Re: Preliminary Report of Subsurface Exploration and Geotechnical Engineering Analysis
North Eastern Strategic Alliance (NESA)
Alligator Industrial Site
Chesterfield County, South Carolina

ECS Project No.: 34.1879

As authorized by your acceptance of our proposal numbered 34.1200-GEP-R1 dated October 29, 2014, ECS Carolinas, LLP (ECS) has completed a subsurface exploration and geotechnical engineering analysis for the subject project. This report presents the results of the field exploration and engineering analysis, along with our recommendations for design of geotechnical related items.

We appreciate the opportunity to be of service to you during this phase of this project and look forward to our continued involvement during the design and construction phase. If you have any questions concerning the information and recommendations presented in this report, please contact us at (843) 654-4448 for further assistance.

Respectfully submitted,

ECS CAROLINAS, LLP

Laura Hill, EIT
Project Manager

Meredith L. Long, P.E.
Geotechnical Department Manager
South Carolina License No. 28188

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Principal Engineer
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1.0 EXECUTIVE SUMMARY

This report contains the results of our preliminary subsurface exploration and geotechnical engineering analysis for the proposed Alligator Industrial Site in Chesterfield County, South Carolina. The site is approximately 497 acres of farmland and woodland. Structural loading conditions were not available at the time of this report; however, based on our experience, we anticipate column loads of 150 kips or less and wall loads on the order of 7 kips/foot would be typical for the type of construction anticipated. Topographic information was not available at the time of this report; however, we anticipate that cuts and fills up to 2 feet may be required to meet finished elevations.

Initially, the exploration encountered 10 to 18 inches of organic laden topsoil and cultivated soils. Below the surface materials, the exploration generally encountered very loose to very dense sand with varying amounts of silt and clay to the termination depth of the deepest sounding at approximately 50 feet below existing grade. Within the sand in sounding C-4, a firm to stiff clay layer was encountered from approximately 33 to 35 feet. All the soundings with exception of sounding C-4 were terminated at approximately 25 ft below the existing ground surface.

Preliminary considerations for foundation and slab support have been provided in this report. Once site grades and structural loads are finalized, additional exploration will be required for final foundation recommendations. In general for foundations designed and constructed in accordance with the recommendations provided in this report, we anticipate a net allowable soil bearing pressure of 1,500 to 2,500 pounds per square foot (psf).

Specific information regarding the subsurface exploration procedures used, the site and subsurface conditions at the time of our exploration, and our conclusions and recommendations concerning the geotechnical design and construction aspects of the project are discussed in detail in the subsequent sections of this report. Please note this Executive Summary is an important part of this report and should be considered a “summary” only. The subsequent sections of this report constitute our findings, conclusions, and recommendations in their entirety.

Prepared By:       Senior Review By:
Laura Hill, EIT       Meredith L. Long., P.E.
Project Manager      Geotechnical Department Manager

Principal Review By:
Allen R. Parker, Jr., P.E.
Principal Engineer
2.0 PROJECT OVERVIEW

2.1 Project Information

This report contains the results of our preliminary subsurface exploration and geotechnical engineering analysis for the proposed industrial site in Chesterfield County, South Carolina. The site is approximately 497 acres of farmland and woodland. Structural loading conditions were not available at the time of this report; however, based on our experience, we anticipate column loads of 150 kips or less and wall loads on the order of 7 kips/foot would be typical for the type of construction anticipated. Topographic information was not available at the time of this report; however, we anticipate that cuts and fills up to 2 feet may be required to meet finished elevations.

2.2 Scope of Work

The conclusions and recommendations contained in this report are based on the results of:

- Nine (9) electronic cone penetration test (CPT) soundings,
- One (1) electronic cone penetration test (CPT) sounding with shear wave velocity measurements, (C-4)
- Ten (10) hand auger borings,
- Engineering analyses of the field findings with respect to the provided project information.

2.3 Purposes of Exploration

The purposes of this exploration program were to determine the soil and groundwater conditions at the site and to develop general considerations to assist in the design and construction of the proposed project. We accomplished these objectives by:

- Performing a site reconnaissance to observe the general existing site conditions,
- Performing CPT soundings, and hand auger borings at widely-spaced locations to explore the subsurface soil, infiltration, and groundwater conditions,
- Analyzing the available data to develop preliminary geotechnical engineering design and construction considerations.
3.0 EXPLORATION PROCEDURES

3.1 Subsurface Exploration Procedures

3.1.2 Cone Penetration Testing

Ten (10) electronic cone penetration test (CPT) soundings were performed at widely spaced locations across the site during our field exploration. The cone penetration test soundings were performed in general conformance with ASTM D 5778 by our subcontractor. The soundings were performed with a track mounted rig. The approximate locations of the CPT soundings are indicated on the Test Location Plan in Appendix A.

