Bertie County – New 911 Facility

Geotechnical Engineering Report

Winsor, North Carolina

May 22, 2025 | Terracon Project No. K5255001

Prepared for:

Schrader Group Architecture, LLC
4208 Six Forks Road Suite 1000
Raleigh, NC 27609

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May 22, 2025

Schrader Group Architecture, LLC
4208 Six Forks Road Suite 1000
Raleigh, NC 27609

Attn: Craig Schulz
P: 919.588.1433
E: cschulz@sgarc.com

Re: Geotechnical Engineering Report
Bertie County – New 911 Facility
206 County Farm Road
Windsor, North Carolina
Terracon Project No. K5255001

Dear Mr. Schulz:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PK5255001 dated February 5, 2025. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavements for the proposed project.

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

Sincerely,

Terracon

Gerald W. Stalls, Jr., PE
Operations Manager
NC Reg. No.: 034336

Bruce R. Spiro, PE
Senior Engineering Consultant
NC Reg. No.: 034724

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Attachments

Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Bertie County New 911 Facility to be located at 206 County Farm Road in Windsor, North Carolina. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Seismic site classification per IBC
- Site preparation and earthwork
- Foundation design and construction
- Floor slab design and construction
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the Site Location and Exploration Plan, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the Exploration and Laboratory Results attachment.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Schrader Group Architecture on January 3, 2025. The request included a topographic map of the site and conceptual plan drawings of the layout of the planned development.
Project Description	The project includes a new 911 Facility with associated parking lots, drive lanes, and infrastructure components.
Proposed Structure	Structures associated with the project include a new single story 911 center having an estimated footprint area of about 6,000 to 7,000 square feet.
Building Construction	The building is anticipated to consist of CMU walls and structural steel framing supported by shallow foundations with a slab-on-grade.
Finished Floor Elevation	Unknown. Finished floor elevation for the building is anticipated to be up to 2 feet above existing surface grades.
Maximum Loads	Based on information provided by the client, the following maximum foundation loads were used in estimating settlement based on our experience with similar projects. ■ Columns: 25 kips ■ Walls: 4.5 kips per linear foot (klf) ■ Slabs: 100 pounds per square foot (psf)
Grading/Slopes	The proposed finished grade elevation for the building pad is estimated to be up to 1.5 feet above existing grades. As such, approximately 1.5 feet of fill is anticipated to be required to develop final grade, excluding remedial grading requirements. Final slopes are planned with a maximum height of 1.5 feet and an inclination of 2H:1V (Horizontal: Vertical) or flatter.
Pavements	Asphalt surfacing is planned for the proposed drive lanes and parking areas. We assume that the traffic classification will consist of: ■ Class I: Parking stalls for autos and pickup trucks ■ Class II: Traffic consisting of home delivery trucks, trash pickup The pavement design period is 20 years.
Building Code	2024 North Carolina State Building Code (based on 2018 International Building Code)

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at 206 County Farm Road in Windsor, North Carolina. Latitude/Longitude (approximate) 35.97708°, -76.94605° See Site Location
Existing Improvements	None known.
Current Ground Cover	Lightly vegetated
Existing Topography	Based on the topographic site plan developed by Timmons Group (dated 09/24/2024), the project site appears to be relatively level with surface elevations generally ranging from about 12 to 14 feet (NAVD88).

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the Exploration and Laboratory Results and the GeoModel can be found in the Figures attachment to this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Surficial Soil	Topsoil
2	Granular	Moist to wet, loose to medium dense SAND (SP, SP-SM, SM, SC) with varying amounts of Silt and/or Clay. With an isolated deposit of Sandy Lean CLAY (CL).
3	Cohesive	Wet, medium stiff Sandy Fat CLAY (CH).

Groundwater, where encountered, was estimated based on the visually apparent moisture content of the recovered soil samples at the time of our field exploration and noted to occur at a depth of about 7 feet below current surface grades. Groundwater conditions may be different at the time of construction as well as may change because of seasonal variations in rainfall, runoff, and other conditions not apparent at the time of drilling. Long-term groundwater monitoring was outside the scope of services for this project.

Field and Laboratory Testing

Soil testing provided by Terracon was performed in accordance with American Society for Testing and Materials (ASTM) standards. All soils and materials tests were performed in our AASHTO re:source (formally AMRL) certified Elizabeth City, North Carolina laboratory.

Soil Classification and Index Testing

Representative portions of all soil samples collected during drilling operations were labeled, preserved and transferred to our laboratory in accordance with ASTM D4220 for classification and analysis. Soil descriptions on the boring logs are provided using visual-manual methods in general accordance with ASTM D2488 using the Unified Soil Classification System (USCS).

Soil samples that were selected for index testing were classified in general accordance with ASTM D2487. It should be noted that some variation can be expected between samples classified using the visual-manual procedure (ASTM D2488) and the USCS (ASTM D2487). A summary of the soil classification system is provided in the Supporting Information attachment to this report.

