REPORT
OF
SUBSURFACE EXPLORATION

PROJECT X-CEL
SHELBY, NORTH CAROLINA

ECS PROJECT NO. 08-8769
January 15, 2013

REPORT OF SUBSURFACE EXPLORATION

Project X-CEL
Shelby, North Carolina

Prepared For:

Mr. Eddie Bailes
Cleveland County
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ECS Project No:

08-8769

Report Date:

January 15, 2013

ECS CAROLINAS, LLP
"Setting the Standard for Service"
Geotechnical • Construction Materials • Environmental • Facilities
NC Registered Engineering Firm F-1078

January 15, 2013

Mr. Eddie Bailes
County Manager
Cleveland County
PO Box 1210
Shelby, North Carolina 28151

Reference: Report of Subsurface Exploration
Project X-CEL
Shelby, North Carolina

ECS Project No. 08-8769

Dear Mr. Bailes:

ECS Carolinas, LLP (ECS) has completed the subsurface exploration for the above referenced project. This project was authorized and performed in general accordance with ECS Proposal No. 08-14518P dated December 24, 2012. The purpose of this exploration was to determine the general subsurface conditions at the site and to evaluate those conditions with regard to foundation and floor slab support, along with general site development. This report presents our findings, conclusions, and recommendations for design and construction of the project.

ECS Carolinas, LLP appreciates the opportunity to assist you during this phase of the project. If you have questions concerning this report, please contact our office.

Respectfully,

ECS CAROLINAS, LLP

NORTH CAROLINA PROFESSIONAL SEAL 037822 ENGINEER JONATHAN R. ALMOND 1/15/13

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1. INTRODUCTION

1.1. Project Information

The project site is located to the southwest of the intersection of Plato Lee Road and Washburn Switch Road outside of Shelby, Cleveland County, North Carolina. The site is identified by Cleveland County GIS further as parcel number 32573. The approximate 40 acres is mostly clear with the eastern portion of the site being predominantly wooded. The site is bordered by an active railroad to the north, Plato Lee Road to the east, and wooded and agricultural land to the south and west. Single-family structures and manufacturing/industrial structures are present to the west and north, respectively.

A preliminary grading plan prepared by Burton Engineering dated October 16, 2012, indicates that the project will consist of an approximate 107,000 square foot manufacturing facility with associated drive and parking areas. Review of the grading plan prepared by Burton Engineering indicate that the finished floor of the facility will be at or near 920 feet MSL. Although no structural information was available at the time of report submittal, ECS anticipates that maximum column and wall footing loads will not exceed 300 kips and 4 kips per linear foot, respectively.

An entrance road to the facility from Plato Lee Road will require a culverted stream crossing near the center of the site. The grading plan indicates that a sand filtered detention pond will be constructed near the stream crossing, as well as another detention pond to the south of the proposed facility. A secondary Phase II grading area is planned to the north of the facility; however, it will not be graded during the initial construction.

ECS has performed a preliminary subsurface exploration on this property in 2010 under ECS Project No. 08-7288.

1.2. Scope of Services

1.2.1 2010 Soil Borings

Our 2010 scope of services included a preliminary subsurface exploration with soil test borings, preliminary engineering analysis of the foundation support options, and preparation of a preliminary report with our recommendations. The preliminary subsurface exploration included ten (10) soil test borings (B-1 through B-10). For purposes of engineering analysis covered within this report, ECS has utilized only borings B-3 through B-7, noted on the boring location as OB-3 through OB-7. Approximate boring locations are shown on the Boring Location Diagram (Figure 2) included in the Appendix. The soil borings were performed using a 550 ATV rubber tire mounted drill rig using continuous-flight, hollow-stem augers.

1.2.2. 2013 Soil Borings

Our scope of services included a subsurface exploration with soil test borings, engineering analysis of the foundation support options, and preparation of this report with our recommendations. The subsurface exploration included nineteen (19) soil test borings (B-1 through B-19). Approximate boring locations are shown on the Boring Location Diagram (Figure 2) included in the Appendix. The soil borings were performed using a 550 ATV rubber tire mounted drill rig using continuous-flight, hollow-stem augers.

2. FIELD SERVICES

2.1. Test Locations

The soil boring locations and depths were selected and located in the field by ECS using handheld GPS technology and existing landmarks as reference. The approximate test locations are shown on the Boring Location Diagram (Figure 2) presented in the Appendix of this report and should be considered accurate only to the degree implied by the method used.

Approximate elevations of the test locations were obtained from a site plan prepared by Burton Engineering. The elevations shown should be considered accurate only to the degree of the method used.

2.2. Seasonal High Groundwater Table (SHWT)

A hand auger boring was advanced to a depth of 10 feet below ground surface (bgs). ECS conducted an investigation of the soils to identify the depth of the seasonal high water table (SHWT) at the location shown on the Boring Location Diagram (Figure 2). The properties and characteristics of the soils retrieved from the boring were observed and recorded in field notes. The properties include texture, depth, the presence of restrictive horizons, depth to seasonal high water table, coarse fragments, etc. The assessment was conducted in accordance with current soil science practices and technology and the North Carolina Division of Water Quality Stormwater Best Management Practices (BMP) Manual, dated July 2007. The results of the SHWT Assessment is reported and included separately within the Appendix of this report.

2.3. Soil Test Borings

A total of twenty four (24) soil test borings were drilled between 2010 and 2013 to evaluate the stratification and engineering properties of the subsurface soils at the project site. Standard Penetration Tests (SPT's) were performed at designated intervals in general accordance with ASTM D 1586. The Standard Penetration Test is used to provide an index for estimating soil strength and density. In conjunction with the penetration testing, split-barrel soil samples were recovered for soil classification and potential laboratory tests at each test interval. Boring Logs are included in the Appendix.

The drill crew also maintained a field log of the soils encountered at each of the boring locations. After recovery, each sample was removed from the auger and visually classified. Representative portions of each sample were then sealed and brought to our laboratory in Charlotte, North Carolina for further visual examination. Groundwater measurements were attempted at the termination of drilling at each boring location.

3. LABORATORY SERVICES

Soil samples were collected from the borings and examined in our laboratory to check field classifications and to determine pertinent engineering properties. Data obtained from the borings and our visual/manual examinations are included on the respective boring logs in the Appendix.

3.1. Soil Classification

A geotechnical engineer classified each soil sample on the basis of color, texture, and plasticity characteristics in general accordance with the Unified Soil Classification System (USCS). The soil engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ, the transition between strata may be gradual in both the vertical and horizontal directions. The results of the visual classifications are presented on the Boring Logs included in the Appendix.

4. SITE AND SUBSURFACE FINDINGS

4.1. Area Geology

The site is located in the Piedmont Physiographic Province of North Carolina. The native soils in the Piedmont Province consist mainly of residuum with underlying saprolites weathered from the parent bedrock, which can be found in both weathered and unweathered states. Although the surficial materials normally retain the structure of the original parent bedrock, they typically have a much lower density and exhibit strengths and other engineering properties typical of soil. In a mature weathering profile of the Piedmont Province, the soils are generally found to be finer grained at the surface where more extensive weathering has occurred. The particle size of the soils generally becomes more granular with increasing depth and gradually changes first to weathered and finally to unweathered parent bedrock. The mineral composition of the parent rock and the environment in which weathering occurs largely control the resulting soil's engineering characteristics. The residual soils are the product of the weathering of the parent bedrock.

It is important to note that alluvial soils may be encountered in the vicinity of the existing streams, low-lying areas, and drainage features. Alluvial soils consist of clays, silts, sands, and gravels deposited by flowing water, and are generally normally consolidated which means they have not experienced overlying loads beyond that of their own weight. This quality makes these soils compressible, and sometimes highly compressible. In addition, they are often moisture sensitive and may prove unstable during mass grading.

In addition, it is apparent that the natural geology within the site has been modified in the past by grading that included the placement of fill materials. The quality of man-made fills can vary significantly, and it is often difficult to assess the engineering properties of existing fills. Furthermore, there is no specific correlation between N-values from standard penetration tests performed in soil test borings and the degree of compaction of existing fill soils; however, a qualitative assessment of existing fills can sometimes be made based on the N-values obtained and observations of the materials sampled in the test borings.

4.2. Subsurface Conditions

The subsurface conditions at the site, as indicated by the borings, generally consisted of fill, alluvial, residual soil, partially weathered rock, and refusal materials to the depths explored. The generalized subsurface conditions are described below. For soil stratification at a particular test location, the respective Boring Log found in the Appendix should be reviewed.

Topsoil was encountered at the ground surface at each boring location to depths ranging from 2 to 7 inches below the existing ground surface.

Previously placed fill soils were encountered in the vicinity of boring B-12 to a depth of 8 feet below the ground surface. The soils generally consisted of Sandy SILT and Clayey SILT, exhibiting SPT N-values between 4 and 14 blows per foot (bpf). A layer of highly organic material was encountered between 5.5 and 8 feet below the ground surface.

Alluvial soils are soils deposited by water and are usually found near streams, drainage features, or low-lying areas. Alluvial soils were encountered below the fill materials in the vicinity of boring B-12 and below the topsoil at boring B-19. The alluvial soils generally consisted of Sandy SILT and Clayey SAND, exhibiting SPT N-values between 3 and 6 blows per foot.

Residual soil was encountered below the topsoil and/or alluvial soils at each boring location. Residual soils are formed by the in-place chemical and mechanical weathering of the parent bedrock. The residual soils extended to depths ranging from 3 to 25 feet below the ground surface. The residual soils encountered in the borings generally consisted of Silty SAND (SM), Sandy SILT (ML), and Clayey SILT (ML and MH), exhibiting an SPT N-value ranging from 3 to 41 bpf.

Partially weathered rock (PWR) was encountered below the residual soil at boring location OB-4. PWR was encountered at a depth of 17 feet below the existing ground surface. PWR is defined as residual material exhibiting SPT N-values greater than 100 bpf. The PWR encountered generally consisted of Silty SAND (SM) exhibiting SPT N-values ranging from 50 blows per 5 inches to 50 blows per 2 inches.

Materials hard enough to cause auger refusal were encountered at boring OB-4 at a depth of 46 feet below the ground surface Auger refusal indicates the presence of material that permitted no further advancement of the hollow stem auger or split spoon sampler.

4.3. Groundwater Observations

Groundwater measurements were attempted at the termination of drilling and after 24 hours of drilling completion. Groundwater was encountered at boring locations OB-3 through OB-6, B-12, and B-18, at depths ranging between 10.7 and 29.7 feet below the ground surface. Fluctuations in the groundwater elevation should be expected depending on precipitation, run-off, utility leaks, and other factors not evident at the time of our evaluation. Normally, highest groundwater levels occur in late winter and spring and the lowest levels occur in late summer and fall.

5. CONCLUSIONS AND RECOMMENDATIONS

The borings performed at this site represent the subsurface conditions at the location of the borings. Due to inconsistencies associated with the prevailing geology, there can be changes in the subsurface conditions over relatively short distances that have not been disclosed by the results of the test location performed. Consequently, there may be undisclosed subsurface conditions that require special treatment or additional preparation once these conditions are revealed during construction.

Our evaluation of foundation support conditions has been based on our understanding of the site, project information and the data obtained in our exploration. The general subsurface conditions utilized in our foundation evaluation have been based on interpolation of subsurface data between and away from the borings. In evaluating the boring data, we have examined previous correlations between penetration resistance values and foundation bearing pressures observed in soil conditions similar to those at your site.

5.1. Organic Laden Soils

A layer of topsoil (i.e. organic laden soil), ranging in thickness from approximately 2 to 7 inches, was encountered at each boring location. The surficial organic laden soil is typically a dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for support of engineering fill, foundations, or slabs-on-grade. ECS has not performed laboratory testing to determine the organic content or other horticultural properties of the observed surficial organic laden soils. Therefore, the phrase "surficial organic laden soil" is not intended to indicate suitability for landscaping and/or other purposes. The surficial organic laden soil depths provided in this report and on the individual Boring Logs are based on driller observations and should be considered approximate. Please note that the transition from surficial organic laden soils to underlying materials may be gradual, and therefore the observation and measurement of the surficial organic laden soil depth is approximate. Actual surficial organic laden soil depths should be expected to vary and generally increases with the amount of vegetation present over the site.

5.2. Undocumented Fill Materials

ECS encountered existing fill materials at boring location B-12, extending to a depth of approximately 8 feet below the ground surface. Due to the organic nature of a portion of the encountered materials, the fill should be considered undocumented.

Undocumented fill poses risks associated with undetected deleterious inclusions within the fill and/or deleterious materials at the virgin ground fill interface that are covered by the fill. Deleterious materials can consist of significant amount of organics derived from organic rich strippings, rubbish, construction or demolition debris, stumps and roots, and logs. If these materials are covered over by or are within undocumented fill, the organic materials tend to decompose slowly in the anaerobic conditions in or under the fill. Decomposition can occur over periods ranging from several years to several decades. As the organic materials decompose, a void is created which can create soft conditions and even subsidence in areas above the organics. Where these types of conditions exist under or within undocumented fill, they are sometimes in discreet pockets that can go undetected by normal subsurface exploration techniques, i.e., soil test borings and test pits.

The magnitude of settlement or subsidence associated with the organic materials is generally related to the volume of organic materials. Therefore, when undocumented fill is present, soil test borings and test pits can indicate generally good conditions when, in fact, undiscovered pockets of organics occur.

The problem with uncontrolled fill is that the degree of risk associated with the above factors and consequences cannot be quantified. Soil test borings on a very close grid of 20 to 30 ft could still miss significant discreet volumes of organics such as a stump pile. The only way to totally eliminate the risk associated with undocumented fill is to remove it, exposing the original ground and allowing evaluation of the quality of the material in the fill volume for reuse as engineered fill.

