an alternate road group may apply. The noted traffic loading, volume and design period result in a total pavement loading of about 31,000 ESALs. The recommended pavement section is presented in the table below.



Pavement Components	Pavement Thickness
HMA Surface Course <sup>1</sup>	200 psy
HMA Intermediate Course <sup>1</sup>	200 psy
Macadam Aggregate Base Course <sup>1</sup>	6 inches

1. See “General Design Recommendations” section below.

#### **4.2.2 General Design Recommendations**

Aggregate base course should be SCDOT Graded Aggregate Base (SCDOT Section 305). Asphaltic cement concrete should be an approved mix design selected from the current SCDOT Standard Type C (SCDOT Sections 402 and 403). Compaction levels of the asphalt and Macadam Base Course materials should conform to SCDOT requirements.

The above sections represent a minimum design thickness and as such periodic maintenance should be anticipated. Higher traffic volumes and/or higher truck percentages may require thicker pavement sections. Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the roadway could saturate the subgrade and contribute to premature pavement deterioration. We recommend preventing construction traffic on areas of partial thickness pavement. Heavy loaded vehicles operation on this surface will cause significant damage resulting in deterioration and reduction in pavement life.

Future performance of pavements constructed on the site will be dependent upon maintaining stable moisture content of the subgrade soils; and, providing for a planned program of preventative maintenance. The performance of all pavements can be enhanced by minimizing excess moisture that can reach the subgrade soils. The following design recommendations should be considered at minimum:

- Site grading at a minimum 2% grade away from the pavements;
- The subgrade and the pavement surface have a minimum ¼ inch per foot cross slope to promote proper surface drainage.

#### **4.2.3 General Construction Considerations**

Pavement subgrades carefully evaluated as the time for pavement construction. We recommend the pavement areas be rough graded and then thoroughly proofrolled with a loaded tandem-axle dump truck. Areas where unsuitable conditions are located should be repaired by replacing the materials with properly compacted fill.

Preventative maintenance should be planned and provided through an on-going pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment.

Preventative maintenance consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Preventative maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventative maintenance.

### **4.3 Earthwork**

The following presents recommendations for site preparation, excavation, subgrade preparation, and placement of engineered fills on the project. The recommendations presented for design and construction of the pavement system is contingent upon following the recommendations outlined in this section.

Earthwork on this project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, and other geotechnical conditions exposed during the construction of the project.

#### **4.3.1 Site Preparation**

Any vegetation and other unsuitable materials should be stripped and removed from the area to be paved. The stripping should extent to at least 5 feet beyond the construction limits. Once the contractor's stripping activities near completion, we recommend that our representative observe the subgrade to identify any remaining pockets of organics that should be removed.

Special precautions should be made to remove all underground utilities and their associated backfill as the new building's foundations or pavements may overlay these materials. Care should be given to locating and addressing these items during the site preparation phase of the project. If overlooked, they could be detrimental to the long-term performance of the building or pavements.

#### **4.3.2 Subgrade Preparation**

The exposed subgrades prior to any pavement/base related work should be uniformly compacted to at least 95 percent of the soil's standard Proctor maximum dry unit weight. The compaction of the subgrade soils will require the use of a heavy vibratory pad-foot roller with a minimum energy rating of 60,000 foot-pounds. The number of passes needed to achieve the recommended compaction level will depend on several factors including soil moisture, percentage of fines in the soil, and the applied energy. The as-received samples were moist but may require some moisture conditioning to better facilitate compaction. The target moisture content should be between -2% and +2% of the optimum moisture content. The effectiveness of the compaction efforts should be evaluated in the field. This should include density testing of the in-place compacted soils prior to any fill placement.

After compaction, the entire subgrade of the roadway should then be proofrolled to check for unstable soil conditions. Proofrolling should be performed with a heavily loaded tandem axle dump truck, scraper or with similar approved construction equipment under the observation of a geotechnical engineer. Any areas that deflect excessively and cannot be stabilized by further rolling should be undercut, the exposed subgrade compacted, and then backfilled with structural fill placed and compacted as recommended herein. Such effort may be necessary in the areas of Borings B-3 B-5 and B-15, as well as other areas of similar soil consistency. Placement of any additional structural fill may commence after the compaction/densification and proofrolling have been successfully completed.

The majority of the roadways are composed of silty sands which can become unstable when exposed to construction traffic, especially after periods of inclement weather or during colder periods of the year. Traffic exposure to wet subgrades can destabilize what would have been otherwise satisfactory conditions, requiring further repair. As a precaution, subgrades should not be exposed to construction traffic after periods of precipitation to allow them to dry. This should help to reduce the amount of subgrade repairs.

### **4.3.3 Utility Roadway Crossings**

Excavations for roadway utility crossings should be based upon the type of pipe and manufacturer’s recommendations. Additionally, where necessary, we recommend utility crossings be installed in general accordance with SCDOT Supplemental Technical Specifications for Permanent Pipe Culverts (SC-M-714). Backfill for the excavation should consist of properly compacted fill as defined in Section 4.3.4. Excavations and backfilling for utility crossings should be conducted prior to proofrolling roadway subgrades.