The cone used in the soundings has a tip area of 10 cm$^2$ and a sleeve area of 150 cm$^2$. The CPT soundings recorded tip resistance and sleeve friction measurements to assist in determining pertinent index and engineering properties of the site soils. The ratio of the sleeve friction to tip resistance is then used to aid in assessing the soil types through which the tip is advanced.

Within the CPT sounding C-4, seismic tests were performed at approximately three foot intervals to refusal to measure the shear wave velocity ($v_s$) of the subsurface materials to aid in assessing the dynamic response properties of the site subsurface materials. The seismic shear waves are generated by making impact with a 20-pound sledgehammer onto a steel beam. The impacts are initiated on the right and left sides of the CPT rig and the corresponding wave traces recorded on an oscilloscope are analyzed to determine the shear wave velocity of the tested material. The waves are measured with three geophones that are installed in the cone. The results of the CPT and seismic testing are presented in Appendix B.

3.1.2 Hand Auger Borings

Ten (10) hand auger borings, one adjacent to each sounding, were performed during our field exploration to further explore the near surface soils across the site. The hand auger borings were conducted in general conformance with ASTM D 1452. The approximate locations of the hand auger borings are indicated on the Test Location Plan in Appendix A.

In this procedure, the auger boring is made by rotating and advancing an auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The auger cuttings were visually classified in the field. Stratification lines shown on the hand auger boring logs represent approximate boundaries between physical soil types. The hand auger boring logs are presented in Appendix C.
4.0 EXPLORATION RESULTS

4.1 Site Conditions

The proposed site is located north of Highway 151 in McBee, Chesterfield County, South Carolina. At the time of our exploration approximately 40% of the site was undeveloped farmland and 60% of the site was a pine tree farm with immature pine trees with little to no underbrush. Several dirt roads traversed the farmland and woodland areas in a grid pattern. A CSX railroad ran east to west between the farmland and woodland.

4.2 Regional Geology

The site is located in the Coastal Plain Physiographic Province of South Carolina. The Coastal Plain is composed of seven terraces, each representing a former level of the Atlantic Ocean. Soils in this area generally consist of sedimentary materials transported from other areas by the ocean or rivers. These deposits vary in thickness from a thin veneer along the western edge of the region to more than 10,000 feet near the coast. The sedimentary deposits of the Coastal Plain rest upon consolidated rocks similar to those underlying the adjacent Piedmont Physiographic Province. In general, shallow unconfined groundwater movement within the overlying soils is largely controlled by topographic gradients. Recharge occurs primarily by infiltration along higher elevations and typically discharges into streams or other surface water bodies. The elevation of the shallow water table is transient and can vary greatly with seasonal fluctuations in precipitation.

4.3 Chesterfield County Soil Survey

We reviewed the Soil Survey of Chesterfield County, South Carolina (USDA SCS 1995) to determine the mapped soil types at the site. The site consists of approximately 1% Ailey Sand, 87% Alpin Sand, and 12% Candor Sand. The location of each soil series is shown on the Soil Survey Map (Figure 2) in Appendix A.

<table>
<thead>
<tr>
<th>Soil Series</th>
<th>Classification</th>
<th>Shallow Foundation Difficulties</th>
<th>Suitability as Roadway Fill</th>
<th>Water Table Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>AaB</td>
<td>SP-SM, SM, SC, SC-SM</td>
<td>Severe, due to cutback caving</td>
<td>Good</td>
<td>4 to 6 feet, perched</td>
</tr>
<tr>
<td>ApB</td>
<td>SP-SM, SM</td>
<td>Severe, due to cutback caving</td>
<td>Good</td>
<td>Greater than 6 feet</td>
</tr>
<tr>
<td>ApC</td>
<td>SP-SM, SM</td>
<td>Severe, due to cutback caving</td>
<td>Good</td>
<td>Greater than 6 feet</td>
</tr>
<tr>
<td>Cab</td>
<td>SP-SM, SM, SC, SC-SM</td>
<td>Severe, due to cutback caving</td>
<td>Good</td>
<td>Greater than 6 feet</td>
</tr>
</tbody>
</table>

4.4 Subsurface Conditions

Details of the subsurface conditions encountered by the soundings and hand auger borings are shown on the logs in the Appendices B and C. These logs represent our interpretation of the subsurface conditions based upon field data. Stratification lines on the logs represent approximate boundaries between soil types; however, the actual transition may be gradual. The
general subsurface conditions and their pertinent characteristics are discussed in the following paragraphs.