Representative split-spoon soil samples were selected and subjected to natural moisture, #200 sieve wash, and Atterberg Limits testing in order to corroborate the visual classification. These test results are presented in the Exploration and Laboratory Results attachment to this report and on the soil test boring logs provided in the Exploration and Laboratory Results attachment to this report. Generalized subsurface soil profiles are provided in the Figures attachment to this report.

Bulk Soil Sample CBR Testing

The bulk soil samples were subjected to Atterberg Limits, natural moisture content, and -# 200 sieve testing in general accordance with ASTM standards. These test results are and presented in the Exploration and Laboratory Results attachment to this report. In addition to classification testing, the bulk soil samples were subjected to Standard Proctor and CBR testing in general accordance with ASTM D698 and ASTM, respectively. The stress-strain curves were plotted. If necessary, the stress-strain curve was corrected by adjusting the location of the origin for concave shaped curves. CBR results were compared for 0.1-inch and 0.2-inch penetration, and subsequently, the CBR value was selected at 0.1-inch penetration using the corrected load values. These test results are presented in the Exploration and Laboratory Results attachment to this report.

Geologic Setting

The project site is located within the Atlantic Coastal Plain physiographic province. Numerous transgressions and regressions of the Atlantic Ocean have deposited marine, lagoonal, and fluvial (stream lain) sediments. The regional geology is very complex, and generally consists of interbedded layers of varying mixtures of sands, silts, and clays. During the Mesozoic era, the coastal plain was a broad sloping region well above sea level with loose soil continually eroded from rains and streams flowing toward the ocean. During the Cenozoic era and occasionally the Mesozoic era, the ocean covered the lowland and then subsided repeatedly, creating terraces each time. Based on our review of existing geologic and soil boring data, the geologic stratigraphy encountered in our subsurface explorations generally conforms to the regional depositional pattern.

Geologic Hazards

Limited known geologic hazards were identified for this site. However, some of the near surface soils encountered at the explored locations are susceptible to deterioration when exposed to excessive moisture and/or construction traffic due their appreciable fines (silt and/or clay) content. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties observed at the site and as described on the exploration logs and results, our professional opinion is that a Seismic Site Classification of DE be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 20 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

The subsurface materials generally consisted of sand with varying amounts of silt and clay underlain by fat clay extending to the maximum depth of the borings. Groundwater, where encountered, was estimated during drilling based on the apparent moisture content of the recovered soils and noted to occur at a depth of about 7 feet below existing surface grades. On-site granular soils classified to consist of SAND (SP, SP-SM, SM), where encountered, are considered suitable to be used as Structural Fill materials. The remaining near surface granular soils consisting of SAND (SC) and/or deposits of CLAY (CL) are not recommended to be reused as Structural Fill due to their appreciable fines content (silt and/or clay) along with the associated difficulties with placement and compaction.

Based on the conditions encountered and estimated load-settlement relationships, the proposed structures can be supported on conventional continuous or spread footings. Due to the low bearing capacity of near surface soils, the foundations should be supported on Structural Fill or native granular soils compacted to at least 98% of the materials respective maximum dry density as determined by the Standard Proctor (ASTM D698). Grading for the proposed foundations should incorporate the limits of the foundations plus a lateral distance beyond the outside edge of footings, where space is available. The Shallow Foundations section addresses support of the building directly bearing on native loose to medium dense sand or Structural Fill. The Floor Slabs section addresses slab-on-grade support of the building.

The near surface, silty sand, clayey sand, and/or sandy lean clay (where present) could become unstable with typical earthwork and construction traffic, especially after precipitation events. Effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the Earthwork section.

Traffic information is currently not available for us to generate an opinion of the minimum pavement component thickness. The Pavements section includes our recommended parameters for subgrade support for surfacing design by others along with regionally accepted typical minimum pavement sections. Our Geotechnical Engineer can provide pavement section thickness design if traffic information is made available if so requested.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the Exploration and Laboratory Results attachment), engineering analyses, and our current understanding of the proposed project. The General Comments section provides an understanding of the report limitations.

Earthwork

Earthwork is anticipated to include clearing and grubbing, excavations, and Structural Fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Prior to placing fill, existing vegetation, topsoil, and root mats should be removed. Complete stripping of the topsoil should be performed in the proposed building and parking/driveway areas.

Although no evidence of fill or underground facilities (such as septic tanks, cesspools, basements, and utilities) was observed during the exploration and site reconnaissance, such features could be encountered during construction. If unexpected fills or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

Following the site stripping to remove topsoil and prior to Structural Fill placement the subgrade soils should be evaluated by a Geotechnical Engineer. Structural Fill placed beneath the entire footprint of the building and pavement areas should extend horizontally a minimum distance of 5 feet beyond the outside edge of footings and 3 feet beyond pavement perimeters. The majority of the near-surface materials anticipated to be developed as excavation spoils are not recommended to be reused as Structural Fill due to its appreciable amounts of fines (Silt and/or Clay) along with the associated difficulties with proper placement and compaction.