### **4.3.4 Material Types**

Engineered fill should meet the following material property requirements:

<b>Fill Type<sup>1</sup></b>	<b>USCS Classification</b>	<b>Acceptable Location for Placement</b>
<b>Imported Structural Fill</b>	SM or SC	All locations and elevations
<b>On-Site Soils (less organics and debris)</b>	SM or SC	All locations and elevations

1. Controlled, compacted structural fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the geotechnical engineer for evaluation.

### 4.3.5 Compaction Requirements

Item	Description
<b>Fill Lift Thickness</b>	8 inches or less in loose thickness
<b>Compaction Requirements<sup>1</sup></b>	95 percent of the material's standard Proctor maximum dry density (ASTM D 698)
<b>Moisture Content</b>	Within the range of -2 percent or +2 percent of the optimum moisture content as determined by the standard proctor test at the time of placement and compaction

1. We recommend that engineered fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.

### 4.3.6 Excavation

The boring data indicate that the site soils should generally be excavatable to the explored depth of 5 feet using conventional construction equipment. Trenches and other shallow excavations can be performed using rubber-tired back-hoes.

As a minimum, all temporary excavations should be sloped or braced as required by Occupational Health and Safety Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Construction site safety is the sole responsibility of the contractor who controls the means, methods and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean that Terracon is assuming any responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

### 4.3.7 Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to pavement construction.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proofrolling; placement and compaction of controlled compacted fills; backfilling of excavations into the completed subgrade, and just prior to construction of pavements.

## **5.0 GENERAL COMMENTS**

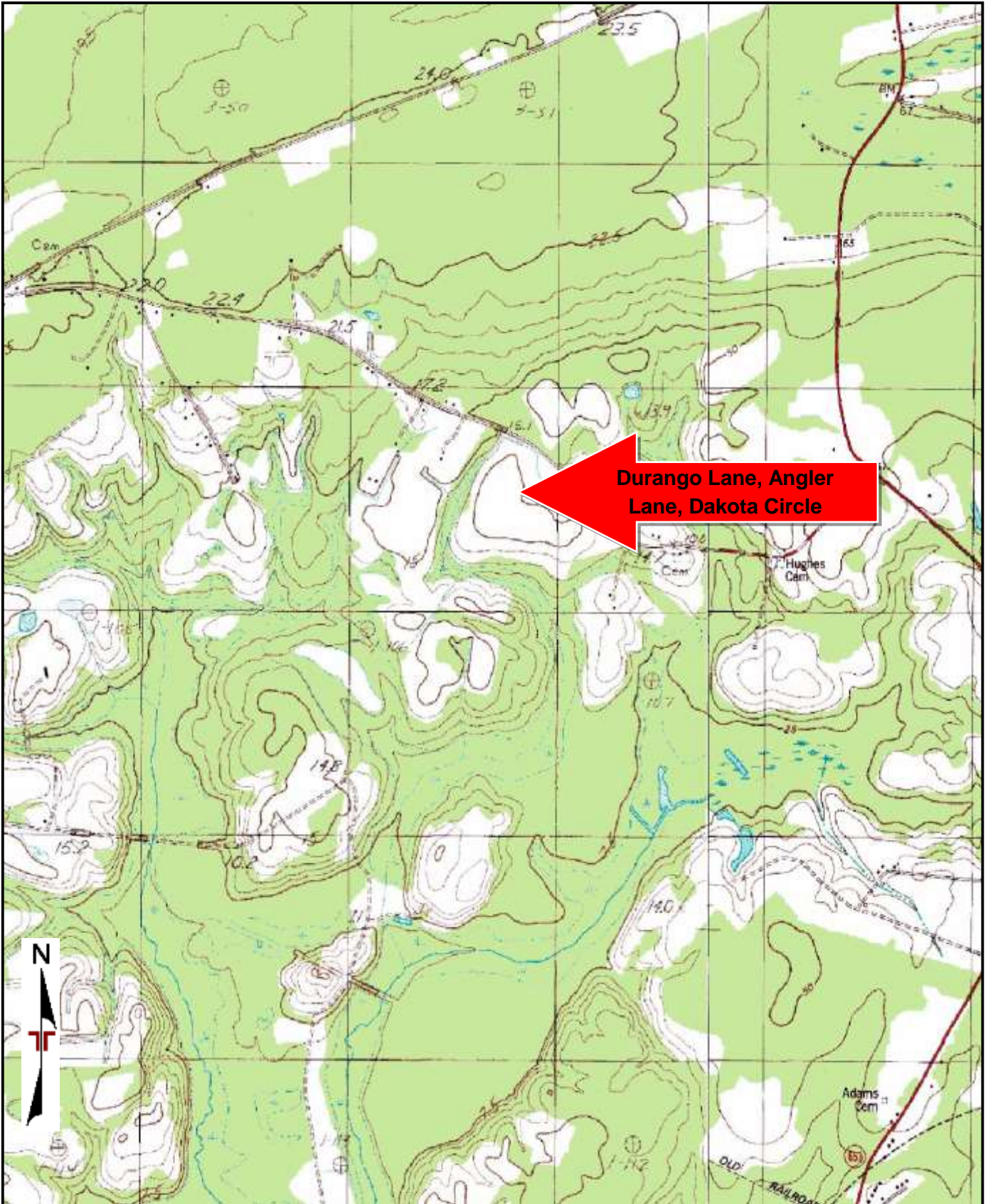
Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