Initially, the exploration encountered 10 to 18 inches of organic laden topsoil and cultivated soils. Below the surface materials, the exploration generally encountered very loose to very dense sand with varying amounts of silt and clay to the termination depth of the deepest sounding at approximately 50 feet below existing grade. Within the sand in sounding C-4, a firm to stiff clay layer was encountered from approximately 33 to 35 feet. All the soundings with exception of sounding C-4 were terminated at approximately 25 ft below the existing ground surface.

4.5 **Groundwater Conditions**

Groundwater measurements were made at the hand auger boring and CPT sounding locations during exploration. The groundwater depth was approximately 23.5 to 25 feet below the existing grade in the soundings at the time of our exploration. Groundwater was not encountered within the hand auger borings.

The highest groundwater observations are normally encountered in the late winter and early spring. Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of this exploration. If long term water levels are crucial to the development of this site, it would be prudent to track water levels with the use of perforated pipes or piezometers.
5.0 GEOTECHNICAL CONSIDERATIONS

Our preliminary exploration indicates the site is adaptable for the proposed construction. The considerations provided in this report are based upon widely spaced test locations; therefore, specific recommendations for design and construction are not provided. Once the final site design is known, additional testing should be performed at specific project locations.

5.1 Subgrade Preparation

The first step in preparing the site for the proposed construction should be to remove vegetation, rootmat, topsoil, deleterious materials, organic materials, and other soft or unsuitable materials from the existing ground surface. These operations should extend at least 10 feet, where possible, beyond the planned limits of the proposed building and pavements. Our exploration encountered approximately 10 to 18 in of organic laden material.

After proper clearing, stripping, grubbing, and prior to fill placement, foundation, slab, or pavement construction, the exposed subgrade soils should be carefully evaluated by an experienced Geotechnical Engineer to identify localized unstable or otherwise unsuitable materials. This evaluation should include proofrolling with a fully loaded, tandem-axle dump truck or similar equipment assessed suitable by the Geotechnical Engineer. Areas that pump or rut excessively under proofrolling should be densified in-place or undercut to stable materials and replaced with compacted engineered fill. We note that much of the property has been used for agricultural purposes. As such, as much as 2 to 3 feet of material may require densification or undercut in some areas. Undercutting operations should be observed by the Geotechnical Engineer to document that unsuitable materials are removed and that suitable materials are not over-excavated. Detailed recommendations concerning undercutting should be provided by ECS during construction.

5.2 Engineered Fill Placement

Following the removal of deleterious surface and subsurface materials, and after achieving a stable subgrade, engineered fills can be placed and compacted to achieve the desired site grades. Engineered fill for support of the proposed construction and for backfill of utility lines within expanded building and pavement limits should consist of an approved material, free of organic matter and debris and cobbles greater than 3 inches, and have a Liquid Limit (LL) and Plasticity Index (PI) less than 35 and 9, respectively. The fill should exhibit a maximum dry density of at least 100 pounds per cubic foot, as determined by a Modified Proctor compaction test (ASTM D 1557).

Unsuitable fill materials include topsoil, organic materials (OH, OL), and high plasticity clays and silts (CH, MH). Such materials removed during grading operations should be either stockpiled for later use in landscape fills, or placed in approved on or off-site disposal areas.

Existing soils containing significant amounts of organic matter will not be suitable for re-use as engineered fill. As such, the organic content of the near surface soils should be evaluated to determine if some of these soils will be suitable for re-use as engineered fill. Natural fine-grained soils classified as clays or silts (CL, ML) with LL and PI greater than 35 and 9, respectively, should be evaluated by the geotechnical engineer at the time of construction to determine their suitability for use as engineered fill.
We recommend that moisture control limits of -2 to +2 percent of the optimum moisture content be used for placement of project fill with the added requirement that fill soils placed wet of optimum remain stable under heavy pneumatic-tired construction traffic. During site grading, some moisture modification (drying and/or wetting) of the onsite soils will likely be required. Engineered fill should be compacted to at least 95 percent of its Modified Proctor (ASTM D 1557) maximum dry density.