To eliminate the risk of poor performance associated with undocumented fill, ECS recommends that all existing fill materials be undercut and removed prior to earthwork operations. Upon completion of undercut operations, the exposed subgrade should be successfully proofrolled prior to receiving engineered fill.

5.3. Alluvial Soils

Alluvial soils were encountered in borings B-12 and B-19. These borings are located near a drainage feature that traverses the site from the north to south. Due to the depositional nature of the alluvial soils, these soils exhibited moderate to excessive long term consolidation potential when surcharged with fill and/or structural loading. ECS recommends that the alluvial soils be removed and replaced with engineered fill in structural areas. ECS recommends that test pits be excavated at the time of site grading to determine the local groundwater conditions at the time of construction. If groundwater levels are elevated to levels that present problems during mass excavation, remediation options can be discussed.

5.4. Deep Fills & Settlement Monitoring

ECS anticipates that fill slopes of up to 45 feet will be required within the southeastern portion of the site. ECS recommends that settlement hubs be placed within these areas to monitor consolidation of the fill and residual materials. The frequency of monitoring should be on a weekly basis, but this should be adjusted as necessary by the geotechnical engineer based upon fill placement rates and settlement rates. Typically, the settlement rates will accelerate during the fill placement, and start tapering off shortly after stopping any fill placement. ECS recommends a minimum timeline between 45 and 60 days to monitor the consolidation upon completion of fill placement. Upon reaching a tolerable settlement rate, foundation construction may begin.

Due to the close proximity of alluvial soils and tall slopes, ECS recommends that a slope stability analysis be performed on the southeastern slope to the west of the culvert crossing.

5.5. Seismic Site Class

The North Carolina Building Code (NCBC) requires that the stiffness of the top 100-ft of soil profile be evaluated in determining a site seismic classification. The method for determining the Site Class is presented in Chapter 16 of the NCBC. The seismic Site Class is typically determined by a calculating a weighted average of the N-values or shear wave velocities recorded in test borings or in cone penetration test soundings to a depth of 100 feet. Based on the depth of boring information, a seismic site class of “D” should be used for design purposes.

5.6. Structure Foundations

Provided the recommendations outlined herein are implemented, the proposed building can be adequately supported on a shallow foundation system consisting of spread footings bearing on firm undisturbed low plasticity residual soil or newly-placed engineered fill. A bearing capacity of up to 3,000 psf is recommended for foundations bearing on firm undisturbed low plasticity residual soil or newly-placed engineered fill. For this project, minimum wall and column footing dimensions of 18 and 24 inches, respectively, should be maintained to reduce the possibility of a localized, "punching" type, shear failure. Exterior foundations and foundations in unheated areas should be embedded deep enough below exterior grades to reduce potential movements from frost action or excessive drying shrinkage. For this region, we recommend footings be placed at least 18 inches below finished grade.

Total settlement is anticipated to be less than 1 inch, while differential settlement between columns is anticipated to be less than ½ inch for shallow foundations bearing on low plasticity residual soil or newly-placed structural fill. Foundation geometry, loading conditions, and/or bearing strata different than those described in this report may result in magnitudes of settlement inconsistent with the previous estimates. ECS recommends that control joints be placed within masonry to allow movement.

5.7. Slab-On-Grade Support

Slabs-on-grade can be adequately supported on undisturbed low plasticity residual soils or on newly-placed engineered fill provided the site preparation and fill recommendations outlined herein are implemented. For a properly prepared site, a modulus of subgrade reaction (k_s) for the soil of 90 pounds per cubic inch for the soil can be used. This value is representative of a 1-ft square loaded area and may need to be adjusted depending the size and shape of the loaded area depending on the method of structural analysis.

We recommend the slabs-on-grade be underlain by a minimum of 4 inches of granular material having a maximum aggregate size of 1½ inches and no more than 2 percent fines. Prior to placing the granular material, the floor subgrade soil should be properly compacted, proofrolled, and free of standing water, mud, and frozen soil. A properly designed and constructed capillary break layer can often eliminate the need for a moisture retarder and can assist in more uniform curing of concrete. If a vapor retarder is considered to provide additional moisture protection, special attention should be given to the surface curing of the slabs to minimize uneven drying of the slabs and associated cracking and/or slab curling. The use of a blotter or cushion layer above the vapor retarder can also be considered for project specific reasons.

Please refer to ACI 302.1R96 Guide for Concrete Floor and Slab Construction and ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs for additional guidance on this issue.

ECS recommends that the slab be isolated from the footings so differential settlement of the structure will not induce shear stresses on the floor slab. Also, in order to minimize the crack width of shrinkage cracks that may develop near the surface of the slab, we recommend mesh reinforcement as a minimum be included in the design of the floor slab. For maximum effectiveness, temperature and shrinkage reinforcements in slabs on ground should be positioned in the upper third of the slab thickness. The Wire Reinforcement Institute recommends the mesh reinforcement be placed 2 inches below the slab surface or upper one-third of slab thickness, whichever is closer to the surface.

Adequate construction joints, contraction joints and isolation joints should also be provided in the slab to reduce the impacts of cracking and shrinkage. Please refer to ACI 302.1R96 Guide for Concrete Floor and Slab Construction for additional information regarding concrete slab joint design.

5.8. Pavement Considerations

Newly placed engineered fill can provide adequate support for a pavement structure designed for appropriate subgrade strength and traffic characteristics. Based on the soil types encountered in the soil test borings and provided the site grading recommendations outlined herein are implemented, we recommend a CBR value of 4 be used in design of the project pavements. For the design and construction of exterior pavements, the subgrades should be prepared in accordance with the recommendations in the “Site and Subgrade Preparation” and “Engineered Fill” sections of this report.

If pavements are placed on the existing undocumented fill or alluvial soils, risk of excessive settlement and cracking/distress to the pavement may occur. This could result in additional maintenance of the pavement sections and should be evaluated prior to site grading activities.

We emphasize that good base course drainage is essential for successful pavement performance. Water buildup in the base course will result in premature pavement failures. The subgrade and pavement should be graded to provide effective runoff to either the outer limits of the paved area or to catch basins so that standing water will not accumulate on the subgrade or pavement.

The pavement at locations for refuse dumpsters should be properly designed for the high axial loads and twisting movements of the trucks. Consideration should be given to the use of concrete pavement for the dumpster and approach areas. We recommend that the refuse collector be consulted to determine the size and thickness of the concrete pads for dumpsters.

At locations where delivery truck, semi-trailers, and/or buses will be turning and maneuvering, the flexible pavement section should be designed to resist the anticipated shear stress on the pavement throughout the required pavement service life. When the traffic volumes, wheel loading conditions, and service life have been estimated, we can perform pavement analyses for flexible and rigid pavements for an additional fee.

5.9. Below Grade Excavation

The available geotechnical data indicates that the majority of the site soils, within the depths of the borings, can be excavated with conventional construction equipment.

As noted in the Geology section of this report, the weathering process in the Piedmont can be erratic and significant variations of the depths of the more dense materials can occur in relatively short distances. In some cases, isolated boulders or thin rock seams may be present in the soil matrix. We have generally found that material that our soil drilling augers can penetrate can also be excavated with a large backhoe or ripped with a dozer mounted ripper. Weathered rock or rock that cannot be penetrated by the mechanical auger will normally require blasting to loosen it for removal.

5.10. Cut and Fill Slopes

ECS does not anticipate cut or fill slopes greater than 10 feet in height, with the exception of the southeastern most slope which will be on the order of 45 feet. We recommend that permanent cut slopes with less than 10 feet crest height through undisturbed residual soils be constructed at 2:1 (horizontal: vertical) or flatter. Permanent fill slopes less than 10 feet tall may be constructed using engineered fill at a slope of 2.5:1 or flatter. A slope of 3:1 or flatter may be desirable to permit establishment of vegetation, safe mowing, and maintenance. The surface of all cut and fill slopes should be adequately compacted. All permanent slopes should be protected using vegetation or other means to prevent erosion.

A slope stability analysis should be performed on the southeastern most slope to determine a slope inclination resulting in a factor of safety greater than 1.4. Upon finalization of site civil drawings, ECS should be contacted to determine if further evaluation is necessary for the slope stability analysis.

The outside face of building foundations and the edges of pavements placed near slopes should be located an appropriate distance from the slope. Buildings or pavements placed at the top of fill slopes should be placed a distance equal to at least 1/3 of the height of the slope behind the crest of the slope. Buildings or pavements near the bottom of a slope should be located at least ½ of the height of the slope from the toe of the slope. Slopes with structures located closer than these limits or slopes taller than the height limits indicated should be specifically evaluated by the geotechnical engineer and may require approval from the building code official.

Temporary slopes in confined or open excavations should perform satisfactorily at inclinations of 2:1. All excavations should conform to applicable OSHA regulations. Appropriately sized ditches should run above and parallel to the crest of all permanent slopes to divert surface runoff away from the slope face. To aid in obtaining proper compaction on the slope face, the fill slopes should be overbuilt with properly compacted structural fill and then excavated back to the proposed grades.

6. CONSTRUCTION CONSIDERATIONS

6.1. Site Preparation

Prior to construction, the proposed construction area should be stripped of all topsoil, organic material, construction debris, existing undocumented fill within the building footprint, and other soft or unsuitable material. Upon completion of these razing and stripping operations, the exposed subgrade in areas to receive fill should be proofrolled with a loaded dump truck or similar pneumatic-tired vehicle having a loaded weight of approximately 25 tons. After excavation, the exposed subgrades in cut areas should be similarly proofrolled.

Proofrolling operations should be performed under the observation of a geotechnical engineer or his authorized representative. The proofrolling should consist of two (2) complete passes of the exposed areas, with each pass being in a direction perpendicular to the preceding one. Any areas which deflect, rut or pump during the proofrolling, and fail to be remedied with successive passes, should be undercut to suitable soils and backfilled with compacted fill.

The ability to dry wet soils, and therefore the ability to use them for fill, will likely be enhanced if earthwork is performed during summer or early fall. If earthwork is performed during winter or after appreciable rainfall then subgrades may be unstable due to wet soil conditions, which could increase the amount of undercutting required. Drying of wet soils, if encountered, may be accomplished by spreading and disking or by other mechanical or chemical means.

6.2. Fill Material and Placement

The project fill should be soil that has less than five percent organic content and a liquid limit and plasticity index less than 50 and 30, respectively. Soils with Unified Soil Classification System group symbols of SP, SW, SM, SC, and ML are generally suitable for use as project fill. Soils with USCS group symbol of CL that meet the restrictions for liquid limit and plasticity index are also suitable for use as project fill. Soils with USCS group symbol of MH (high elasticity soil) may be used in deeper fill areas with the added requirement that they remain stable beneath heavy construction traffic.

The fill should exhibit a maximum dry density of at least 90 pounds per cubic foot, as determined by a standard Proctor compaction test (ASTM D 698). We recommend that moisture control limits of -3 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. The majority of the onsite soils appear suitable for use as project fill.

Project fill should be compacted to at least 95 percent of its standard Proctor maximum dry density except within 24 inches of finished soil subgrade elevation beneath slab-on-grade and pavements. Within the top 24 inches of finished soil subgrade elevation beneath slab on grade and pavements, the approved project fill should be compacted to at least 100 percent of its standard Proctor maximum dry density. Aggregate base course (ABC stone) should be compacted to 100 percent of standard Proctor maximum dry density. However, for isolated excavations around footing locations or within utility excavations, a hand tamper will likely be required. ECS recommends that field density tests be performed on the fill as it is being placed, at a frequency determined by an experienced geotechnical engineer, to verify that proper compaction is achieved.

The maximum loose lift thickness depends upon the type of compaction equipment use. The table below provides maximum loose lifts that may be placed based on compaction equipment.

LIFT THICKNESS RECOMMENDATIONS

Equipment	Maximum Loose Lift Thickness, in.
Large, Self-Propelled Equipment (CAT 815, etc.)	8
Small, Self-Propelled or Remote Controlled (Rammax, etc.)	6
Hand Operated (Plate Tamps, Jumping Jacks, Wacker-Packers)	4

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. For mass grading operations we recommend a minimum of one density test per 2,500 SF per lift of fill placed or per 1 foot of fill thickness, whichever results in more tests. When dry, the majority of the site soil should provide adequate subgrade support for fill placement and construction operations. When wet, the soil may degrade quickly with disturbance from construction traffic. Good site drainage should be maintained during earthwork operations to prevent ponding water on exposed subgrades.

We recommend at least one test per 1 foot thickness of fill for every 100 linear ft of utility trench backfill. Where fill will be placed on existing slopes, we recommend that benches be cut in the existing slope to accept the new fill. All fill slopes should be overbuilt and then cut back to expose compacted material on the slope face. While compacting adjacent to below-grade walls, heavy construction equipment should maintain a horizontal distance of 1(H):1(V). If this minimum distance cannot be maintained, the compaction equipment should run perpendicular, not parallel to, the long axis of the wall.

6.3. Foundation Construction & Testing

Foundation excavations should be tested to confirm adequate bearing prior to installation of reinforcing steel or placement of concrete. Unsuitable soils should be undercut to firm soils and the undercut excavations should be backfilled with compacted controlled fill. Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time; therefore, foundation concrete should be placed the same day that foundations are excavated. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1- to 3-inch thick "mud mat" of "lean" concrete may be placed on the bearing surface to protect the bearing soils. The mud mat should not be placed until the bearing soils have been tested for adequate bearing capacity. Foundations undercut should be backfilled with engineered fill. If lean concrete is placed within the undercut zone, the foundation footprint does not require oversizing. However, if soil or ABC stone is used in lieu of lean concrete, the foundation footprint should be oversized on a 1V:1H scale.

We recommend testing all shallow foundations to confirm the presence of foundation materials similar to those assumed in the design. We recommend the testing consist of hand auger borings with Dynamic Cone Penetrometer (DCP) testing performed by an engineer or engineering technician.