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

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

**APPENDIX A**  
**FIELD EXPLORATION**



**Durango Lane, Angler Lane, Dakota Circle**

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY  
 QUADRANGLES INCLUDE: ROUND O, SC (1/1/1988) and COTTAGEVILLE, SC (1/1/1980).

Project Manager:	JDF
Drawn by:	PTK
Checked by:	JDF
Approved by:	PAM
Project No.:	73175080
Scale:	1"=2,000'
File Name:	A-1 & A-3
Date:	July 2018

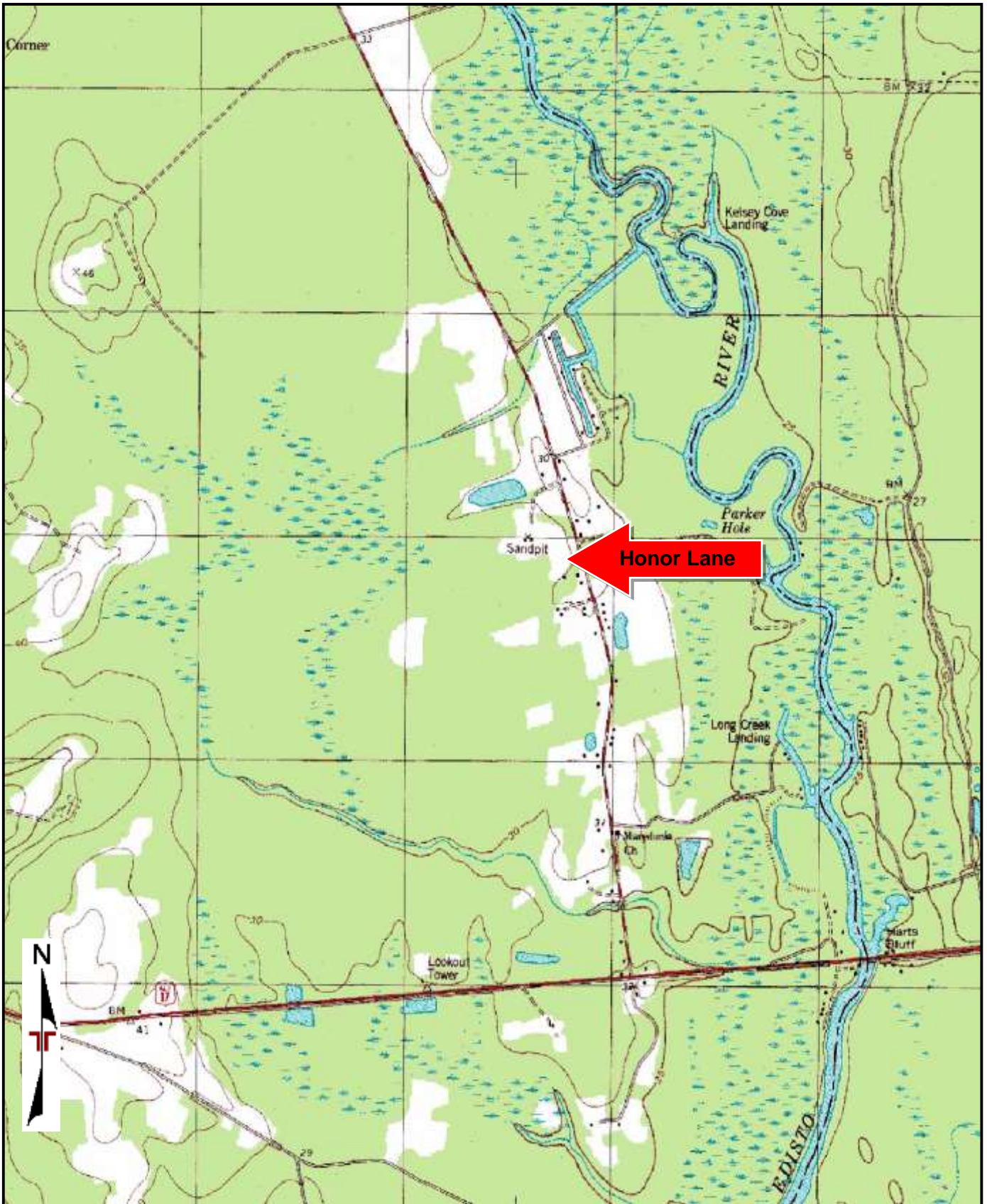
**Terracon**

521 Clemson Rd  
 Columbia, SC 29229-4307

**SITE LOCATION MAP**

Colleton County Dirt Road Paving  
 Colleton County, South Carolina

Exhibit
<b>A-1</b>



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY  
 QUADRANGLES INCLUDE: COTTAGEVILLE, SC (1/1/1980).