ECS recommends that fill operations be observed and tested by an engineering technician to determine if compaction requirements are being met. The testing agency should perform a sufficient number of tests to confirm that compaction is being achieved.

Fill materials should not be placed on soils which have been recently subjected to precipitation. Wet soils should be removed prior to the continuation of site grading and fill placement. Borrow fill materials, if required, should not contain excessively wet materials at the time of placement.

5.3 Foundations

Based on our preliminary exploration, the soils appear to be suitable for support of structures with column and wall loads on the order of 150 kips and 7 kip/ft, respectively, on shallow foundations. Our test locations were widely spaced; therefore, final design values have not been provided. However, we anticipate that shallow foundations can be designed to accommodate allowable bearing capacities of 1,500 to 2,500 psf. We expect that total settlements for the proposed construction to be in the range of 1 inch or less, while the differential settlement will be approximately 1/2 of the anticipated total settlement. This assessment is based on our engineering experience and assumed structural loadings for the typical construction.

The settlement of a structure is a function of the compressibility of the bearing materials, bearing pressure, actual structural loads, fill depths, and the bearing elevation of footings with respect to the final ground surface elevation. Estimates of settlement for foundations bearing on engineered or non-engineered fills are strongly dependent on the quality of fill placed. Factors which may affect the quality of fill include maximum loose lift thickness of the fills placed and the amount of compactive effort placed on each lift.

5.4 Floor Slab Design

Provided a suitable subgrade will be prepared, the site appears suitable for ground level slabs to be designed as slabs-on-grade. Our findings indicate that a modulus of subgrade reaction ($k_s$) of 150 to 200 pci should be available for design provided that upper 18 inches of the slab subgrade soils have been uniformly compacted to at least 95 percent of their Modified Proctor maximum dry density.
5.5 Seismic Site Class Determination and Liquefaction Potential

A preliminary liquefaction\(^1\) analysis based on the 2012 International Building Code (IBC 2012) design earthquake\(^2\) indicates sands encountered have a low potential to liquefy during the design seismic event.

Based on the results of the CPT soundings and shear wave velocities, it is our interpretation the site may be considered a Site Class D. The average shear wave velocity was approximately 1014 ft/sec.

5.6 Pavement Design Considerations

For the design and construction of exterior pavements, the subgrades should be prepared in strict accordance with the recommendations in the “Subgrade Preparation” and “Engineered Fill Placement” sections of this report. An important consideration with the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should minimize the possibility of the subgrade materials becoming saturated during the normal service period of the pavement.

We recommend 2 inches of asphalt surface mix overlying 6 inches of compacted crushed stone in the light pedestrian type vehicle areas and 4 inches of asphalt surface mix overlying 8 inches of compacted crushed stone in the main heavily traveled drive areas serving heavy truck traffic.

Please note that large, front-loading trash dumpsters frequently impose concentrated front-wheel loads on pavements during loading. This type of loading typically results in rutting of bituminous pavements and ultimately pavement failures and costly repairs. Consequently, we recommend the use of an 6 inch thick, mesh reinforced concrete slab that extends the entire length of the truck. Concrete pavements should be properly jointed and reinforced as needed to help reduce the potential for cracking and to permit proper load transfer.

5.7 Suitability of On-Site Soil

Based on the hand auger borings, the soil encountered on-site should be suitable for use as select engineered fill. The soils encountered appeared to be primarily silty sand and relatively clean sand. We note that if materials are encountered that contain significant amounts of clay/silt, they will be moisture sensitive and may require additional efforts obtain proper compaction if used as engineered fill. Soils containing organic material will not be suitable for use as engineered fill.

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\(^1\) Liquefaction is the loss of a soil’s shear strength due to an increase in porewater pressure resulting from an earthquake.