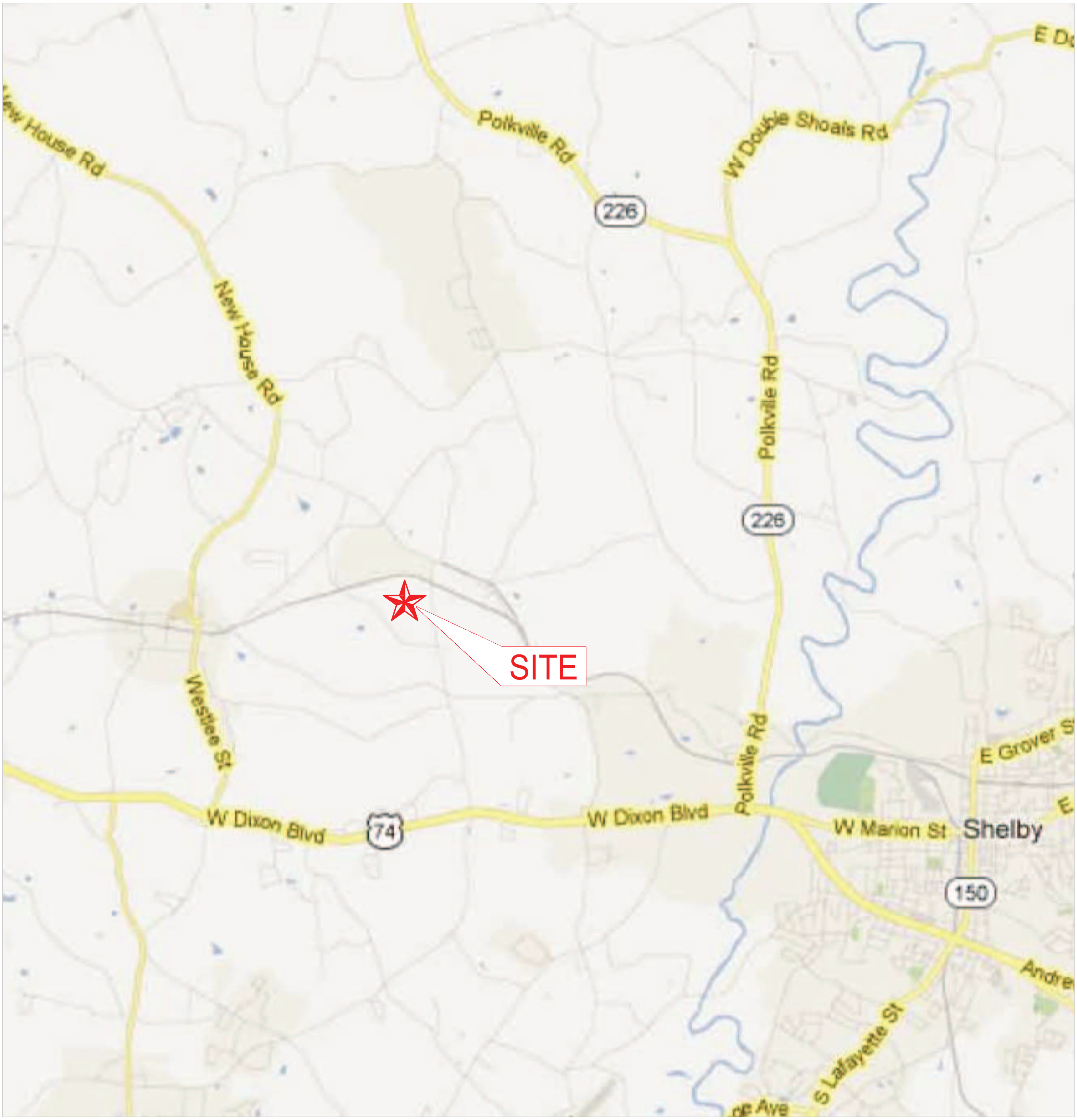
7. GENERAL COMMENTS

The borings performed at this site represent the subsurface conditions at the location of the borings only. Due to the prevailing geology and presence of existing undocumented fill, changes in the subsurface conditions can occur over relatively short distances that have not been disclosed by the results of the borings performed. Consequently, there may be undisclosed subsurface conditions that require special treatment or additional preparation once these conditions are revealed during construction.

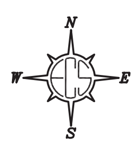
Our evaluation of foundation support conditions has been based on our understanding of the site and project information and the data obtained in our exploration. The general subsurface conditions utilized in our foundation evaluation have been based on interpolation of subsurface data between and away from the test holes. If the project information is incorrect or if the structure locations (horizontal or vertical) and/or dimensions are changed, please contact us so that our recommendations can be reviewed. 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 evaluation. The assessment of site environmental conditions for the presence of pollutants in the soil, rock, and groundwater of the site was beyond the scope of this exploration.

The recommendations outlined herein should not be construed to address moisture or water intrusion effects after construction is completed. Proper design of landscaping, surface and subsurface water control measures are required to properly address these issues. In addition, proper operation and maintenance of building systems is required to minimize the effects of moisture or water intrusion. The design, construction, operation, and maintenance of waterproofing and dampproofing systems are beyond the scope of services for this project.

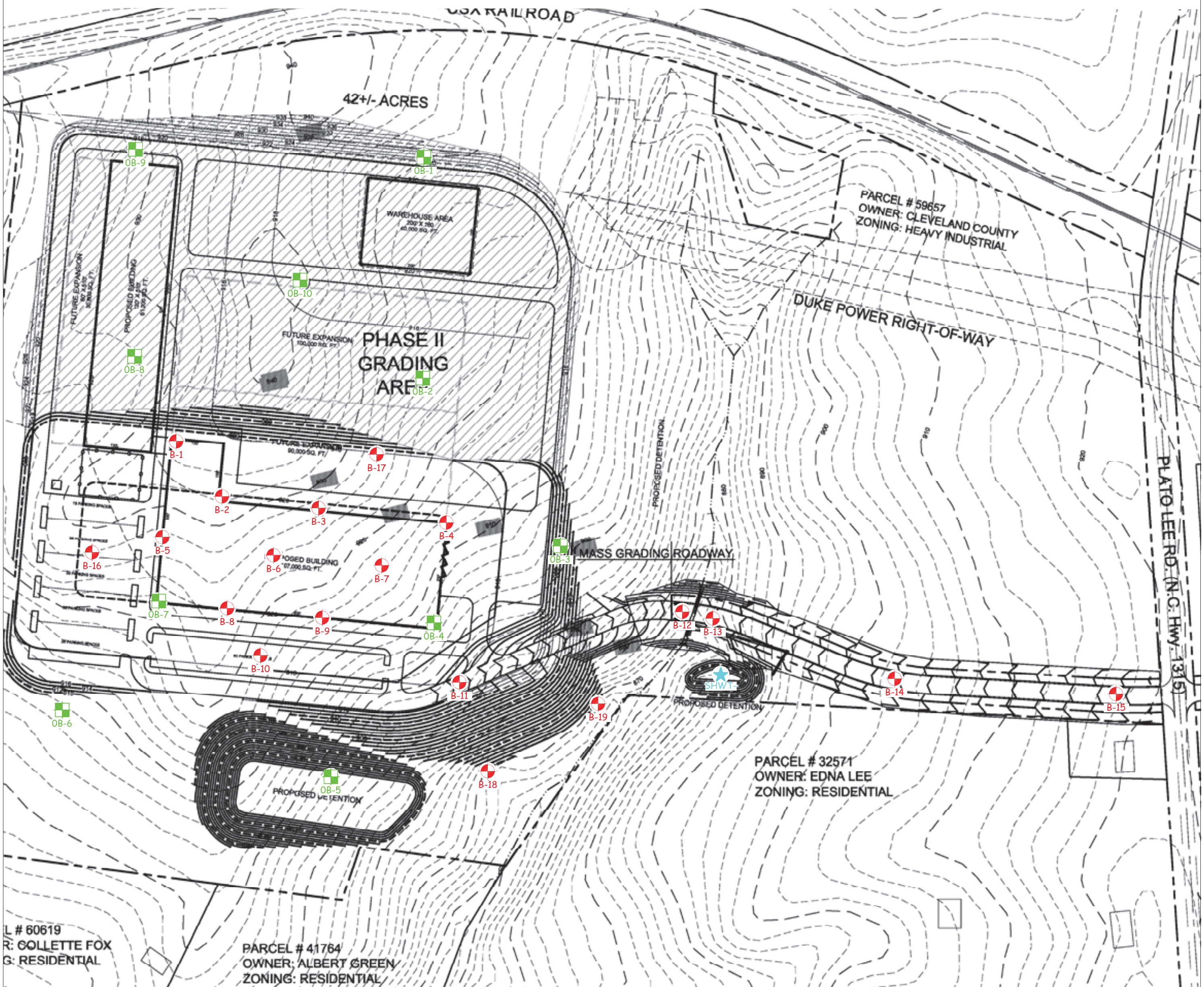
APPENDIX



LEGEND:



Source: **Google Maps**	ECS LLP CAROLINAS SETTING THE STANDARD FOR SERVICE	**FIGURE 1** **SITE VICINITY MAP** Project X-CEL **Shelby, North Carolina**	PROJ. MGR. JRA	SCALE N.T.S.
			DRAFTSMAN JRA	PROJECT NO. 08-8769
			REVISIONS	FIGURE 1
				DATE 1-11-13



LEGEND:

= Approximate Location of 2013 Boring

= Approximate Location of 2010 Boring

N W E S

= Approximate Location of SHWT Survey

Source: **Base Map Provided by:** **Burton Engineering**	ECS LLP CAROLINAS SETTING THE STANDARD FOR SERVICE	**FIGURE 2** **BORING LOCATION DIAGRAM** Project X-CEL **Shelby, North Carolina**	PROJ. MGR. JRA DRAFTSMAN JRA REVISIONS	SCALE N.T.S. PROJECT NO. 08-8769 FIGURE 2 DATE 1-11-13

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-1	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% —— - REC.% ——— 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

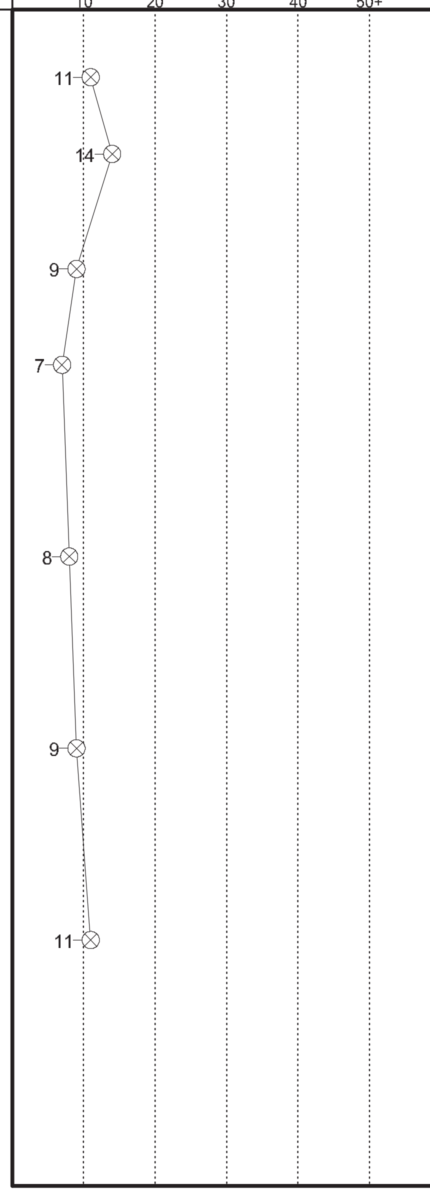
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 934

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [6"]				
	S-1	SS	18	14	RESIDUAL- Stiff, Brownish Red, Clayey SILT with mica, Moist (ML)			4 5 6	11
	S-2	SS	18	18	Medium Stiff, Orangish Red, Sandy SILT with mica, Moist (ML)		930	4 7 7	14
5									
	S-3	SS	18	18				2 4 5	9
	S-4	SS	18	18			925	3 3 4	7
10									
					Medium Stiff, Reddish Brown and Black, Sandy SILT with mica, Moist (ML)				
	S-5	SS	18	18			920	3 4 4	8
15									
					Stiff, Reddish Brown and Black, Sandy SILT with mica, Moist (ML)				
	S-6	SS	18	18			915	3 4 5	9
20									
	S-7	SS	18	18			910	4 5 6	11
25					END OF BORING @ 25.0'				
							905		
30									



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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 19.8'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-2	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% —— - REC.% ——: 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT | WATER CONTENT % | LIQUID LIMIT %

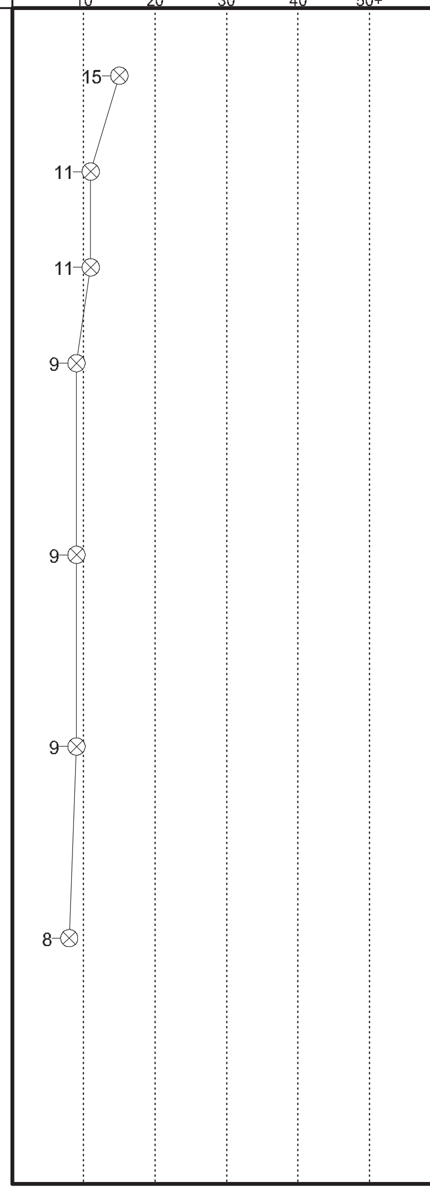
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 932