Project Manager:	JDF
Drawn by:	PTK
Checked by:	JDF
Approved by:	PAM
Project No.:	73175080
Scale:	1"=2,000'
File Name:	A-2 & A-4
Date:	July 2018

**Terracon**  
 521 Clemson Rd  
 Columbia, SC 29229-4307

**SITE LOCATION MAP**

Colleton County Dirt Road Paving  
 Colleton County, South Carolina

Exhibit
<b>A-2</b>



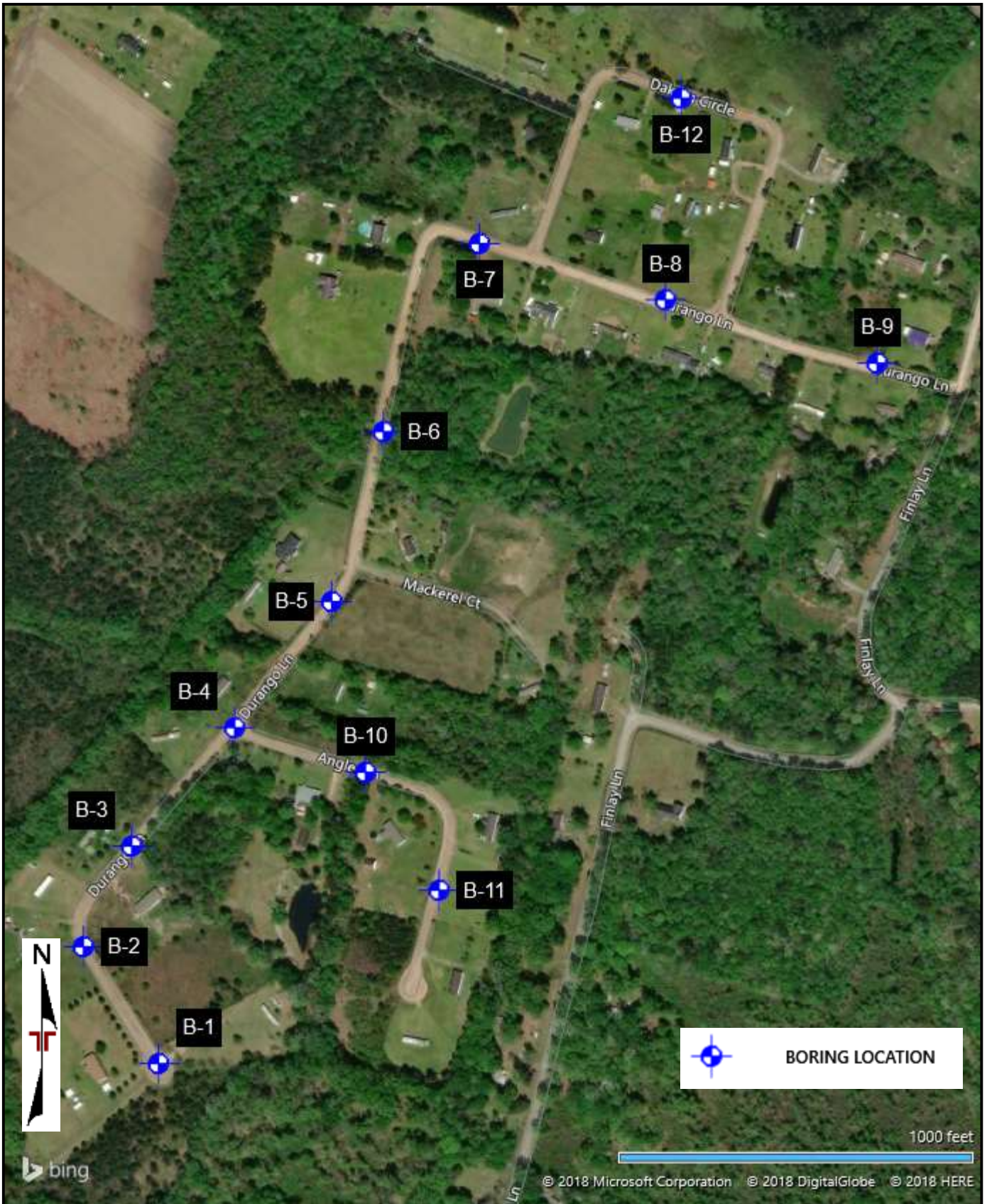


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager:	JDF
Drawn by:	PTK
Checked by:	JDF
Approved by:	PAM
Project No.:	73175080
Scale:	AS SHOWN
File Name:	A-1 & A-3
Date:	July 2018