The natural subgrade should be proofrolled with an adequately loaded vehicle such as a fully-loaded tandem-axle dump truck (20-ton minimum) or similar rubber-tired construction equipment. The proofrolling should be performed under the observation of the Geotechnical Engineer or representative. Areas excessively deflecting under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer and removed by the contractor. Excessively wet or dry material should either be removed, or moisture conditioned and recompacted.

In addition to proofrolling, test pit excavations extending to depths of about 2 feet should be performed within the building and pavement areas to verify the successful removal of surficial organic laden. The location and depth of the test pit excavations should be determined in the field by the Geotechnical Engineer at the time of construction. In the event that any organic laden soils are encountered during the subgrade evaluations they should be removed and backfilled with well compacted Structural Fill.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable; however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Fill Material Types

Fill required to achieve design grade should be classified as Structural Fill and general fill. Structural Fill is material used below, or within 5 feet of structures, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas.

Reuse of On-Site Soil: Excavated on-site granular soils classified to consist of SAND (SP, SP-SM, SM), where encountered, are considered suitable to be used as Structural Fill materials. The remaining near surface granular soils consisting of Clayey SAND (SC) and/or deposits of CLAY (CL) are not recommended to be reused as Structural Fill due to their appreciable fines content (silt and/or clay) along with the associated difficulties with placement and compaction.

Material property requirements for on-site soil for use as general fill and Structural Fill are noted in the table below:

Property	General Fill	Structural Fill
Composition	Free of deleterious material	Free of deleterious material
Maximum particle size	6 inches (or 2/3 of the lift thickness)	2 inches
Fines content	Not limited	Less than 20% Passing No. 200 sieve
Plasticity	Not limited	Maximum plasticity index of 6
GeoModel Layer Expected to be Suitable[1]	1, 2	2 [2]

1. Based on subsurface exploration. Actual material suitability should be determined in the field at time of construction.
2. The portions of GeoModel layer 2 that may potentially be reused as structural fill are currently anticipated to be limited throughout the site and are recommended to consist of SAND (SP, SP-SM, SM) soils.

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

Soil Type [1]	USCS Classification	Acceptable Parameters (for Structural Fill)
Granular	GW, GP, GM, SW, SP, SM	Less than 20% passing No. 200 sieve Liquid Limit Less than 20 Plasticity Index less than 6

1. Structural and general fill should consist of approved materials free of organic matter and debris. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.

Fill Placement and Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	General Fill	Structural Fill
Maximum Lift Thickness	Same as Structural Fill	10 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used
Minimum Compaction Requirements [1]	92% of maximum	98% of maximum
Water Content Range [1]	As required to achieve min. compaction requirements.	Granular: -2% to +2% of optimum

1. Maximum density and optimum water content as determined by the Standard Proctor test (ASTM D 698).

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with Structural Fill or bedding material in accordance with public works specifications for the utility be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and expansion index requirements of Structural Fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure’s maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

The groundwater table could affect excavation efforts, especially for overexcavation and replacement of lower strength soils and/or unsuitable soils. A temporary dewatering system consisting of sumps with pumps may be necessary to achieve the recommended depth of excavation depending on groundwater conditions at the time of construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

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

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,000 square feet of compacted fill in the building areas and 2,500 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 100 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer or his representative. Specifically, the inspector should perform hand auger borings in the base of the footings to confirm the bearing soils are consistent with those presented in this report. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer’s evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

If the site has been prepared in accordance with the requirements noted in Earthwork, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing Pressure [1, 2]	2,000 psf - foundations bearing upon Structural Fill or approved suitable undisturbed native soils.
Required Bearing Stratum [3]	GeoModel Layer 2 or approved suitable undisturbed native soils or Structural Fill extending to approved suitable undisturbed native soils.
Minimum Foundation Dimensions	Continuous Wall Footings: 24 inches Isolated Spread Footings: 3 feet by 3 feet
Minimum Embedment below Finished Grade [4]	Exterior footings in unheated areas: 24 inches Exterior footings in heated areas: 24 inches Interior footings in heated areas: 24 inches
Estimated Total Settlement from Structural Loads [2]	Up to about 1 inch
Estimated Differential Settlement [2, 5]	About 1/2 of total settlement

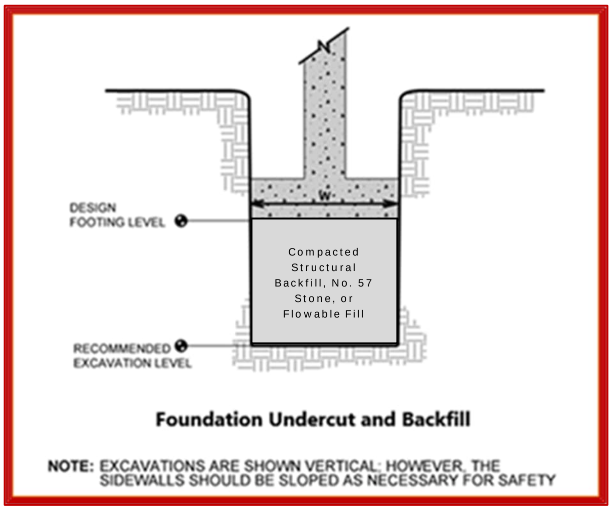
1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in Project Description. Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in Earthwork.
4. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
5. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

Foundation Construction Considerations

As noted in Earthwork, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

Sensitive soils exposed at the surface of footing excavations may require surficial compaction with hand-held dynamic compaction equipment prior to placing Structural Fill, steel, and/or concrete. Should surficial compaction not be adequate, construction of a working surface consisting of either crushed stone or a lean concrete mud mat may be required prior to the placement of reinforcing steel and construction of foundations.