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT N
0					Topsoil Depth [6"]	932		
	S-1	SS	18	12	RESIDUAL- Stiff, Orangish Red, ClayeySILT with mica, Moist (ML)	930	4 6 9	15
5	S-2	SS	18	16			4 5 6	11
	S-3	SS	18	18		925	4 5 6	11
10	S-4	SS	18	18	Stiff, Orangish Red and Tan, Sandy SILT with mica, Moist (ML)		4 5 4	9
15	S-5	SS	18	18	Stiff, Light Red, Sandy SILT with mica, Moist (ML)	920	2 4 5	9
20	S-6	SS	18	18	Stiff, Reddish Purple, Sandy SILT with mica, Moist (ML)	915	4 4 5	9
25	S-7	SS	18	18		910	2 3 5	8
25					END OF BORING @ 25.0'			
30						905		



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

WL GNE WS☐ WD☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 21.8'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-3	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% —— - REC.% ——: 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 926

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [5"]				
					RESIDUAL- Stiff, Orangish Red, Sandy SILT with mica, Moist (ML)		925		
	S-1	SS	18	14				3 5 6	11
					Stiff, Reddish Purple, Sandy SILT with mica, Moist (ML)				
	S-2	SS	18	18				4 5 6	11
5									
							920		
	S-3	SS	18	18				4 5 7	12
	S-4	SS	18	18				4 6 8	14
10									
							915		
	S-5	SS	18	18				5 5 6	11
15									
							910		
	S-6	SS	18	18				5 6 6	12
20					END OF BORING @ 20.0'				
							905		
25									
							900		
30									

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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 17.2'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-4	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

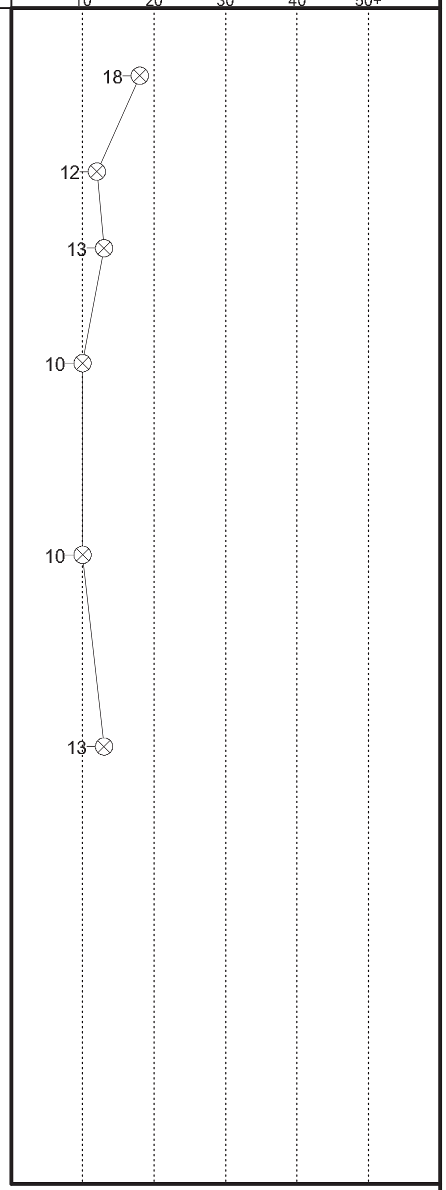
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 914

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT (BLOWS/FT)
0					Topsoil Depth [7"]			
	S-1	SS	18	12	Very Stiff, Reddish Yellow, Clayey SILT, Moist (ML)		5 9 9	18
	S-2	SS	18	16	Stiff, Reddish Brown, Clayey SILT with mica, Moist (ML)	910	5 5 7	12
5	S-3	SS	18	18	Loose, Reddish Brown, Silty Fine to Medium SAND, Moist (SM)		4 6 7	13
10	S-4	SS	18	18		905	4 5 5	10
					Stiff, Orangish Brown, Sandy SILT with mica, Moist (ML)			
15	S-5	SS	18	18		900	4 5 5	10
					Stiff, Brown, Sandy SILT with mica, Moist (ML)			
20	S-6	SS	18	18		895	5 6 7	13
					END OF BORING @ 20.0'			
25						890		
30						885		



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

WL GNE WS☐ WD☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 16.8'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-5	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% —— - REC.% —— : 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT | WATER CONTENT % | LIQUID LIMIT %

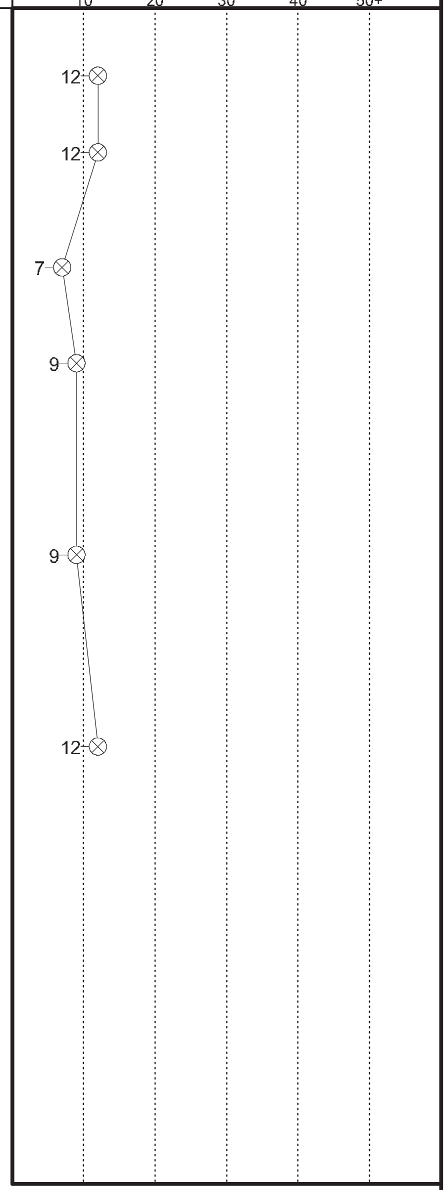
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 928

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT (BLOWS/FT)
0					Topsoil Depth [6"]			
	S-1	SS	18	14	RESIDUAL- Stiff to Medium Stiff, Brownish Red, Clayey SILT with mica, Moist (ML)		3 5 7	12
	S-2	SS	18	18	Stiff, Reddish Brown and Black, Sandy SILT with mica, Moist (ML)	925	3 6 6	12
5								
	S-3	SS	18	18			2 3 4	7
						920		
	S-4	SS	18	18			2 4 5	9
10								
					Stiff, Tan and Black, Sandy SILT with mica, Moist (ML)	915		
	S-5	SS	18	18			3 4 5	9
15								
					Medium Dense, Tan, Silty Fine to Medium SAND, Moist (SM)	910		
	S-6	SS	18	18			4 6 6	12
20					END OF BORING @ 20.0'			
						905		
25								
						900		
30								



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

WL GNE WS☐ WD☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 17.1'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-6	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% —— - REC.% ——: 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

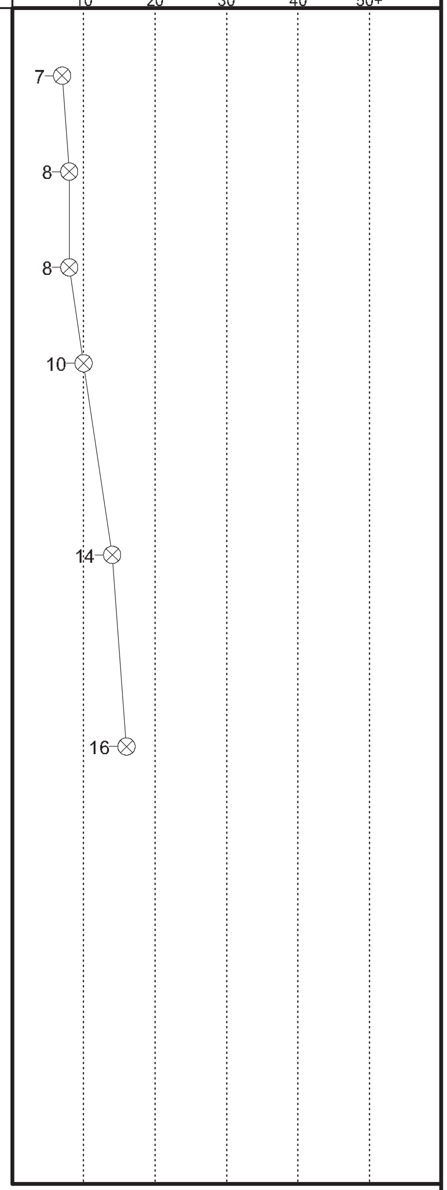
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 924

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT (BLOWS/FT)
0					Topsoil Depth [5"]			
					RESIDUAL- Medium Stiff, Reddish Yellow, Sandy SILT with mica, Moist (ML)			
	S-1	SS	18	12			3 3 4	7
	S-2	SS	18	16		920	3 3 5	8
5								
	S-3	SS	18	18			3 4 4	8
					Loose to Medium Dense, Reddish Purple and Tan , Silty Fine to Medium SAND, Moist (SM)			
	S-4	SS	18	18		915	4 5 5	10
10								
	S-5	SS	18	18		910	4 7 7	14
15								
	S-6	SS	18	18		905	5 7 7	16
20					END OF BORING @ 20.0'			
25						900		
30						895		



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

WL WS☐ WD☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR)	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 16.9'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-7	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% - REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

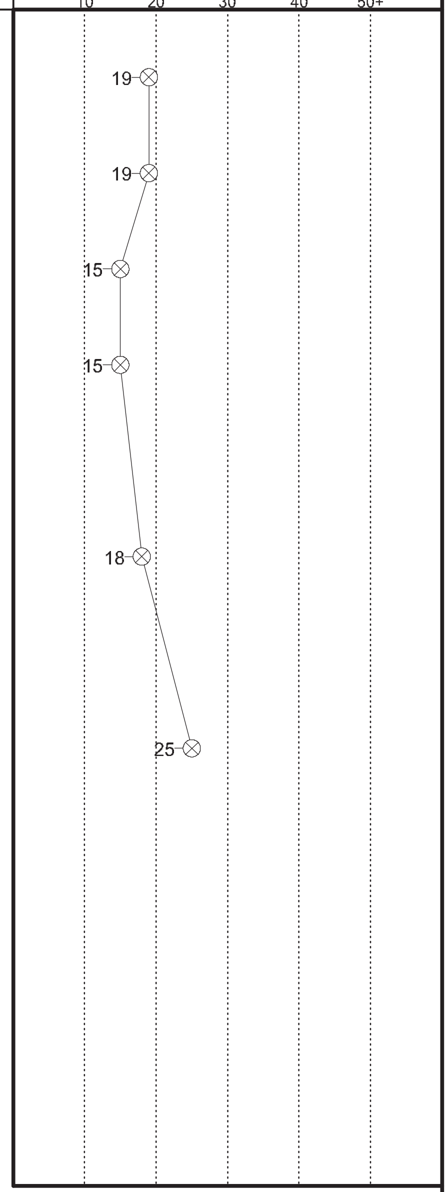
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 916

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT N
0					Topsoil Depth [6"]			
					RESIDUAL- Very Stiff, Orangish Red, Sandy SILT with mica, Moist (ML)	915		
	S-1	SS	18	12			4 9 10	19
					Medium Dense, Yellowish Brown, Silty SAND with mica, Moist (SM)			
	S-2	SS	18	16			5 10 9	19
5						910		
	S-3	SS	18	18			4 7 8	15
	S-4	SS	18	18			7 7 8	15
10						905		
					Medium Dense, Gray and White, Silty SAND with mica, Moist (SM)			
	S-5	SS	18	18			10 9 9	18
15						900		
	S-6	SS	18	18			11 13 12	25
20					END OF BORING @ 20.0'	895		
25						890		
30								



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

WL GNE WS☐ WD☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 15.4'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-8	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% —— - REC.% ——; 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

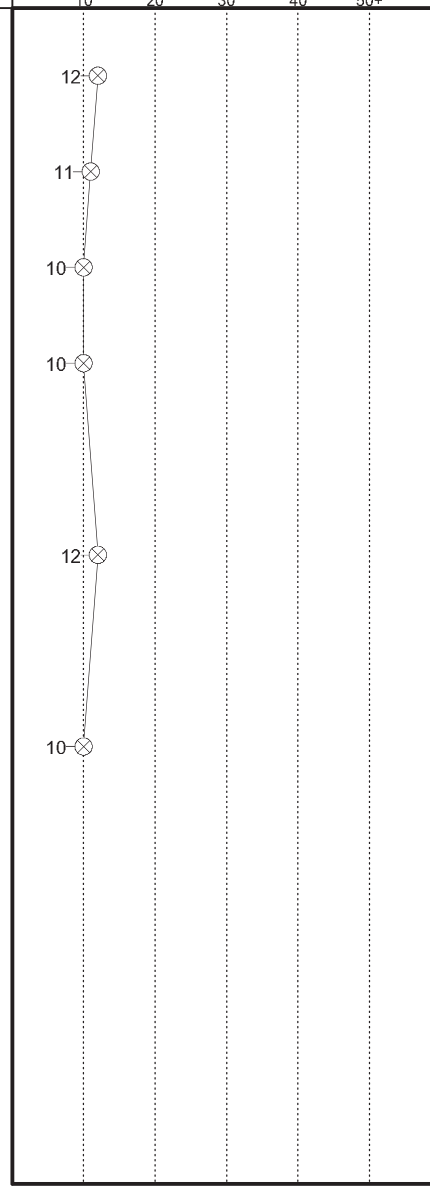
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 924