\(^2\) The IBC design earthquake has a 2% probability of exceedance in 50 years. Our liquefaction analysis was based on an earthquake with a magnitude of 7.3 and ground surface acceleration of 0.29 g.
6.0 CLOSING

Our geotechnical evaluation of the site has been based on our understanding of the site, the project information provided to us, and the data obtained during our exploration. The general subsurface conditions utilized in our evaluations have been based on interpolation of subsurface data between the borings. If the project information provided to us is changed, please contact us so that our recommendations can be reviewed and appropriate revisions provided, if necessary. The discovery of any site or subsurface conditions during construction which deviate from the data outlined in this exploration should be reported to us for our review, evaluation and revision of our recommendations, if necessary. The assessment of site environmental conditions for the presence of pollutants in the soil and groundwater of the site is beyond the scope of this geotechnical exploration.
APPENDICES
Base drawing was provided by Alliance Consulting Engineers, Inc. and adapted by ECS Carolinas, LLP. Test locations are approximate. This drawing should not be used for design or construction.
Base drawing was provided by US Department of Agriculture and adapted by ECS Carolinas, LLP. Locations are approximate. This drawing should not be used for design or construction. Drawing can be found at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

AaB – Ailey Sand
ApB – Alpin Sand
ApC – Alpin Sand
CaB – Candor Sand
APPENDIX B

CPT SOUNDING LOGS
Operator: Cory Robison
Sounding: C-1
Cone Used: DDG1299
CPT Date/Time: 11/5/2014
Location: Chesterfield County, SC
Job Number: 34.1879

Maximum Depth = 26.25 feet
Depth Increment = 0.164 feet

Tip Resistance
Qt TSF

Local Friction
Fs TSF

Pore Pressure
Pw PSI

Soil Behavior Type*
Zone: UBC-1983

SPT N*
60% Hammer

*Soil behavior type and SPT based on data from UBC-1983
**ECS CAROLINAS, LLP**

Operator: Cory Robison  
Sounding: C-2  
Cone Used: DDG1299  
CPT Date/Time: 11/5/2014  
Location: Chesterfield County, SC  
Job Number: 34.1879

- Maximum Depth = 25.26 feet  
- Depth Increment = 0.164 feet

- Tip Resistance
  - Depth (ft)
  - Qt TSF

- Local Friction
  - Fs TSF

- Pore Pressure
  - Pw PSI

- Soil Behavior Type*
  - Zone: UBC-1983

- SPT N*
  - 60% Hammer

*Soil behavior type and SPT based on data from UBC-1983
Operator: Cory Robison
Sounding: C-3
Cone Used: DDG1299
CPT Date/Time: 11/5/2014
Location: Chesterfield County, SC
Job Number: 34.1879

Maximum Depth = 25.26 feet
Depth Increment = 0.164 feet

*Soil behavior type and SPT based on data from UBC-1983

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)
Maximum Depth = 53.15 feet
Depth Increment = 0.164 feet

Soil Behavior Type:
1. sensitive fine grained
2. organic material
3. clay
4. silty clay to clay
5. clayey silt to silty clay
6. sandy silt to clayey silt
7. silty sand to sandy silt
8. sand to silty sand
9. sand
10. gravelly sand to sand
11. very stiff fine grained (*)
12. sand to clayey sand (*)

Tip Resistance
Local Friction
Pore Pressure
Soil Behavior Type
SPT N*

Maximum Depth = 53.15 feet
Depth Increment = 0.164 feet

*Soil behavior type and SPT based on data from UBC-1983
ECS CAROLINAS, LLP

Operator: Cory Robison
Sounding: C-5
Cone Used: DDG1299

CPT Date/Time: 11/5/2014
Location: Chesterfield County, SC
Job Number: 34.1879

Maximum Depth = 25.26 feet
Depth Increment = 0.164 feet

Soil Behavior Type*

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Tip Resistance Qt TSF
Local Friction Fs TSF
Pore Pressure Pw PSI
SPT N* 60% Hammer

*Soil behavior type and SPT based on data from UBC-1983
Maximum Depth = 25.26 feet
Depth Increment = 0.164 feet

*Soil behavior type and SPT based on data from UBC-1983

- 1: sensitive fine grained
- 2: organic material
- 3: clay
- 4: silty clay to clay
- 5: clayey silt to silty clay
- 6: sandy silt to clayey silt
- 7: silty sand to sandy silt
- 8: sand to silty sand
- 9: sand
- 10: gravelly sand to sand
- 11: very stiff fine grained (*)
- 12: sand to clayey sand (*)