**Terracon**  
 521 Clemson Rd  
 Columbia, SC 29229-4307

**EXPLORATION PLAN**

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Colleton County Dirt Road Paving  
 Colleton County, South Carolina

Exhibit

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**A-3**



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager:	JDF
Drawn by:	PTK
Checked by:	JDF
Approved by:	PAM
Project No.	73175080
Scale:	AS SHOWN
File Name:	A-2 & A-4
Date:	July 2018

**Terracon**  
 521 Clemson Rd  
 Columbia, SC 29229-4307

**EXPLORATION PLAN**

Colleton County Dirt Road Paving  
 Colleton County, South Carolina

Exhibit
<b>A-4</b>

### **Field Exploration**

Nineteen (19) test borings were drilled at the site on July 18, 2018. The borings were drilled to an approximate depth of 5 feet below the ground surface at the approximate locations shown on the boring location plans, Exhibits A-3 and A-4.

The test borings were located as follows:

<b>Borings</b>	<b>Location</b>	<b>Depths (feet)</b>
B-1 to B-9	Durango Lane	5
B-10 and B-11	Angler Lane	5
B-12	Dakota Circle	5
B-13 to B-19	Honor Lane	5

The borings were located in the field by using the proposed site plan and an aerial photograph of the site. Distances were measured from the various identifiable structures on the noted sources. As no topographic information was provided for the site, no elevations are indicated on the boring logs. The boring locations shown on the Boring Location Plan are approximate and should be considered accurate only to the degree implied by the method of location.

The test borings were advanced with a truck-mounted CME-45C drill rig utilizing 2-¼-inch inside diameter hollow-stem augers. Penetration resistance measurements were obtained by driving the split-spoon samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency or relative density of materials encountered. At selected intervals, samples of the subsurface materials were taken by driving split-spoon samplers.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Continuous lithologic logs of each boring were recorded by our field engineer during the drilling operations. Representative disturbed soil samples were obtained from the borings and were placed in sealed containers and returned to our laboratory where our engineer visually reviewed and classified them. The purposes of this review were to check the drillers' field classifications and visually estimate the soils' relative constituents (sand, clay, etc.). The soil types and

## **Geotechnical Engineering Report**

Colleton County Dirt Road Paving Project ■ Colleton County, SC  
July 20, 2018 ■ Terracon Project No. 73175080



penetrometer values are shown on the Boring Logs. These records represent our interpretation of the field conditions based on the driller's field logs and our engineer's review of the soil samples. The lines designating the interfaces between various strata represent approximate boundaries only, as transitions between materials may be gradual.

Groundwater conditions were evaluated in each boring at the time of site exploration. At the completion of drilling, the boreholes were checked for the presence of groundwater. After which, the borings were backfilled with the auger cuttings.

Our exploration services include storing the collected soil samples and making them available for inspection for 60 days from the report date. The samples will then be discarded unless requested otherwise.

# BORING LOG NO. B-1

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.968° Longitude: -80.514°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
0.0	<b>SILTY SAND</b> , fine to medium grained, light brown, medium dense to loose			X	5-10-10 N=20				
3.0				X	3-2-5 N=7				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light reddish brown, loose			X	3-2-5 N=7	18	40-18-22	43	
	<b>Boring Terminated at 5 Feet</b>	5							

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

<b>WATER LEVEL OBSERVATIONS</b>
<i>No free water observed at end of drilling</i>



Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-6

# BORING LOG NO. B-2

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9689° Longitude: -80.5147°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
0.0	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	3-4-4 N=8				
3.0				X	3-2-6 N=8				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light reddish brown, loose			X	3-4-5 N=9				
	<b>Boring Terminated at 5 Feet</b>	5							

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018

Boring Completed: 06-18-2018

Drill Rig: CME-45C

Driller: S. Blair

Project No.: 73175080

Exhibit: A-7

# BORING LOG NO. B-3

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9697° Longitude: -80.5142°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, loose			X	4-3-2 N=5				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light reddish brown, loose			X	3-2-3 N=5	22	55-22-33	40	
5.0	<b>Boring Terminated at 5 Feet</b>	5		X	3-4-5 N=9				

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Notes:	
Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-8

# BORING LOG NO. B-4

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**

**Colleton County, South Carolina**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9706° Longitude: -80.5133°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	6-4-5 N=9			
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light reddish brown, loose			X	5-5-3 N=8	15		36
5.0	<b>Boring Terminated at 5 Feet</b>	5		X	4-4-4 N=8			

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

See Exhibit A-5 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.

Notes:

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-9



# BORING LOG NO. B-5

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**

Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9716° Longitude: -80.5124°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
0.0	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	5-3-3 N=6				
3.5				X	2-3-4 N=7				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light brown, medium dense			X	2-3-8 N=11				
	<b>Boring Terminated at 5 Feet</b>	5							
Stratification lines are approximate. In-situ, the transition may be gradual.					Hammer Type: Automatic				

Advancement Method:  
2-1/4" Hollow Stem Auger

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

See Exhibit A-5 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.