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [6"]				
					RESIDUAL- Stiff, Orangish Red, Sandy SILT with mica, Moist (ML)				
	S-1	SS	18	12				4 5 7	12
	S-2	SS	18	18			920	3 5 6	11
5									
					Loose, Light Brown, Silty SAND, Moist (SM)				
	S-3	SS	18	18				4 5 5	10
					Loose to Medium Dense, Tan, Silty SAND with mica, Moist (SM)				
	S-4	SS	18	18			915	4 4 6	10
10									
	S-5	SS	18	18			910	5 6 6	12
15									
					Loose, Tan and White, Silty SAND with mica, Moist (SM)				
	S-6	SS	18	18			905	4 5 5	10
20					END OF BORING @ 20.0'				
							900		
25									
							895		
30									



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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 17.4'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-9	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% —— - REC.% —— : 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

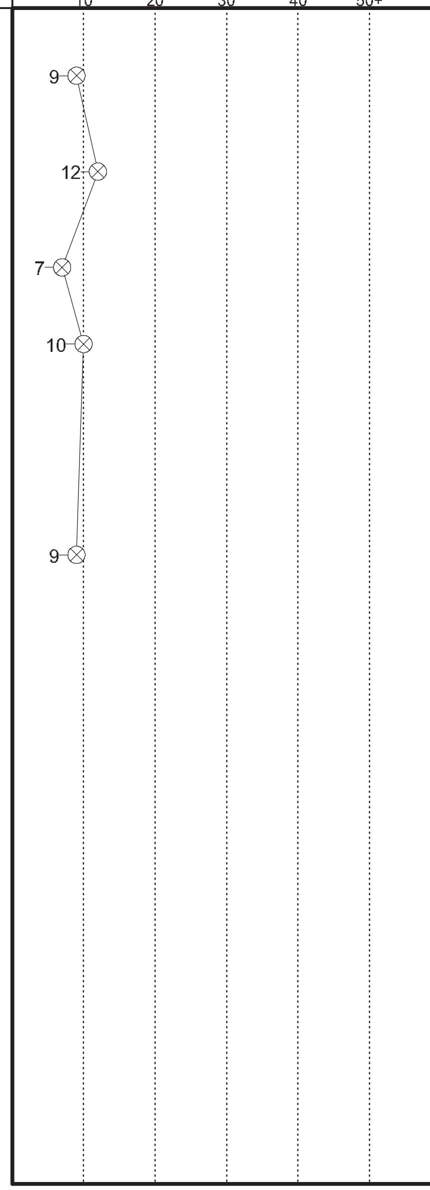
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 916

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT N
0					Topsoil Depth [5"]			
	S-1	SS	18	16	RESIDUAL- Stiff, Orangish Red, Clayey SILT with mica, Moist (ML)	915	3 4 5	9
5	S-2	SS	18	18	Stiff, Reddish Yellow, Sandy SILT with mica, Moist (ML)		4 6 6	12
	S-3	SS	18	16	Loose, Pinkish Orange, Silty Fine to Medium SAND with mica, Moist (SM)	910	2 3 4	7
10	S-4	SS	18	18	Loose, Brownish Orange, Silty Fine to Medium SAND with mica, Moist (SM)	905	3 5 5	10
15	S-5	SS	18	18	Loose, Purple, Silty Fine to Medium SAND with mica, Moist (SM)		3 4 5	9
					END OF BORING @ 15.0'	900		
20						895		
25						890		
30								



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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 12.2'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-10	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% — REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

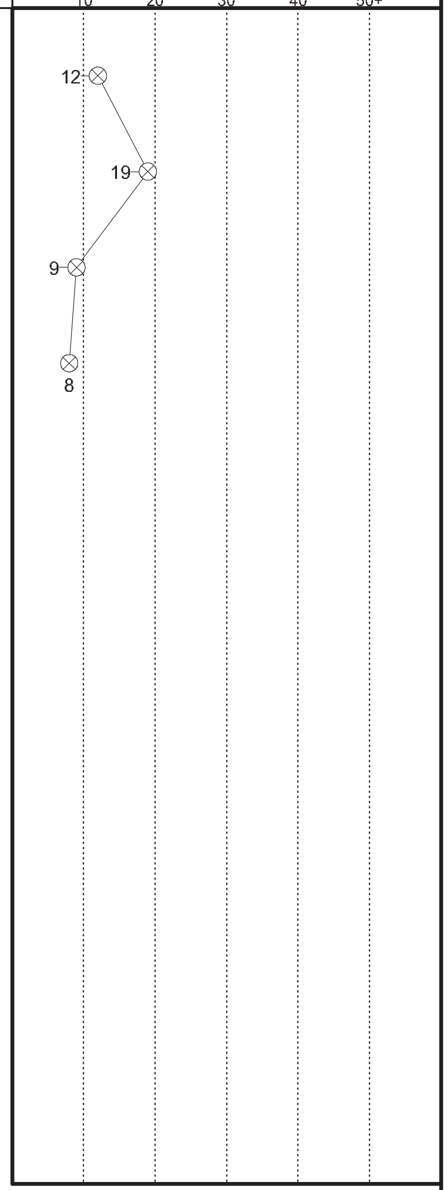
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 918

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [6"]			
	S-1	SS	18	12	RESIDUAL- Stiff, Orangish Red, Clayey SILT with mica, Moist (ML)			4 5 7
							915	
	S-2	SS	18	16	Very Stiff, Reddish Brown, Sandy SILT with mica, Moist (ML)			8 10 9
5								
	S-3	SS	18	18	Loose, Brown, Silty Fine to Medium SAND with mica, Moist (SM)			3 4 5
							910	
	S-4	SS	18	18	Tan, Silty Fine to Medium SAND with mica, Moist (SM)			3 4 4
10					END OF BORING @ 10.0'			
							905	
15								
							900	
20								
							895	
25								
							890	
30								



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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 6.9'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-11	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% - REC.% — 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 906

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT N
0					Topsoil Depth [5"]	906		
					RESIDUAL- Stiff, Orangish Red, Clayey SILT with mica, Moist (ML)	905		
	S-1	SS	18	18			4 6 8	14
	S-2	SS	18	18			4 7 8	15
5						900		
	S-3	SS	18	18			3 6 6	12
					Medium Dense, Yellowish Brown, Silty Fine to Medium SAND with mica, Moist (ML)			
	S-4	SS	18	18			5 6 7	13
10					END OF BORING @ 10.0'	895		
15						890		
20						885		
25						880		
30								

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

WL GNE WS☐ WD☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 7.1'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-12	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% —— - REC.% —— (20%, 40%, 60%, 80%, 100%)

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

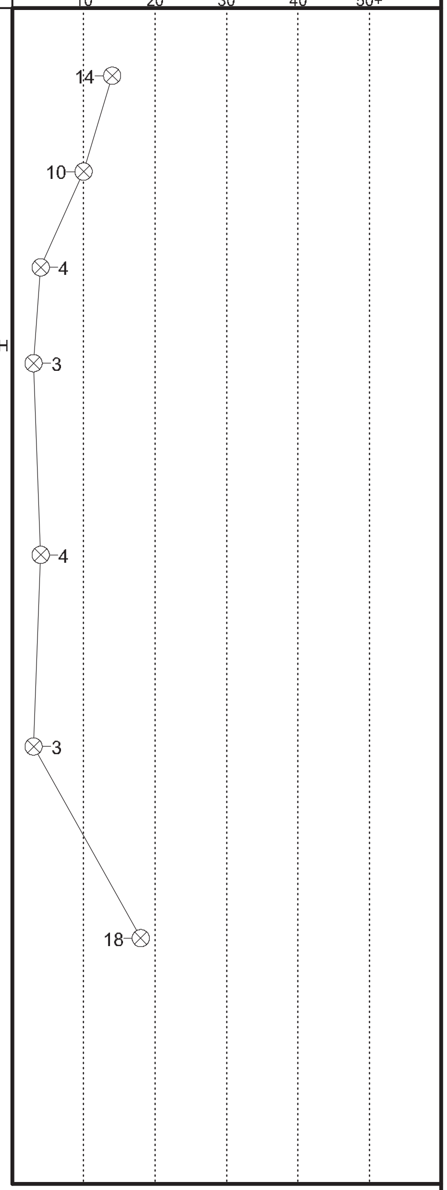
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 874

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	SPT (BLOWS/FT)
0					Topsoil Depth [5"]			
	S-1	SS	18	18	FILL- Stiff, Orangish Red, Sandy SILT with mica, Moist (ML)		5 6 8	14
	S-2	SS	18	16		870	3 5 5	10
5	S-3	SS	18	18	FILL- Soft, Black, Silty Highly Organic CLAY, Moist (CL)		2 2 2	4
	S-4	SS	18	12	ALLUVIAL- Soft, Reddish Brown and Gray, Sandy SILT, Moist (ML)	865	WOH 1 2	3
10					RESIDUAL- Soft, Yellowish Brown, Sandy SILT with mica, Moist (ML)			
	S-5	SS	18	6		860	2 2 2	4
15								
	S-6	SS	18	18		855	2 1 2	3
20					Medium Dense, Yellowish Brown and White, Silty Fine to Medium SAND with mica, Moist (ML)			
	S-7	SS	18	18		850	2 6 12	18
25					END OF BORING @ 25.0'			
						845		
30								



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

WL 19.0 WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) 19.3	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 17.1'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-13	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% —— - REC.% ——: 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 878

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [5"]			
					RESIDUAL- Medium Stiff to Stiff, Orangish Red, Sandy SILT, Moist (ML)			
	S-1	SS	18	18			2 3 5	8
						875		
	S-2	SS	18	16			3 5 5	10
5								
					Loose, Gray, Silty Fine to Medium SAND, Moist (SM)			
	S-3	SS	18	18			2 2 2	4
					Loose, Yellowish Brown, Silty Fine to Medium SAND with mica, Moist (SM)	870		
	S-4	SS	18	16			2 2 2	4
10								
					Loose, Brown and White, Silty Fine to Medium SAND with mica, Moist (SM)	865		
	S-5	SS	18	10			2 2 2	4
15								
					Loose, Yellowish Brown, Silty Fine to Medium SAND with mica, Moist (SM)	860		
	S-6	SS	18	14			2 4 4	8
20					END OF BORING @ 20.0'			
						855		
25								
						850		
30								

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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 15.0'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-14	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% / REC.% : 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

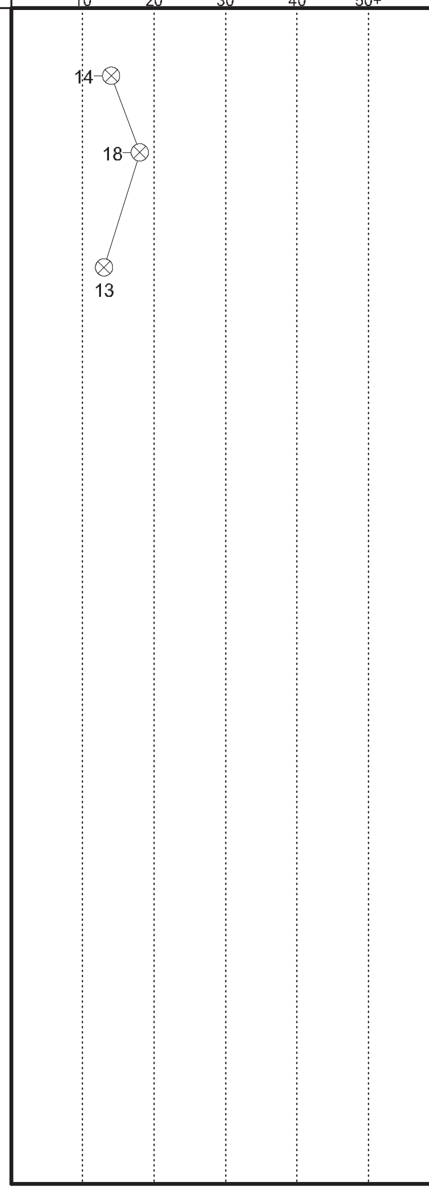
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 903

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [5"]				
	S-1	SS	18	17	RESIDUAL- Stiff, Orangish Red, Highly Elastic SILT with mica, Moist (MH)			4 6 8	14
	S-2	SS	18	16	Very Stiff, Orangish Red, Sandy SILT with mica, Moist (ML)		900	4 8 10	18
5									
	S-3	SS	18	16	Medium Dense, Brownish Yellow, Silty Fine to Medium SAND with mica, Moist (SM)			4 5 8	13
					END OF BORING @ 7.5'		895		
10									
							890		
15									
							885		
20									
							880		
25									
							875		
30									



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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 4.8'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-15	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% — REC.% — 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