Tip Resistance
Qt TSF

Local Friction
Fs TSF

Pore Pressure
Pw PSI

SPT N*
60% Hammer

CPT Date/Time: 11/5/2014
Location: Chesterfield County, SC
Job Number: 34.1879
Operator: Cory Robison
Location: Chesterfield County, SC
Cone Used: DDG1299
CPT Date/Time: 11/5/2014
Job Number: 34.1879

Maximum Depth = 25.26 feet
Depth Increment = 0.164 feet

Tip Resistance
Qt TSF

Local Friction
Fs TSF

Pore Pressure
Pw PSI

Soil Behavior Type*
Zone: UBC-1983

SPT N*
60% Hammer

*Soil behavior type and SPT based on data from UBC-1983
Maximum Depth = 24.28 feet
Depth Increment = 0.164 feet

Soil Behavior Type:
1. sensitive fine grained
2. organic material
3. clay
4. silty clay to clay
5. clayey silt to silty clay
6. sandy silt to clayey silt
7. silty sand to sandy silt
8. sand to silty sand
9. sand
10. gravelly sand to sand
11. very stiff fine grained (*)
12. sand to clayey sand (*)

Tip Resistance Qt TSF
Local Friction Fs TSF
Pore Pressure Pw PSI
SPT N*

*Soil behavior type and SPT based on data from UBC-1983
ECS CAROLINAS, LLP

Operator: Cory Robison
Sounding: C-10
Cone Used: DDG1299

CPT Date/Time: 11/5/2014
Location: Chesterfield County, SC
Job Number: 34.1879

Maximum Depth = 25.43 feet
Depth Increment = 0.164 feet

*Soil behavior type and SPT based on data from UBC-1983

Tip Resistance
Qt TSF

Local Friction
Fs TSF

Pore Pressure
Pw PSI

Soil Behavior Type*
Zone: UBC-1983

SPT N*
60% Hammer

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)
APPENDIX C

HAND AUGER BORING LOGS
Topsoil and Cultivated Soil Depth [10"]

(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist

END OF HAND AUGER @ 4.00’
Topsoil and Cultivated Soil Depth [12"

(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist

END OF HAND AUGER @ 4.00'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.
### Site Location

**Highway 151, McBee, Chesterfield County**

#### Description of Material

- **Topsoil and Cultivated Soil Depth [12"]**
- **(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist**
- **END OF HAND AUGER @ 4.00’**

---

#### In-Situ Analysis

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Sample Type</th>
<th>Sample Dist. (In)</th>
<th>Description of Material</th>
<th>Water Levels</th>
<th>Elevation (FT)</th>
<th>Blows/6&quot;</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

#### Additional Data

- **WL**
- **WL(BCR)**
- **WL(ACR)**

---

**The Stratification lines represent the approximate boundary lines between soil types. In-situ the transition may be gradual.**

**Clients:**

Alliance Consulting Engineers

**Job #:** 1879

**Boring #:** C-3

**Sheet #:** 1 OF 1

**Project Name:** Alligator Industrial Site - GEO

**Architect-Engineer:**

**Site Location:** Highway 151, McBee, Chesterfield County

**Boring started:** 11/05/14

**Boring completed:** 11/05/14

**Modes:**

- **WL**
- **WL(BCR)**
- **WL(ACR)**

**Rig Foreman:**

**Drilling Method:**

**Soil Types (ENGLISH UNITS):**

- **Loss of Circulation**
- **Rock Quality Designation & Recovery**
- **Plastic Limit %**
- **Water Content %**
- **Liquid Limit %**
- **Standard Penetration Blows/FT**

---

**Notes:**

- **WL:**
- **WL(BCR):**
- **WL(ACR):**

---

**Calibrated Penetrometer Tons/FT²**
### Site Location

**Highway 151, McBee, Chesterfield County**

### Stratification Lines

The stratification lines represent the approximate boundary lines between soil types. In-situ, the transition may be gradual.

### Depth and Sample Details

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample No.</th>
<th>Sample Type</th>
<th>Sample Dist (in)</th>
<th>Description of Material</th>
<th>English Units</th>
<th>Water Levels</th>
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<td>(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist</td>
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**Topsoil and Cultivated Soil Depth [16"]**

(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist

END OF HAND AUGER @ 4.00’
### Project Information

**Project Name:** Alligator Industrial Site - GEO  
**Site Location:** Highway 151, McBee, Chesterfield County

### Boring Details

- **Job #:** 1879  
- **Boring #:** C-6  
- **Sheet:** 1 OF 1

### Soil Depth

- **Topsoil and Cultivated Soil Depth [12"]**

### Soil Type

- **(SM) Silty Fine to Medium Sand, Light Brown, Moist**

### Stratification Lines

The stratification lines represent the approximate boundary lines between soil types. In-situ transition may be gradual.