If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or properly compacted Structural Fill, No. 57 stone, or lean concrete. The replacement zone is illustrated on the sketch below.



Floor Slabs

Design parameters for floor slabs assume the requirements for Earthwork have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support[1]	Overlying up to 1.5 feet of well compacted granular structural fill materials. Subgrade compacted to recommendations in Earthwork Directly supported by at least a 4-inch layer of relatively clean, compacted, poorly graded Sand (SP) or Gravel (GP) with less than 5% passing the No. 200 Sieve (0.074 MM). Alternatively, the concrete slabs may be directly supported by a 6 to 8-inch layer of well compacted aggregate base stone (NCDOT Aggregate Base Course: ABC)
Estimated Modulus of Subgrade Reaction [2]	100 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in Earthwork, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and Structural Fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

Pavements

Pavement Subgrade Support Characteristics

Sufficient information is not available for us to provide an opinion of minimum pavement thickness for the project. For pavement design by others, we recommend that a subgrade California Bearing Ratio, CBR, of 7 be used for the asphaltic concrete pavement designs which is based on the results of the completed laboratory CBR testing procedures and includes a 2/3rds factor for potential variability of the native subgrade soils. We recommend that a modulus of subgrade reaction of 100 pci be used for the portland cement concrete pavement designs. This value was empirically derived based upon our experience with the silty sand and sandy lean clay subgrade soils and our expectation of the quality of the subgrade as prescribed by the Site Preparation conditions as outlined in Earthwork. Kessler Dynamic Cone Penetrometer (DCP) testing was also performed at each boring location to determine correlated in-situ CBR values of the native subgrade soils. The results generally indicated in-situ CBR values less than that of the laboratory CBR testing. As such, the results of the DCP testing should not be used for pavement design analysis and the subgrade should be prepared as indicated in Earthwork.

Pavement Section Thicknesses

Although an AASHTO pavement design analysis was not completed for this project, the following tables provide estimated, generally accepted typical thicknesses for asphaltic concrete and portland cement concrete pavement sections within vehicular pavement areas for similar projects and soil conditions:

Typical Minimum Asphaltic Concrete Pavement Sections

Layer	Thickness (inches)	
	Light Duty [1]	Heavy Duty [1]
AC [1, 2]	2	5
Aggregate Base	8	8

1. All materials should meet the current Owner Specifications and/or North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures.
   - Asphaltic Surface - NCDOT Type S-9.5B Asphaltic Cement Concrete
   - Asphaltic Base - NCDOT Type I-19.0C Asphaltic Cement Concrete
2. A minimum 1.5-inch surface course should be used on ACC pavements.

Typical Minimum Portland Cement Concrete (PCC) Sections

Layer	Thickness (inches)	
	Light Duty [1]	Heavy Duty [1]
PCC [2, 3]	6	8
Aggregate Base[4]	4	6

1. See Project Description for more specifics regarding traffic classifications.
2. All materials should meet the current Owner Specifications and/or NCDOT Department of Transportation (NCDOT) Standard Specifications for Roads and Structures.
3. Concrete Pavement - NCDOT Portland Cement Concrete Class – Pavement having a minimum compressive strength of 4,500 psi at 28 days.
4. ABC materials are recommended to be underlain by a Geotextile Fabric (such as Mirafi 500X, or equivalent).

Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Although not required for structural support, a minimum 4-inch thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its “green” state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or collect and discharge excess water from the islands. Examples of features are edge drains connected to the stormwater collection system, longitudinal subdrains, or other suitable outlets and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

It will be necessary to tie-in the new asphalt pavement sections to the existing roadway alignment. The tie-ins of the new pavement sections to the existing pavement sections should conform to North Carolina Department of Transportation (NCDOT) requirements.

Pavement section thicknesses and design criteria should be reviewed by the design civil engineer to determine the adequacy of the pavement section for its intended purpose. All pavement material and construction procedures should conform to North Carolina Department of Transportation (NCDOT) requirements.

Obtaining the CBR design value included in our analysis for the subgrade soils when constructing new pavements is contingent upon successfully preparing and compacting the subgrade soils to a depth of at least 12 inches along with the quality control testing procedures as indicated in this report. In the event that the subgrade soils are not firm, stable, and properly compacted, a CBR value less than that noted above will be achieved which will reduce the lifespan of the pavement section and/or potentially result in pavement failures.

In preparation for a stable subgrade support for the pavement sections, the following construction steps are recommended:

- Following pavement rough grading operations, the exposed subgrade should be observed under proofrolling. This proofrolling should be accomplished with a fully loaded dump truck or 7- to 10-ton drum roller to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed should be removed and replaced with a well-compacted Select Fill in accordance with the recommendations of this report. The inspection of these phases should be performed by a geotechnical engineer or a qualified engineer's representative.