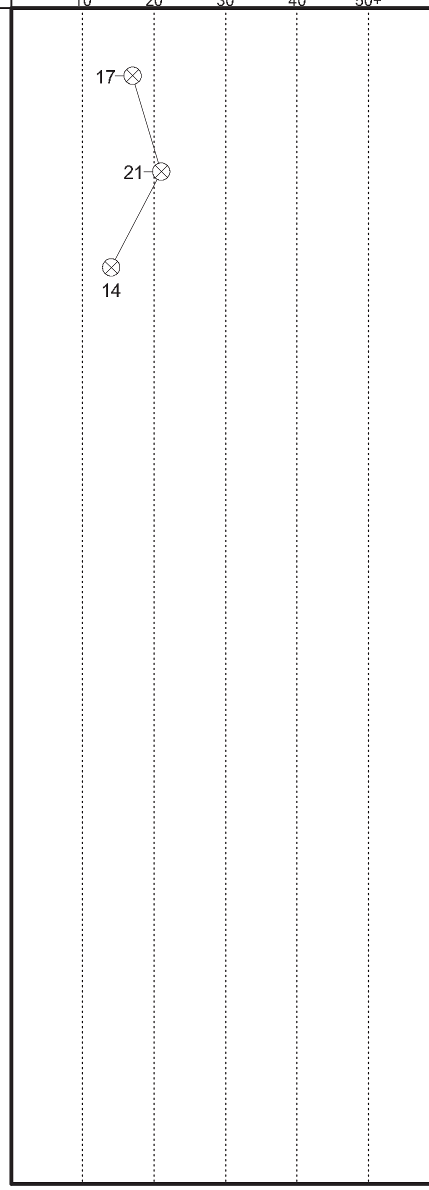
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 917

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [5"]			
					RESIDUAL- Very Stiff, Reddish Brown, Sandy SILT with mica, Moist (ML)			
	S-1	SS	18	16			915	4 7 10
					Medium Dense, Reddish Brown, Silty Fine to Medium SAND with mica, Moist (SM)			
	S-2	SS	18	18				7 10 11
5								
	S-3	SS	18	18			910	5 7 7
					END OF BORING @ 7.5'			
10							905	
15							900	
20							895	
25							890	
30								



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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 4.8'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-16	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% - REC.% — 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

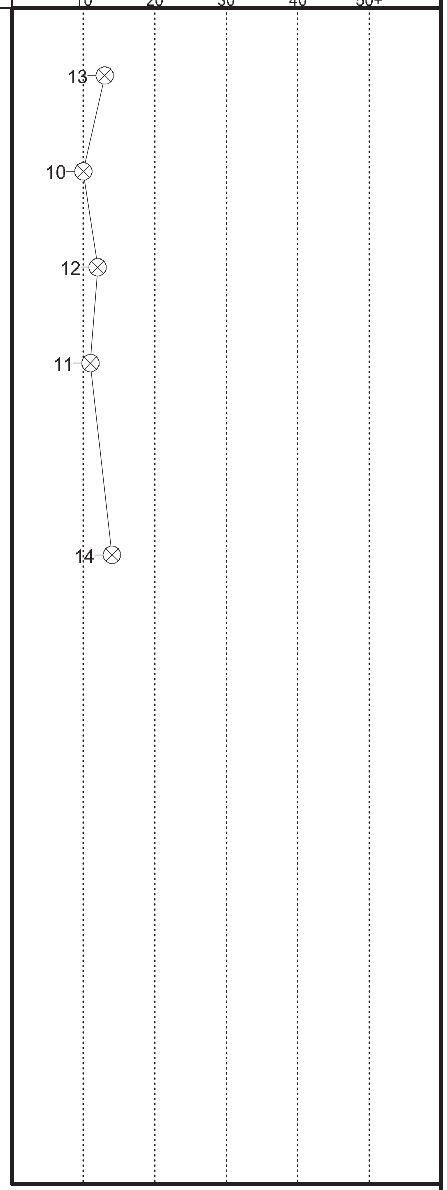
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 928

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [6"]			
					RESIDUAL- Stiff, Reddish Yellow, Sandy SILT with mica, Moist, (ML)			
	S-1	SS	18	12			4 6 7	13
						925		
	S-2	SS	18	16			3 5 5	10
5								
					Medium Dense, Brown, Silty Fine to Medium SAND with mica, Moist, (SM)			
	S-3	SS	18	18			4 5 7	12
						920		
	S-4	SS	18	18			4 4 7	11
10								
					Medium Dense, Tan and Purple, Silty Fine to Medium SAND with mica, Moist, (SM)	915		
	S-5	SS	18	18			6 7 7	14
15					END OF BORING @ 15.0'			
						910		
20								
						905		
25								
						900		
30								



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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 11.7'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-17	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY — RQD% - REC.% — 20%, 40%, 60%, 80%, 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 926

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [6"]			
					RESIDUAL- Very Stiff to Stiff, Orangish Red, Sandy SILT with mica, Moist (ML)	925		
	S-1	SS	18	14			6 7 9	16
	S-2	SS	18	16			4 6 9	15
5					Medium Dense, Purplish Brown, Silty Fine to Medium SAND with mica, Moist (SM)	920		
	S-3	SS	18	18			4 4 7	11
	S-4	SS	18	18			5 6 7	13
10					END OF BORING @ 10.0'			
						915		
15						910		
20						905		
25						900		
30								

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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 6.3'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-18	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% —— - REC.% —— 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

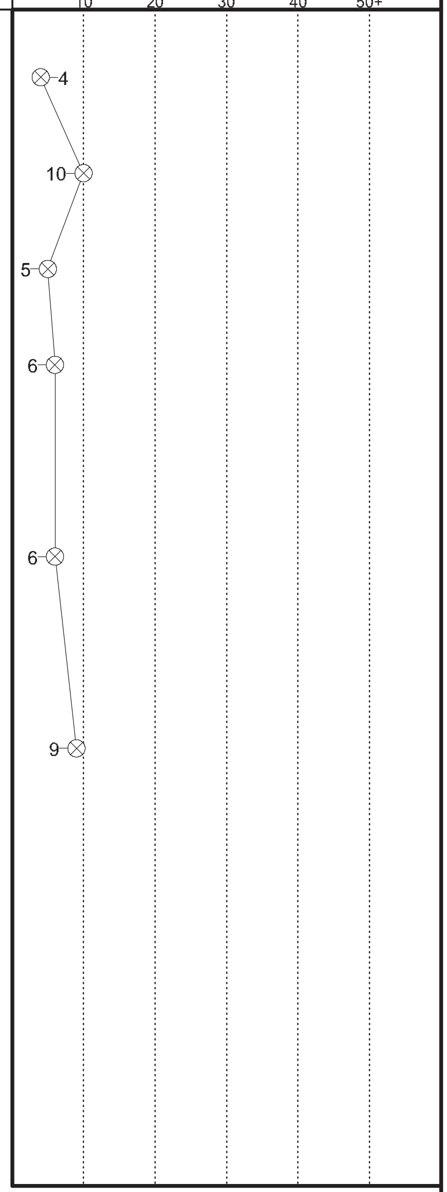
STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 870

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"
0					Topsoil Depth [5"]	870	
					RESIDUAL- Soft, Orangish Red, Sandy SILT with mica, Moist (ML)		
	S-1	SS	18	18			1 2 2
					Stiff, Reddish Orange, Sandy SILT with mica, Moist (ML)		
	S-2	SS	18	18			3 4 6
5						865	
					Medium Stiff to Stiff, Tan, Sandy SILT with mica, Moist (ML)		
	S-3	SS	18	12			2 3 2
	S-4	SS	18	16			2 2 4
10						860	
	S-5	SS	18	18			2 2 4
15						855	
	S-6	SS	18	18			3 3 6
20					END OF BORING @ 20.0'	850	
25						845	
30						840	



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

WL 10.7 WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR)	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 15.7'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	8769	B-19	1 OF 1

PROJECT NAME: Project X-CEL - DTR

SITE LOCATION: Plato Lee Road, Charlotte,

CALIBRATED PENETROMETER TONS/FT2: 1, 2, 3, 4, 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% —— - REC.% ——— 20% 40% 60% 80% 100%

PLASTIC LIMIT — WATER CONTENT % — LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 868

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT
0					Topsoil Depth [5"]	868		
	S-1	SS	18	16	ALLUVIAL- Medium Stiff to Soft, Gray, Silty Clayey SAND with mica, Moist (ML)		2 3 3	6
	S-2	SS	18	17		865	2 2 2	4
5	S-3	SS	18	14	Soft, Olive, Sandy SILT with mica, Moist (ML)		1 2 2	4
	S-4	SS	18	18		860	1 2 2	4
10					END OF BORING @ 10.0'			

Depth scale: 0, 5, 10, 15, 20, 25, 30. Elevation scale: 865, 860, 855, 850, 845, 840.

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

WL GNE WS ☐ WD ☐	BORING STARTED 01/07/13	
WL(BCR) WL(ACR) GNE	BORING COMPLETED 01/07/13	CAVE IN DEPTH @ 7.2'
WL	RIG 550 ATV FOREMAN Don	DRILLING METHOD 2.25 HSA

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-1	1 OF 1

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

CALIBRATED PENETROMETER TONS/FT.² 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

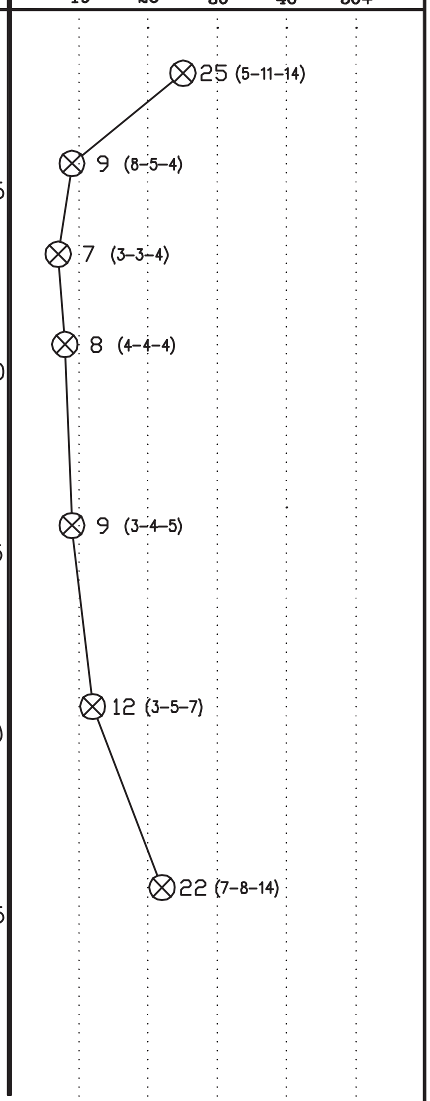
⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 930

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 2"	930	
	1	SS	18	18	RESIDUAL - Very Stiff to Stiff, Red and Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)		25 (5-11-14)
	2	SS	18	18			9 (8-5-4)
5					Medium Stiff to Stiff, Red, Brown, and White, Fine Sandy SILT with Trace Mica, Moist, (ML)	925	
	3	SS	18	18			7 (3-3-4)
	4	SS	18	16			8 (4-4-4)
10						920	
	5	SS	18	18			9 (3-4-5)
15						915	
	6	SS	18	16			12 (3-5-7)
20						910	
					Very Stiff, Light Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)		
	7	SS	18	18			22 (7-8-14)
25					END OF BORING @ 25.0'	905	
30							



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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) — WL(ACR) GNE	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 21.1'
WL GNE (EOD)	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010)

KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-2	1 OF 1

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 924

CALIBRATED PENETROMETER TONS/FT.² 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 3"	924	
	1	SS	18	18	RESIDUAL - Very Stiff to Stiff, Red, Fine Sandy SILT with Trace Mica, Moist, (ML)		16 (5-7-9)
	2	SS	18	18		920	12 (5-6-6)
5					Stiff to Very Stiff, Brown and White, Fine Sandy SILT with Trace Mica, Moist, (ML)		
	3	SS	18	18			10 (4-4-6)
	4	SS	18	18		915	22 (7-11-11)
10							
	5	SS	18	16		910	21 (4-8-13)
15							
	6	SS	18	18		905	14 (7-8-6)
20							
	7	SS	18	18		900	10 (3-5-5)
25					END OF BORING @ 25.0'		
						895	
30							

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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) — WL(ACR) GNE	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 21.7'
WL GNE (EOD)	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010)

KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-3	1 OF 1

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 905

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 2"	905	
	1	SS	18	18	RESIDUAL - Stiff to Very Stiff, Red, Fine Sandy Clayey SILT with Trace Mica, Moist, (ML)		13 (2-6-7)
5	2	SS	18	18		900	21 (6-10-11)
	3	SS	18	18			10 (3-4-6)
10	4	SS	18	18		895	9 (4-4-5)
					Medium Stiff, Fine Sandy SILT with Trace Mica, Moist, (ML)		
15	5	SS	18	18		890	7 (3-4-3)
					Loose, Light Brown and White, Silty Fine to Medium SAND with Trace Mica, Moist, (SM)		
20	6	SS	18	18		885	6 (3-3-3)
					Soft, Brown, Fine Sandy SILT with Trace Mica, Moist to Wet, (ML)		
25	7	SS	18	18		880	4 (2-2-2)
					Stiff, Brown, Fine Sandy SILT with Trace Mica and Rock Fragments, Wet, (ML)		
30	8	SS	18	18			12 (3-4-8)

END OF BORING @ 30.0'

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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) — WL(ACR) 26.0'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 26.9'
WL 25.6' (EOD)	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010)

KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-4	1 OF 2

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT–ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▶ LOSS OF CIRCULATION [100%]