### Water Levels

- **Water Levels Elevation (FT):**

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<th>Sample Dist. (IN)</th>
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### Rock Quality Designation & Recovery

- **RQD%**:  
- **REC %**:  

### Standard Penetration

- **BLOWS/FT**:  

### Additional Notes

- **Boring Started**: 11/05/14  
- **Boring Completed**: 11/05/14  
- **Cave in Depth**:  
- **Rig Foreman**:  
- **Drilling Method**:  

**Note:** The stratification lines represent the approximate boundary lines between soil types. In-situ transition may be gradual.
Topsoil and Cultivated Soil Depth [14"]

(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist

END OF HAND AUGER @ 4.00'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.
**CLIENT**: Alliance Consulting Engineers  
**JOB #**: 1879  
**BORING #**: C-8  
**SHEET**: 1 OF 1

**PROJECT NAME**: Alligator Industrial Site - GEO

**SITE LOCATION**: Highway 151, McBee, Chesterfield County

---

**Description of Material**

1. **Topsoil and Cultivated Soil Depth [12"]**
2. **(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist**

---

**THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.**

---

**WL**

**WL(BCR)**

**WL(ACR)**

**WL**

---

**BORING COMPLETED**: 11/05/14  
**CAVE IN DEPTH**  
**BOARING STARTED**: 11/05/14  
**RIG FOREMAN**: Drilling Method
### Topsoil and Cultivated Soil Depth [16”]

- **Description of Material:** (SM) Silty Fine to Medium Sand, Light Brown, Moist
- **Depth:** 0.00’
- **Elevation:** Surface Elevation
- **End of Hand Auger @ 4.00’**

---

**THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.**

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**WL**

**WL(BCR)**

**WL(ACR)**

**WL**

- **BORING STARTED:** 11/05/14
- **BORING COMPLETED:** 11/05/14
- **CAVE IN DEPTH**
- **RIG FOREMAN DRILLING METHOD**
Topsoil and Cultivated Soil Depth [18"]

(SM) SILTY FINE TO MEDIUM SAND, Light Brown, Moist

END OF HAND AUGER @ 4.00’
APPENDIX D

GENERAL CONDITIONS
General Conditions

The analysis, conclusions, and recommendations submitted in this report are based on the exploration previously outlined and the data collected at the points shown on the attached location plan. This report does not reflect specific variations that may occur between test locations. The soundings were located where site conditions permitted and where it is believed representative conditions occur, but the full nature and extent of variations between soundings and of subsurface conditions not encountered by any sounding may not become evident until the course of construction. If variations become evident at any time before or during the course of construction, it will be necessary to make a re-evaluation of the conclusions and recommendations of this report and further exploration, observation, and/or testing may be required.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and makes no other warranties, either expressed or implied, as to the professional advice under the terms of our agreement and included in this report. The recommendations contained herein are made with the understanding that the contract documents between the owner and foundation or earthwork contractor or between the owner and the general contractor and the foundation, excavating and earthwork subcontractors, if any, shall require that the contractor certify that all work in connection with foundations, slabs, pavements, compacted fills and other elements of the foundation or other support components are in place at the locations, with proper dimensions and tolerances, as shown on the plans and specifications for the project.

Further, it is understood the contract documents will specify that the contractor will, upon becoming aware of apparent or latent subsurface conditions differing from those disclosed by the original soil exploration work, promptly notify the owner, both verbally to permit immediate verification of the change, and in writing, as to the nature and extent of the differing conditions and that no claim by the contractor for any conditions differing from those anticipated in the plans and specifications and disclosed by the soil studies will be allowed under the contract unless the contractor has so notified the owner both verbally and in writing, as required above, of such changed conditions. The owner will, in turn, promptly notify this firm of the existence of such unanticipated conditions and will authorize such further exploration as may be required to properly evaluate these conditions.

Further, it is understood that any specific recommendations made in this report as to on-site construction review by this firm will be authorized and funds and facilities for such review will be provided at the times recommended if we are to be held responsible for the design recommendations.