- Where excessively unstable subgrade soils are observed during proofrolling and/or fill placement, it is expected that these weak areas can be stabilized by means of undercutting and replacing with suitable material, thickening the base course layer, and/or by chemically stabilizing the subgrade. These alternates should be addressed by the Geotechnical Engineer during construction, if necessary, who will recommend the most economical approach at the time.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly effect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

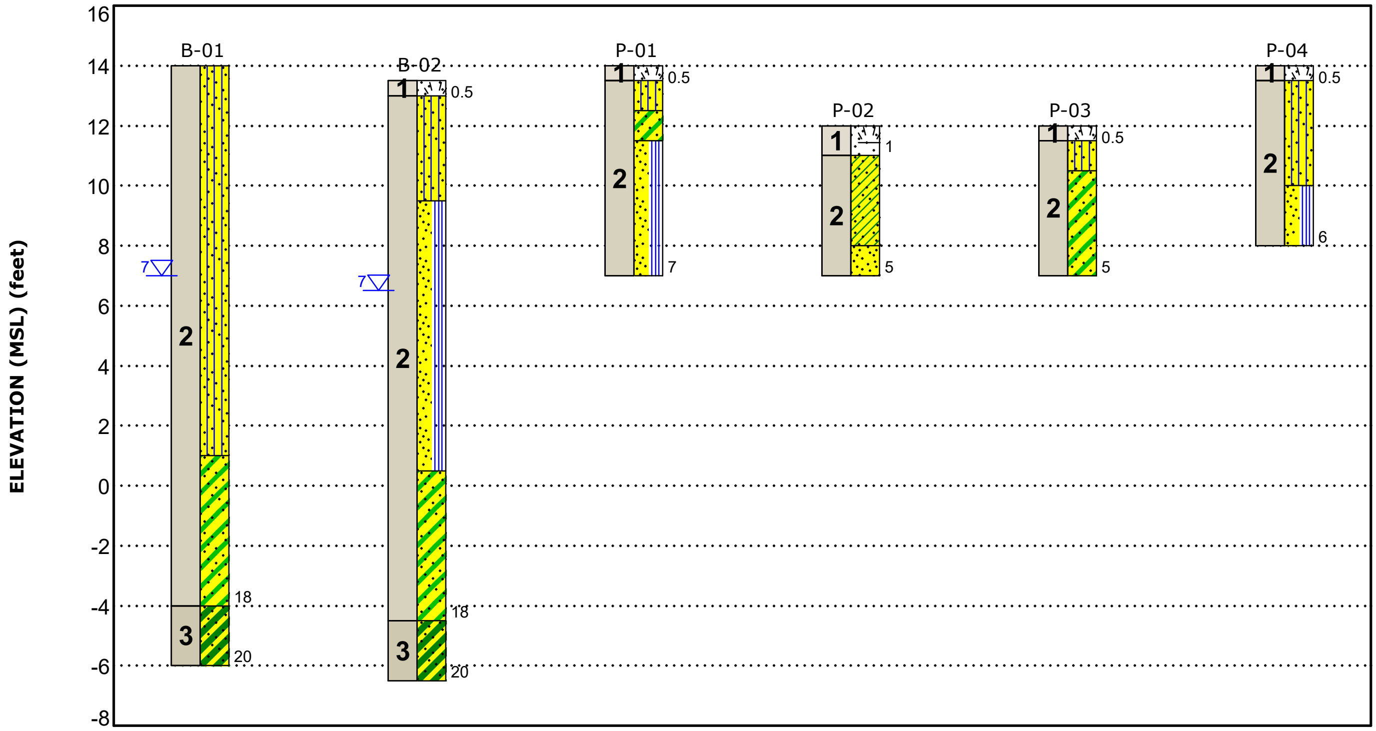
Figures

Contents:

Bertie County - New 911 Facility
206 County Farm Road | Windsor, NC
Terracon Project No. K5255001

106 Capital Trace, Unit E
Elizabeth City, NC

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surficial Soils	Topsoil
2	Granular Soils	Moist to wet, loose to medium dense SAND (SP, SP-SM, SM, SC) with varying amounts of Silt and Clay. With an isolated deposit of Sandy Lean CLAY (CL)
3	Cohesive Soils	Wet, medium stiff Sandy CLAY (CH)

Legend

- Silty Sand
- Clayey Sand
- Sandy Fat Clay
- Topsoil
- Poorly-graded Sand with Silt
- Sandy Lean Clay
- Poorly-graded Sand