Notes:

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-10

# BORING LOG NO. B-6

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9729° Longitude: -80.5119°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	5-5-3 N=8				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light brownish red, medium dense to loose			X	5-7-8 N=15	22	54-21-33	39	
5.0	<b>Boring Terminated at 5 Feet</b>	5		X	1-3-6 N=9				
Stratification lines are approximate. In-situ, the transition may be gradual.						Hammer Type: Automatic			

Advancement Method: 2-1/4" Hollow Stem Auger	See Exhibit A-5 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.	Notes:
Abandonment Method: Boring backfilled with auger cuttings upon completion.		
<b>WATER LEVEL OBSERVATIONS</b> <i>No free water observed at end of drilling</i>	521 Clemson Rd Columbia, SC	Boring Started: 06-18-2018 Boring Completed: 06-18-2018 Drill Rig: CME-45C Driller: S. Blair Project No.: 73175080 Exhibit: A-11

# BORING LOG NO. B-7

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9743° Longitude: -80.511°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	3-4-4 N=8				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light reddish brown, loose			X	6-4-5 N=9				
	<b>Boring Terminated at 5 Feet</b>	5		X	3-3-5 N=8				

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018

Boring Completed: 06-18-2018

Drill Rig: CME-45C

Driller: S. Blair

Project No.: 73175080

Exhibit: A-12

# BORING LOG NO. B-8

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9739° Longitude: -80.5093°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, medium dense			X	6-7-4 N=11				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light brownish red, medium dense to loose			X	2-7-4 N=11	17	38-17-21	39	
5.0	<b>Boring Terminated at 5 Feet</b>	5		X	2-3-6 N=9				
Stratification lines are approximate. In-situ, the transition may be gradual.					Hammer Type: Automatic				

Advancement Method: 2-1/4" Hollow Stem Auger	See Exhibit A-5 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix C for explanation of symbols and abbreviations.
<b>WATER LEVEL OBSERVATIONS</b> <i>No free water observed at end of drilling</i>	

**Terracon**

521 Clemson Rd  
Columbia, SC

Notes:	
Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-13

# BORING LOG NO. B-9

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9734° Longitude: -80.5074°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	6-5-4 N=9				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light reddish brown, medium dense			X	2-4-8 N=12				
	<b>Boring Terminated at 5 Feet</b>	5		X	3-3-7 N=10				
Stratification lines are approximate. In-situ, the transition may be gradual.					Hammer Type: Automatic				

Advancement Method: 2-1/4" Hollow Stem Auger	See Exhibit A-5 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix C for explanation of symbols and abbreviations.
<b>WATER LEVEL OBSERVATIONS</b> <i>No free water observed at end of drilling</i>	

<p style="font-size: small; margin: 0;">521 Clemson Rd Columbia, SC</p>		Notes:  Boring Started: 06-18-2018 Drill Rig: CME-45C Project No.: 73175080	Boring Completed: 06-18-2018 Driller: S. Blair Exhibit: A-14
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# BORING LOG NO. B-10

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9703° Longitude: -80.5121°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	3-5-3 N=8				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light reddish brown, loose to medium dense			X	3-4-3 N=7				
5.0	<b>Boring Terminated at 5 Feet</b>	5		X	5-4-7 N=11				
Stratification lines are approximate. In-situ, the transition may be gradual.					Hammer Type: Automatic				

Advancement Method: 2-1/4" Hollow Stem Auger	See Exhibit A-5 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix C for explanation of symbols and abbreviations.
<b>WATER LEVEL OBSERVATIONS</b> No free water observed at end of drilling	

**Notes:**

Boring Started: 06-18-2018  
 Drill Rig: CME-45C  
 Project No.: 73175080

521 Clemson Rd  
 Columbia, SC

Boring Completed: 06-18-2018  
 Driller: S. Blair  
 Exhibit: A-15

# BORING LOG NO. B-11

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9694° Longitude: -80.5114°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, loose			X	5-3-6 N=9				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light brownish red, loose to medium dense			X	3-4-4 N=8				
				X	3-4-6 N=10				
	<b>Boring Terminated at 5 Feet</b>	5							

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018

Boring Completed: 06-18-2018

Drill Rig: CME-45C

Driller: S. Blair

Project No.: 73175080

Exhibit: A-16

# BORING LOG NO. B-12

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-3 Latitude: 32.9755° Longitude: -80.5092°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
1.5	<b>SILTY SAND</b> , fine to medium grained, light brown, medium dense			X	2-4-7 N=11				
5.0	<b>CLAYEY SAND</b> , fine to medium grained, light brownish red, loose to medium dense			X	3-4-4 N=8				
	<b>Boring Terminated at 5 Feet</b>	5		X	1-2-9 N=11				
Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Automatic									

Advancement Method: 2-1/4" Hollow Stem Auger	See Exhibit A-5 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix C for explanation of symbols and abbreviations.
<b>WATER LEVEL OBSERVATIONS</b> No free water observed at end of drilling	