SURFACE ELEVATION 904

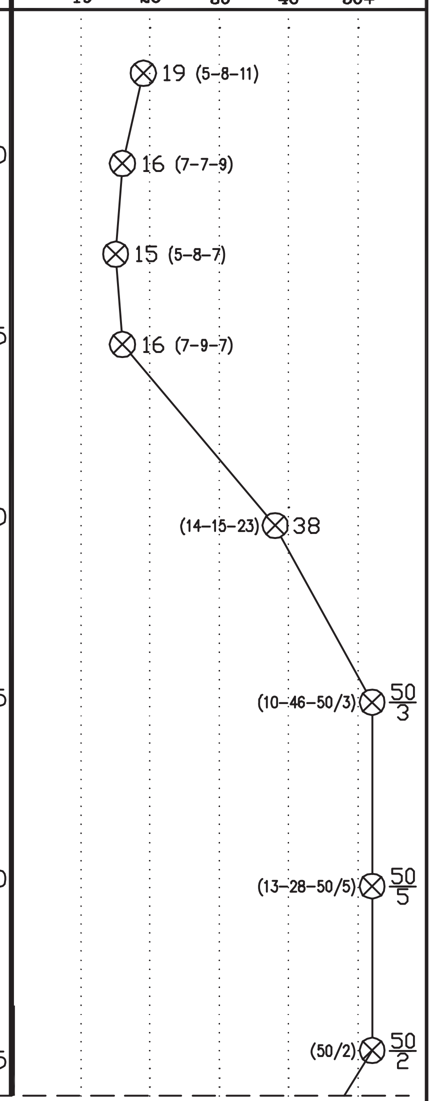
—○— CALIBRATED PENETROMETER TONS/FT.² 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)
0					Topsoil Depth 2"	904
	1	SS	18	18	RESIDUAL – Very Stiff to Stiff, Red, Fine Sandy SILT with Trace Mica, Moist, (ML)	
	2	SS	18	18		900
5	3	SS	18	18		
	4	SS	18	18	Medium Dense to Dense, Red and Brown, Silty Fine SAND with Trace Mica, Moist, (SM)	895
10						
	5	SS	18	18		890
15					PARTIALLY WEATHERED ROCK – Sampled as Brown, Silty Fine to Coarse SAND with Trace Mica, Moist to Wet, (PWR)	
	6	SS	15	15		885
20						
	7	SS	17	17		880
25					PARTIALLY WEATHERED ROCK – Sampled as Brown, Silty Coarse SAND with Trace Mica and Rock Fragments, Wet, (PWR)	
	8	SS	2	2		875
30						



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

▽ WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
▼ WL(BCR) 25.0' ▼ WL(ACR) 21.6'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 41.0'
▽ WL	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010)

KOrr

CLIENT: Cleveland County | JOB #: 7288 | BORING #: OB-4 | SHEET: 2 OF 2

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

—○— CALIBRATED PENETROMETER TONS/FT.² 1 2 3 4 5+

PLASTIC LIMIT % X —— WATER CONTENT % ● —— LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

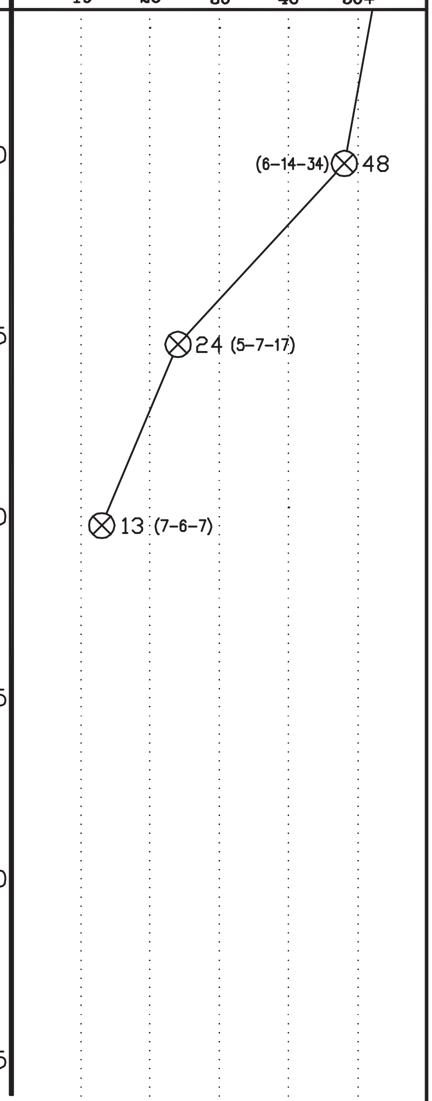
⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 904

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)
30					PARTIALLY WEATHERED ROCK - Sampled as Brown, Silty Coarse SAND with Trace Mica and Rock Fragments, Wet, (PWR)	
					Dense to Medium Dense, Brown and White, Silty Fine to Coarse SAND with Trace Mica and Rock Fragments, Wet, (SM)	
	9	SS	18	18		870
35						
	10	SS	18	18		865
40						
					Stiff, Brown and Gray, Fine Sandy SILT with Trace Mica, Wet, (ML)	
	11	SS	18	18		860
45						
					AUGER REFUSAL @ 46.0'	
						855
50						
						850
55						
						845
60						



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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) 25.0' WL(ACR) 21.6'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 41.0'
WL	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010) KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-5	1 OF 1

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT–ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

CALIBRATED PENETROMETER TONS/FT.^{2}: 1 2 3 4 5+

PLASTIC LIMIT % X —— WATER CONTENT % ● —— LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% —— 20% 40% 60% 80% 100%

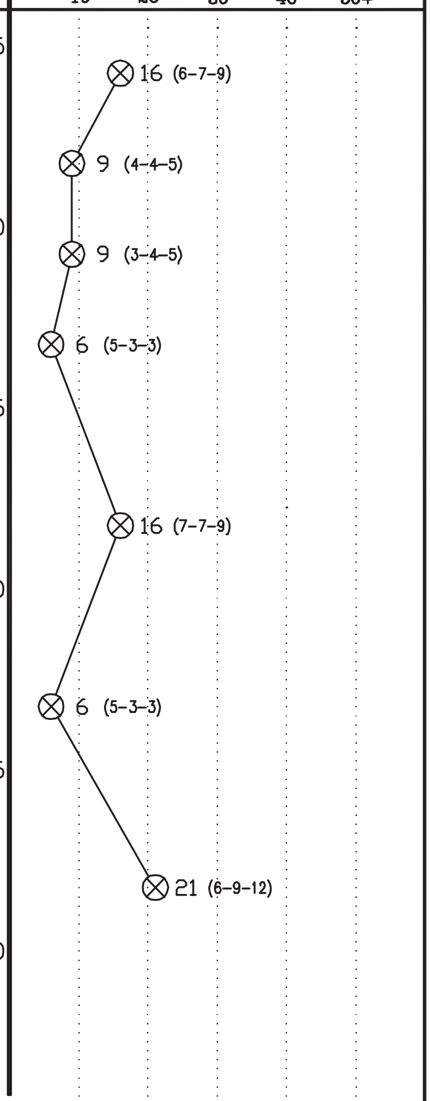
⊗ STANDARD PENETRATION BLOWS/FT.: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 896

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 3"		
	1	SS	18	16	RESIDUAL – Very Stiff to Stiff, Red and Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)	895	16 (6-7-9)
	2	SS	18	18			9 (4-4-5)
5						890	
	3	SS	18	18			9 (3-4-5)
	4	SS	18	18	Loose to Medium Dense, Brown and Gray, Silty Fine SAND with Trace Mica, Moist, (SM)		6 (5-3-3)
10						885	
	5	SS	18	18			16 (7-7-9)
15						880	
					Medium Stiff, Brown and Gray, Fine Sandy SILT with Trace Mica, Moist, (ML)		
	6	SS	18	16			6 (5-3-3)
20						875	
					Medium Dense, Brown and White, Silty Fine to Coarse SAND with Trace Mica, Moist to Wet, (SM)		
	7	SS	18	18			21 (6-9-12)
25					END OF BORING @ 25.0'	870	
30							



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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) 22.5' WL(ACR) 21.5'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 22.0'
WL 20.0' (EOD)	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010) KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-6	1 OF 2

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

-○- CALIBRATED PENETROMETER TONS/FT.^{2}: 1, 2, 3, 4, 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT.: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 905

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 3"	905	
	1	SS	18	18	RESIDUAL – Medium Stiff to Stiff, Red to Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)		8 (2-3-5)
	2	SS	18	18			14 (6-6-8)
5						900	
	3	SS	18	18			8 (3-4-4)
	4	SS	18	18			8 (3-4-4)
10						895	
	5	SS	18	17			8 (3-3-5)
15						890	
					Very Stiff to Hard, Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)		
	6	SS	18	18			21 (10-10-11)
20						885	
	7	SS	18	18			35 (9-19-16)
25						880	
	8	SS	18	18			27 (9-13-14)
30							

CONTINUED ON NEXT PAGE.

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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) 32.0' WL(ACR) 29.7'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 43.5'
WL	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010) KOrr

CLIENT: Cleveland County

JOB #: 7288

BORING #: OB-6

SHEET: 2 OF 2

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

—○— CALIBRATED PENETROMETER TONS/FT.^{2}: 1, 2, 3, 4, 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

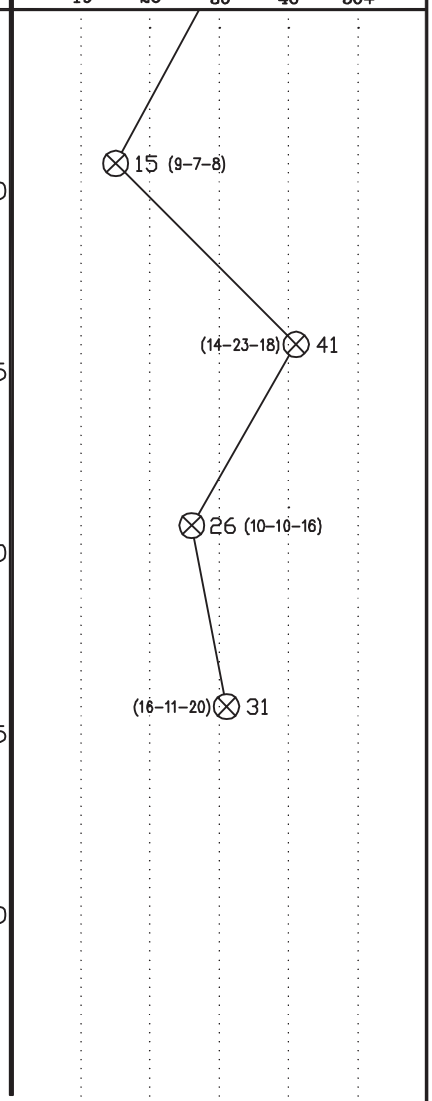
⊗ STANDARD PENETRATION BLOWS/FT.: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 905

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)
30					Very Stiff to Hard, Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)	
					Stiff, Light Brown, Fine Sandy SILT with Trace Mica, Moist to Wet, (ML)	
	9	SS	18	18		
35						870
					Hard to Very Stiff, Brown, Fine Sandy SILT with Trace Mica, Moist to Wet, (ML)	
	10	SS	18	18		
40						865
	11	SS	18	18		
45						860
					Dense, Brown, Silty Fine to Coarse SAND with Trace Mica, Moist to Wet, (SM)	
	12	SS	18	18		
50					END OF BORING @ 50.0'	855
55						850
60						



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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) 32.0' WL(ACR) 29.7'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 43.5'
WL	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010)

KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-7	1 OF 1

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

-○- CALIBRATED PENETROMETER TONS/FT.² 1 2 3 4 5+

PLASTIC LIMIT % X ——— WATER CONTENT % ● ——— LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

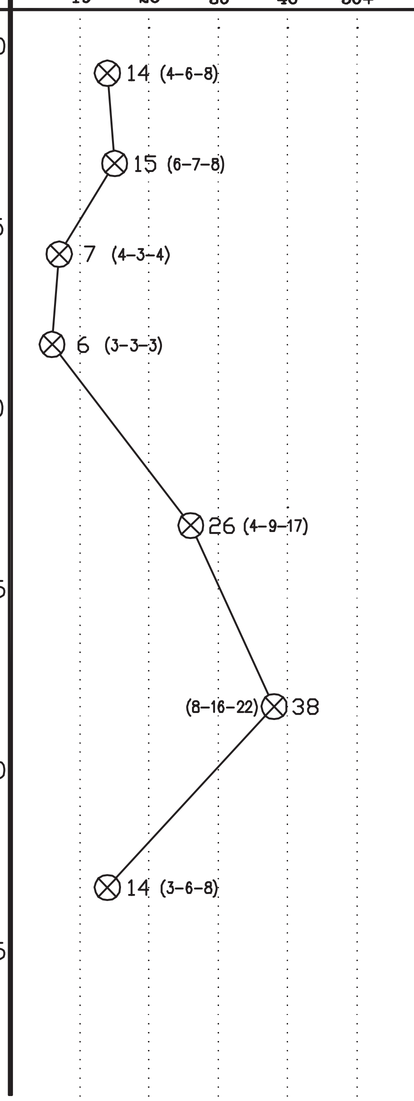
⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION 921

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	SPT BLOWS/FT.
0					Topsoil Depth 2"	920	
	1	SS	18	18	RESIDUAL - Stiff to Medium Stiff, Red to Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)		14 (4-6-8)
5	2	SS	18	18			15 (6-7-8)
	3	SS	18	10		915	7 (4-3-4)
10	4	SS	18	15		910	6 (3-3-3)
					Medium Dense, Brown, Silty Fine SAND with Trace Mica, Moist, (SM)		
15	5	SS	18	18		905	26 (4-9-17)
					Dense, White, Silty Fine to Coarse SAND with Trace Mica, Moist, (SM)		
20	6	SS	18	18		900	38 (8-16-22)
					Medium Dense, Brown, Silty Fine SAND with Trace Mica, Moist, (SM)		
25	7	SS	18	18		895	14 (3-6-8)
					END OF BORING @ 25.0'		
30							



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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) — WL(ACR) GNE	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 21.0'
WL GNE (EOD)	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010) KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-8	1 OF 1