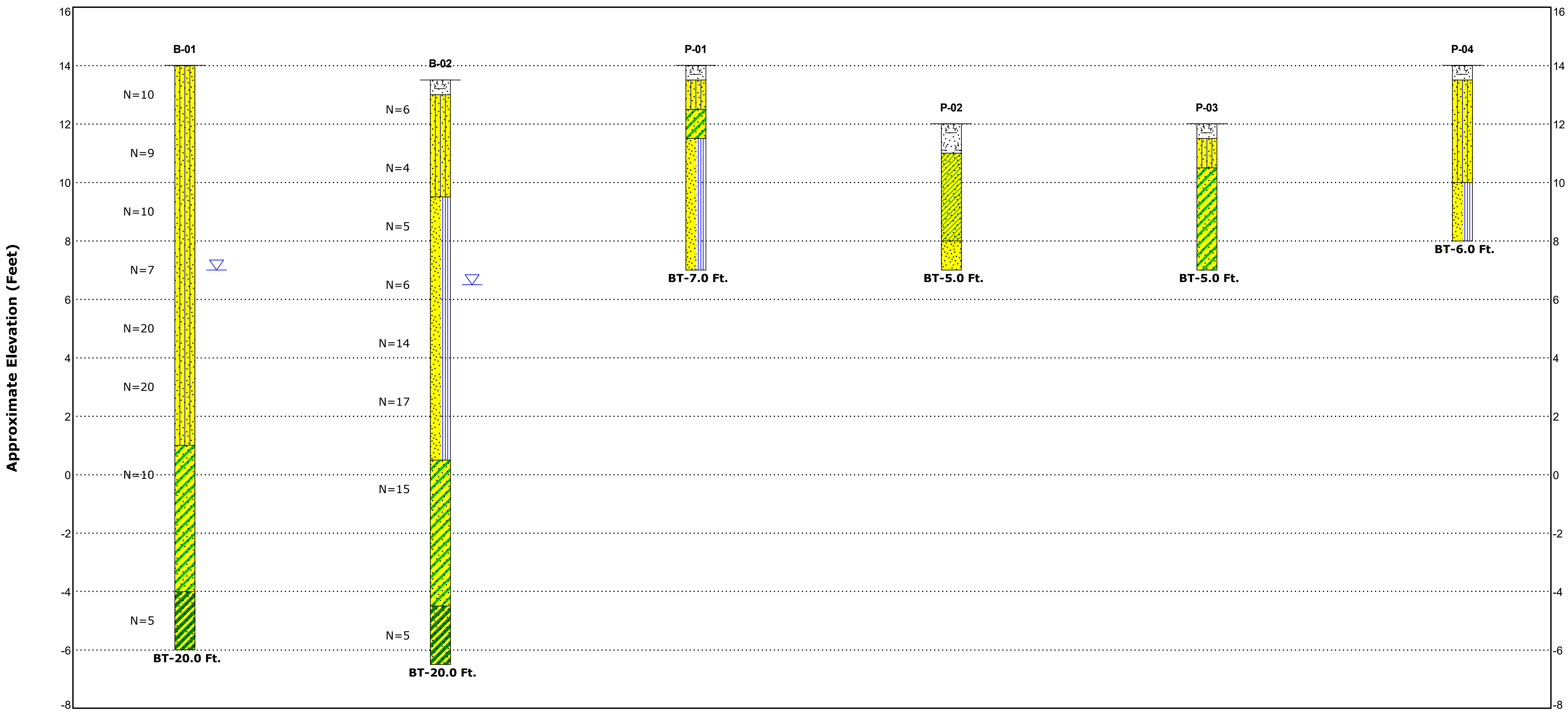
First Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

Subsurface Profile

Terracon
106 Capital Trace, Unit E
Elizabeth City, NC



Notes	Water Level Observations	Explanation	Material Legend
See Exploration Plan for orientation of soil profile. See General Notes in Supporting Information for symbols and soil classifications. Soils profile provided for illustration purposes only. Soils between borings may differ AR - Auger Refusal BT - Boring Termination	Water Level Reading at time of drilling. Water Level Reading after drilling.	B-01 — Borehole Number Moisture Content — %w LL PL — Liquid and Plastic Limits Sampling (See General Notes) Borehole Lithology AR BT — Borehole Termination Type	Silty Sand Clayey Sand Sandy Fat Clay Topsoil Poorly-graded Sand with Silt Sandy Lean Clay Poorly-graded Sand

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
2	25	Building area
4	5 to 7	Pavement areas

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. Approximate ground surface elevations were obtained by interpolation from the topographic site plan developed by Timmons Group (dated 09/24/2024). If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings within the building limits with a track-mounted, rotary drill rig using mud rotary procedures. Continuous samples were obtained in the upper 12 feet of each boring and at intervals of 5 feet thereafter. In the split barrel sampling procedure, a standard 2-inch outer diameter split barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the second and third 6-inch interval of a normal 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. For safety purposes, all borings were backfilled with drilling spoils after their completion. The borings within the pavement areas were performed using hand auger procedures with continuous soil sampling. Pavement borings were backfilled with auger cuttings upon completion. Kessler Dynamic Cone Penetrometer (DCP) testing was completed at each boring location to provide correlated in-situ CBR values.

We also estimated the boreholes while drilling for the presence of groundwater based on the apparent wetness of the recovered soils. The estimated groundwater levels are shown on the attached boring logs.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Atterberg Limits
- Sieve Analysis
- CBR Testing

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Site Location and Exploration Plans

Contents:

Note: All attachments are one page unless noted above.