**Terracon**

521 Clemson Rd  
Columbia, SC

Notes:	
Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-17



# BORING LOG NO. B-13

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-4 Latitude: 32.9383° Longitude: -80.4213°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, medium dense			X	6-7-4 N=11				
				X	5-7-7 N=14				
				X	8-8-12 N=20				
	5.0 <b>Boring Terminated at 5 Feet</b>	5							

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018

Boring Completed: 06-18-2018

Drill Rig: CME-45C

Driller: S. Blair

Project No.: 73175080

Exhibit: A-18

# BORING LOG NO. B-14

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-4 Latitude: 32.9395° Longitude: -80.4213°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, loose to medium dense			X	5-9-6 N=15				
				X	4-6-3 N=9				
				X	4-4-6 N=10				
5.0	<b>Boring Terminated at 5 Feet</b>	5							

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018

Boring Completed: 06-18-2018

Drill Rig: CME-45C

Driller: S. Blair

Project No.: 73175080

Exhibit: A-19

# BORING LOG NO. B-15

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-4 Latitude: 32.9404° Longitude: -80.4212°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, loose			X	3-2-3 N=5				
				X	3-4-3 N=7				
				X	2-4-4 N=8				
	5.0 <b>Boring Terminated at 5 Feet</b>	5							

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*

521 Clemson Rd  
Columbia, SC

Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-20

# BORING LOG NO. B-16

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON.DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-4 Latitude: 32.9412° Longitude: -80.4197°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
2.0	<b>WELL GRADED SAND WITH SILT</b> , fine to medium grained, light brown, loose			X	2-9-1 N=10			
5.0	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, loose to medium dense			X	3-5-4 N=9	15		10
				X	4-4-7 N=11			
	<b>Boring Terminated at 5 Feet</b>	5						

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018

Boring Completed: 06-18-2018

Drill Rig: CME-45C

Driller: S. Blair

Project No.: 73175080

Exhibit: A-21

# BORING LOG NO. B-17

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-4 Latitude: 32.9415° Longitude: -80.4183°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
5.0	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, medium dense	5		X	3-4-5 N=9				
				X	5-8-11 N=19				
				X	7-9-11 N=20				
	<b>Boring Terminated at 5 Feet</b>								

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

See Exhibit A-5 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.

Notes:

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-22

# BORING LOG NO. B-18

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-4 Latitude: 32.942° Longitude: -80.4164°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, loose to medium dense			X	5-6-11 N=17				
				X	9-10-8 N=18	10		16	
				X	5-8-11 N=19				
	5.0	5							
	<b>Boring Terminated at 5 Feet</b>								
Stratification lines are approximate. In-situ, the transition may be gradual.					Hammer Type: Automatic				

Advancement Method: 2-1/4" Hollow Stem Auger	See Exhibit A-5 for description of field procedures See Appendix B for description of laboratory procedures and additional data (if any).
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix C for explanation of symbols and abbreviations.
<b>WATER LEVEL OBSERVATIONS</b> <i>No free water observed at end of drilling</i>	

**Terracon**

521 Clemson Rd  
Columbia, SC

Notes:	
Boring Started: 06-18-2018	Boring Completed: 06-18-2018
Drill Rig: CME-45C	Driller: S. Blair
Project No.: 73175080	Exhibit: A-23

# BORING LOG NO. B-19

**PROJECT:** Colleton County Dirt Road Paving Project

**CLIENT:** Mead & Hunt  
Lexington, South Carolina

**SITE:**  
Colleton County, South Carolina

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 73175080 - COLLETON COUNTY DIRT ROAD PAVING.GPJ TERRACON\_DATATEMPLATE.GDT 7/20/18

GRAPHIC LOG	LOCATION See Exhibit A-4 Latitude: 32.9427° Longitude: -80.414°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
5.0	<b>SILTY SAND</b> , fine to medium grained, light brown to light brownish red, medium dense			X	3-5-7 N=12				
				X	6-7-9 N=16				
				X	3-6-7 N=13				
	<b>Boring Terminated at 5 Feet</b>	5							

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

Hammer Type: Automatic

Advancement Method:  
2-1/4" Hollow Stem Auger

See Exhibit A-5 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.