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 927

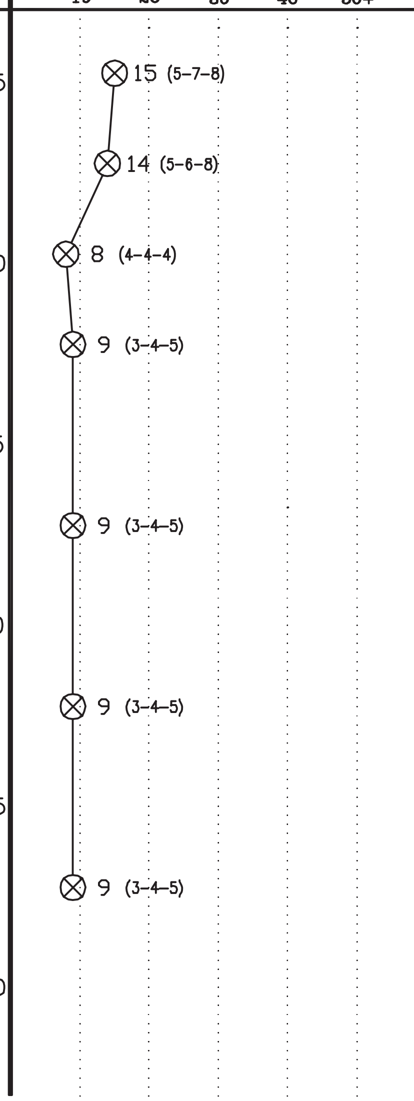
-○- CALIBRATED PENETROMETER TONS/FT.² 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% —— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 2"		
	1	SS	18	16	RESIDUAL - Stiff, Red, Fine Sandy SILT with Trace Mica, Moist, (ML)	925	15 (5-7-8)
5	2	SS	18	18			14 (5-6-8)
	3	SS	18	18	Medium Stiff to Stiff, Light Brown and Red, Fine Sandy SILT with Trace Mica, Moist, (ML)	920	8 (4-4-4)
10	4	SS	18	18		915	9 (3-4-5)
15	5	SS	18	18		910	9 (3-4-5)
20	6	SS	18	18		905	9 (3-4-5)
25	7	SS	18	18			9 (3-4-5)
					END OF BORING @ 25.0'	900	
30							



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

▽ WL	WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
▼ WL(BCR)	▼ WL(ACR) GNE	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 21.9'
▽ WL GNE		RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010) KOrr

CLIENT: Cleveland County

JOB #: 7288

BORING #: OB-9

SHEET: 1 OF 1

ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT-ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

—O— CALIBRATED PENETROMETER TONS/FT.^{2}: 1, 2, 3, 4, 5+

PLASTIC LIMIT % X —— WATER CONTENT % ● —— LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% ——— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT.: 10, 20, 30, 40, 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 928

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 2"	928	
	1	SS	18	18	RESIDUAL - Stiff to Very Stiff, Red, Fine Sandy SILT with Trace Mica, Moist, (ML)		14 (3-6-8)
	2	SS	18	18			20 (6-10-10)
	3	SS	18	18			11 (3-5-6)
	4	SS	18	18			9 (4-4-5)
					Stiff to Medium Stiff, Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)		
	5	SS	18	18			10 (3-5-5)
	6	SS	18	16			8 (3-4-4)
	7	SS	18	18			7 (3-3-4)
25					END OF BORING @ 25.0'		

Depth scale (FT): 0, 5, 10, 15, 20, 25, 30

Elevation scale (FT): 925, 920, 915, 910, 905, 900

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

WL	WS OR WD	BORING STARTED 11/23/10
DRILLER: Ameridrill Corporation		
WL(BCR)	WL(ACR) GNE	BORING COMPLETED 11/23/10
CAVE IN DEPTH @ 22.3'		
WL GNE		RIG 550 ATV FOREMAN Brian
DRILLING METHOD SPT		

(12/02/2010)

KOrr

CLIENT	JOB #	BORING #	SHEET
Cleveland County	7288	OB-10	1 OF 2

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT–ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

ECS LLP CAROLINAS

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 940

Legend: CALIBRATED PENETROMETER TONS/FT.² (1, 2, 3, 4, 5+); PLASTIC LIMIT % (X) — WATER CONTENT % (●) — LIQUID LIMIT % (Δ); ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — —, REC.% ——— (20%, 40%, 60%, 80%, 100%); ⊗ STANDARD PENETRATION BLOWS/FT. (10, 20, 30, 40, 50+)

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
0					Topsoil Depth 2"		
	1	SS	18	18	RESIDUAL – Stiff to Medium Stiff, Red and Light Brown, Fine Sandy SILT with Trace Mica, Moist to Wet, (ML)		14 (4-7-7)
	2	SS	18	18			14 (6-7-7)
5						935	
	3	SS	18	15			6 (3-3-3)
	4	SS	18	16			6 (3-2-4)
10						930	
	5	SS	18	18			12 (4-6-6)
15						925	
	6	SS	18	18			12 (9-6-6)
20						920	
	7	SS	18	18			10 (3-4-6)
25						915	
					Very Stiff and Stiff, Red and Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)		
	8	SS	18	18			16 (5-6-10)
30							

CONTINUED ON NEXT PAGE.

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

WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
WL(BCR) GNE — WL(ACR) 47.0'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 48.0'
WL	RIG 550 ATV — FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010) KOrr

CLIENT	JOB #	BORING #	SHEET	
Cleveland County	7288	OB-10	2 OF 2	ECS LLP CAROLINAS

PROJECT NAME: Plato Lee Road Approximate 40 Acre Site - DTR

ARCHITECT–ENGINEER:

SITE LOCATION: Plato Lee Road at Washburn Switch Road, Shelby, NC

-O- CALIBRATED PENETROMETER TONS/FT.^{2} 1 2 3 4 5+

PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — — — REC.% —— 20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION 100%

SURFACE ELEVATION: 940

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	STANDARD PENETRATION BLOWS/FT.
30					Very Stiff and Stiff, Red and Brown, Fine Sandy SILT with Trace Mica, Moist, (ML)			
35	9	SS	18	18			905	12 (4-5-7)
40	10	SS	18	18			900	11 (2-6-5)
45	11	SS	18	18			895	11 (3-5-6)
						▼ (47.0)		
50	12	SS	18	18	END OF BORING @ 50.0'		890	16 (4-7-9)
55							885	
60								

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

▽ WL — WS OR WD	BORING STARTED 11/23/10	DRILLER: Ameridrill Corporation
▼ WL(BCR) GNE ▼ WL(ACR) 47.0'	BORING COMPLETED 11/23/10	CAVE IN DEPTH @ 48.0'
▽ WL	RIG 550 ATV FOREMAN Brian	DRILLING METHOD SPT

(12/02/2010)

KOrr

Scope of Services

ECS conducted an investigation of the soils to determine the Seasonal High Water Table, (SHWT) in the designated area, SHWT Boring, indicated in the field. The investigation included drilling soil borings within the designated area with a hand auger to a depth of 10 feet below ground surface (bgs). The properties and characteristics of the soils retrieved from the borings were observed and recorded in field notes. The properties include texture, depth, the presence of restrictive horizons, depth to seasonal high water table, coarse fragments, etc. The assessment was conducted in accordance with current soil science practices and technology and the North Carolina Division of Water Quality Storm Water Best Management Practices Manual (BMP), dated July, 2007.

Seasonal High Water Table Determination

Below is a summary of the soils retrieved from the borings.

SHWT Boring The surface layer to a depth of 4 inches bgs consists of reddish brown loam. The structure appears to be granular with very friable consistence. The subsurface layer from 4 to 30 inches bgs consists of red clay. The structure appears to be moderate medium subangular blocky with firm, slightly sticky, slightly plastic consistence. The subsurface layer from 30 to 50 inches bgs consists of yellowish red sandy clay loam with common fine flakes of mica. The structure appears to be weak fine subangular blocky with firm, slightly sticky, slightly plastic consistence. The subsurface layer from 50 to 60 inches bgs consists of yellowish brown sandy clay loam with common fine flakes of mica. The structure appears to be massive with friable, slightly sticky, slightly plastic consistence. The subsurface layer from 60 to 96 inches bgs consists of brownish yellow sandy clay loam with common fine pale brown mottles and common fine flakes of mica. The structure appears to be massive with friable consistence. The subsurface layer from 96 to 120 inches bgs consists of multi-colored soft weathered rock that has a texture of sandy loam. The structure appears to be massive.

Conclusions

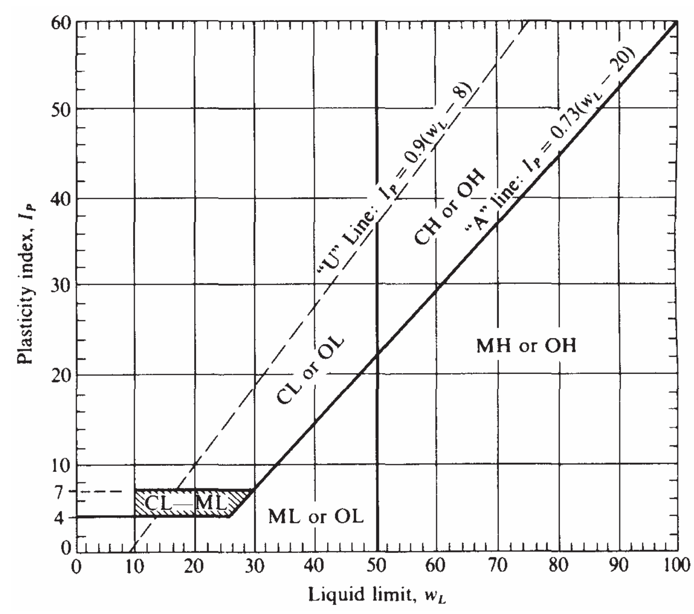
The SHWT properties and characteristics at SHWT Boring were found to be greater than 120 inches bgs.

The type of storm water management facility designed is based on the depth of the SHWT study or confining layer. The information above can be utilized to determine the type of storm water management facility best suited for this site according to the North Carolina Division of Water Quality Storm Water Best Management Practice Manual (BMP), dated July, 2007.

Submitted by,

Joseph A. Hinton, LSS
Senior soil Scientist

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria		
Coarse-Grained Soils (More than half of the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieves size)	Clean Gravels (Little or no fines)	GW		Well graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve. Depending on the percentage of the fines (fraction smaller than No. 200 sieve size), Coarse grained soils are classified as follows: Less than 5% GW, GP, SW, SP; More than 12% GM, GC, SM, SC; 5 to 12% Borderline cases requiring dual symbols[b]	$C_u = D_{60}/D_{10}$ greater than 4; $C_c = (D_{30})^2/(D_{10} \times D_{60})$ between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravels with fines	GM[a]	d	Silty Gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			GC		Clayey Gravels, gravel-sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean Sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines		$C_u = D_{60}/D_{10}$ greater than 6; $C_c = (D_{30})^2/(D_{10} \times D_{60})$ between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW	
		Sands with fines	SM[a]	d	Silty sands, sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			SC		Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
Fine-Grained Soils (More than half of material is smaller than No. 200 sieve)	Silts and Clays (Liquid Limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity			
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL		Organic silts and organic silty clays of low plasticity			
	Silts and Clays (Liquid Limit greater than 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH		Inorganic clays of high plasticity, fat clays			
			OH		Organic clays of medium to high plasticity, organic silts			
	Highly Organic Soils		Pt		Peat and other highly organic soils			



Reference: Winterkorn & Fang, 1975 (ASTM D-2487)

[a]Division of GM and SM groups into subdivision of d and u are for road and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u is used when L.L. is greater that 28.

[b]Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

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UNIFIED SOIL CLASSIFICATION SYSTEM

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols

SS	Split Spoon Sampler	ST	Shelby Tube Sampler
RC	Rock Core, NX, BX, AX	PM	Pressuremeter
DC	Dutch Cone Penetrometer	RD	Rock Bit Drilling
BS	Bulk Sample of Cuttings	PA	Power Auger (no sample)
HSA	Hollow Stem Auger	WS	Wash sample
REC	Rock Sample Recovery %	RQD	Rock Quality Designation %

II. Correlation of Penetration Resistances to Soil Properties

Standard Penetration (blows/ft) refers to the blows per foot of a 140 lb. hammer falling 30 inches on a 2-inch OD split-spoon sampler, as specified in ASTM D 1586. The blow count is commonly referred to as the N-value.

A. Non-Cohesive Soils (Silt, Sand, Gravel and Combinations)

Density		*Relative Properties*	
Under 4 blows/ft	Very Loose	Adjective Form	12% to 49%
5 to 10 blows/ft	Loose	With	5% to 12%
11 to 30 blows/ft	Medium Dense		
31 to 50 blows/ft	Dense		
Over 51 blows/ft	Very Dense		

Particle Size Identification		
Boulders		8 inches or larger
Cobbles		3 to 8 inches
Gravel	Coarse	1 to 3 inches
	Medium	½ to 1 inch
	Fine	¼ to ½ inch
Sand	Coarse	2.00 mm to ¼ inch (dia. of lead pencil)
	Medium	0.42 to 2.00 mm (dia. of broom straw)
	Fine	0.074 to 0.42 mm (dia. of human hair)
Silt and Clay		0.0 to 0.074 mm (particles cannot be seen)

B. Cohesive Soils (Clay, Silt, and Combinations)

Blows/ft	*Consistency*	*Unconfined Comp. Strength Q_p (tsf)*	*Degree of Plasticity*	*Plasticity Index*
Under 2	Very Soft	Under 0.25	None to slight	0 – 4
3 to 4	Soft	0.25-0.49	Slight	5 – 7
5 to 8	Medium Stiff	0.50-0.99	Medium	8 – 22
9 to 15	Stiff	1.00-1.99	High to Very High	Over 22
16 to 30	Very Stiff	2.00-3.00		
31 to 50	Hard	4.00–8.00		
Over 51	Very Hard	Over 8.00		

III. Water Level Measurement Symbols

WL	Water Level	BCR	Before Casing Removal	DCI	Dry Cave-In
WS	While Sampling	ACR	After Casing Removal	WCI	Wet Cave-In
WD	While Drilling	▽	Est. Groundwater Level	▼	Est. Seasonal High GWT

The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clay and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from alight industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ-sometimes significantly from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in-this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer For Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
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