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

**WATER LEVEL OBSERVATIONS**  
*No free water observed at end of drilling*



Boring Started: 06-18-2018

Boring Completed: 06-18-2018

Drill Rig: CME-45C

Driller: S. Blair

Project No.: 73175080

Exhibit: A-24

**APPENDIX B**  
**LABORATORY TESTING**



**Geotechnical Engineering Report**

Colleton County Dirt Road Paving Project ■ Colleton County, SC  
July 20, 2018 ■ Terracon Project No. 73175080



**Laboratory Testing Description**

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix C. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. Selected bulk samples of the site soils were combined to make composite samples, and these composite samples were tested in the laboratory. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- |   |                                |               |
|---|--------------------------------|---------------|
| ■ | Percent Fines                  | ASTM D1140-06 |
| ■ | Atterberg Limits               | ASTM D4318-10 |
| ■ | Moisture Content Determination | ASTM D2216-10 |
















**APPENDIX C**  
**SUPPORTING DOCUMENTS**

# GENERAL NOTES

## DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

<b>SAMPLING</b>			<b>WATER LEVEL</b>		Water Initially Encountered	<b>FIELD TESTS</b>	(HP) Hand Penetrometer	
	<b>Auger</b>	<b>Split Spoon</b>			Water Level After a Specified Period of Time		(T) Torvane	
					Water Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)	
	<b>Shelby Tube</b>	<b>Macro Core</b>		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.			(PID) Photo-Ionization Detector	
							(OVA) Organic Vapor Analyzer	
<b>Ring Sampler</b>	<b>Rock Core</b>							
								
<b>Grab Sample</b>	<b>No Recovery</b>							

## 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.

<b>STRENGTH TERMS</b>	<b>RELATIVE DENSITY OF COARSE-GRAINED SOILS</b> (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			<b>CONSISTENCY OF FINE-GRAINED SOILS</b> (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

## RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 - 29
Modifier	> 30

## GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

## RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 - 12
Modifier	> 12

## PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

# UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>				Soil Classification		
				Group Symbol	Group Name <sup>B</sup>	
<b>Coarse Grained Soils:</b> More than 50% retained on No. 200 sieve	<b>Gravels:</b> More than 50% of coarse fraction retained on No. 4 sieve	<b>Clean Gravels:</b> Less than 5% fines <sup>C</sup>	$Cu \geq 4$ and $1 \leq Cc \leq 3$ <sup>E</sup>	GW	Well-graded gravel <sup>F</sup>	
		<b>Gravels with Fines:</b> More than 12% fines <sup>C</sup>	Fines classify as ML or MH	GP	Poorly graded gravel <sup>F</sup>	
			Fines classify as CL or CH	GM	Silty gravel <sup>F,G,H</sup>	
		<b>Sands:</b> 50% or more of coarse fraction passes No. 4 sieve	<b>Clean Sands:</b> Less than 5% fines <sup>D</sup>	$Cu \geq 6$ and $1 \leq Cc \leq 3$ <sup>E</sup>	GC	Clayey gravel <sup>F,G,H</sup>
	<b>Sands with Fines:</b> More than 12% fines <sup>D</sup>		Fines classify as ML or MH	SW	Well-graded sand <sup>I</sup>	
			Fines classify as CL or CH	SP	Poorly graded sand <sup>I</sup>	
	<b>Silts and Clays:</b> Liquid limit less than 50		<b>Inorganic:</b>	$PI > 7$ and plots on or above "A" line <sup>J</sup>	SM	Silty sand <sup>G,H,I</sup>
		<b>Organic:</b>	Liquid limit - oven dried < 0.75	SC	Clayey sand <sup>G,H,I</sup>	
<b>Fine-Grained Soils:</b> 50% or more passes the No. 200 sieve	<b>Silts and Clays:</b> Liquid limit 50 or more	<b>Inorganic:</b>	$PI < 4$ or plots below "A" line <sup>J</sup>	CL	Lean clay <sup>K,L,M</sup>	
		<b>Organic:</b>	Liquid limit - not dried < 0.75	ML	Silt <sup>K,L,M</sup>	
			$PI$ plots on or above "A" line	OL	Organic clay <sup>K,L,M,N</sup>	
		<b>Silts and Clays:</b> Liquid limit 50 or more	<b>Inorganic:</b>	$PI$ plots below "A" line	OH	Organic silt <sup>K,L,M,O</sup>
	<b>Organic:</b>		Liquid limit - oven dried < 0.75	CH	Fat clay <sup>K,L,M</sup>	
			Liquid limit - not dried < 0.75	MH	Elastic Silt <sup>K,L,M</sup>	
	<b>Highly organic soils:</b>		Primarily organic matter, dark in color, and organic odor			OH
					PT	Organic silt <sup>K,L,M,Q</sup>
<b>Highly organic soils:</b>				PT	Peat	

<sup>A</sup> Based on the material passing the 3-inch (75-mm) sieve

<sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup> 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.

<sup>D</sup> 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

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

<sup>F</sup> If soil contains  $\geq 15\%$  sand, add "with sand" to group name.

<sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>H</sup> If fines are organic, add "with organic fines" to group name.

<sup>I</sup> If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.

<sup>J</sup> If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

<sup>K</sup> If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

<sup>L</sup> If soil contains  $\geq 30\%$  plus No. 200 predominantly sand, add "sandy" to group name.

<sup>M</sup> If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup>  $PI \geq 4$  and plots on or above "A" line.

<sup>O</sup>  $PI < 4$  or plots below "A" line.

<sup>P</sup>  $PI$  plots on or above "A" line.

<sup>Q</sup>  $PI$  plots below "A" line.