Site Location

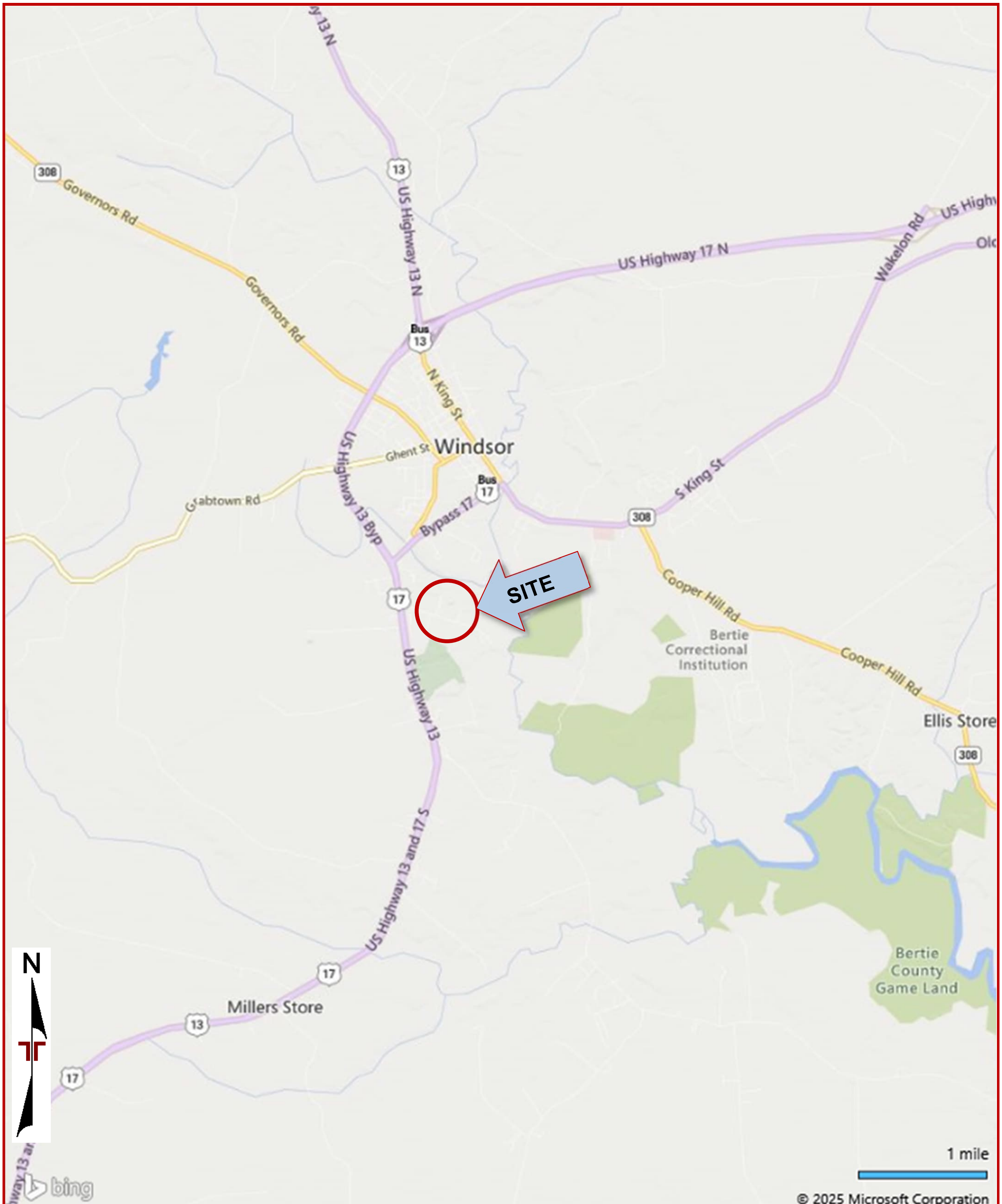


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

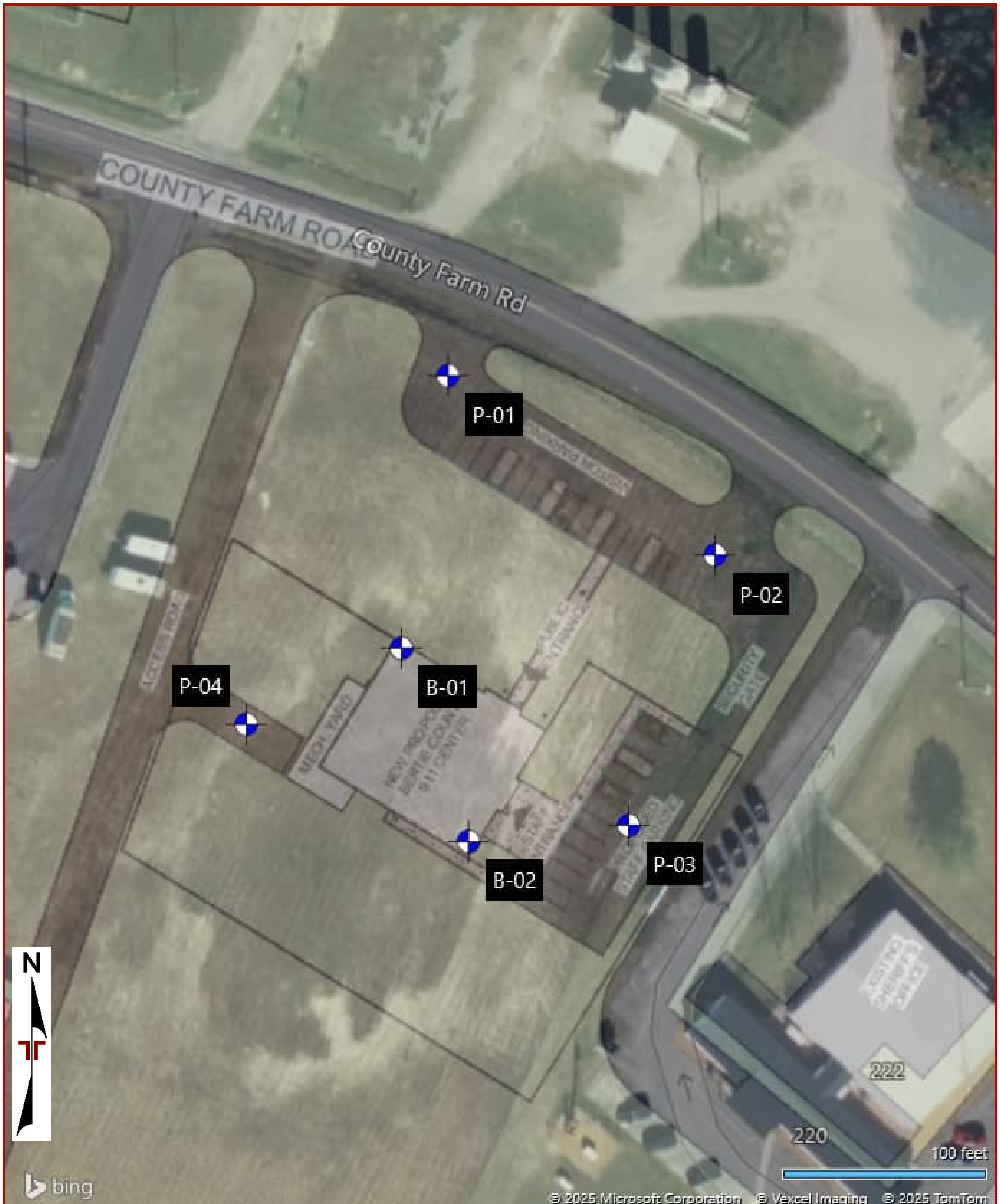


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Note: All attachments are one page unless noted above.

Terracon
106 Capital Trace, Unit E
Elizabeth City, NC

Boring Log No. B-01

Location: See Exploration Plan

Latitude: 35.9772° Longitude: -76.9461°

Approximate Elevation: 14 (Ft.)

Model Layer	Depth (Ft.)	Material Description	Elevation (Ft.)	Sample Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND WITH SILT (SP-SM) TO SILTY SAND (SM)**, tan, moist to wet, loose to medium dense		0-2		SPT	5-5-5-5 N=10	10.0		16.6
				2-4		SPT	5-5-4-5 N=9			
				4-6		SPT	5-5-5-5 N=10			
		wet from 7 feet		6-8	▽	SPT	3-3-4-3 N=7			
		contains stone fragments from 8 feet		8-10		SPT	8-10-10-12 N=20			
	13.0		1	10-12		SPT	9-9-11-13 N=20			
	18.0	**CLAYEY SAND (SC)**, tan, wet, medium dense	-4	13-15		SPT	7-6-4-7 N=10			
3	20.0	**SANDY FAT CLAY (CH)**, dark gray, wet, medium stiff	-6	18-20		SPT	2-2-3-4 N=5			

Boring Terminated at 20 Feet

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
▽ While drilling

Drill Rig
CME-45C

Hammer Type
Automatic

Driller
J. Hofler

Notes

Advancement Method
rotary "mud" wash

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Logged by
D. Morrison

Boring Started
04-03-2025

Boring Completed
04-03-2025

Terracon
106 Capital Trace, Unit E
Elizabeth City, NC

Boring Log No. B-02

Location: See Exploration Plan

Latitude: 35.9769° Longitude: -76.9460°

Approximate Elevation: 13.5 (Ft.)

Model Layer	Depth (Ft.)	Description	Elevation (Ft.)	Water Level Observations	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.5	**TOPSOIL**, 6 inches	13					
2		**POORLY GRADED SAND WITH SILT (SP-SM) TO SILTY SAND (SM)**, reddish tan, moist, loose			2-2-4-4 N=6			
		tan from 2 feet			2-2-2-2 N=4			
	4.0		9.5					
		POORLY GRADED SAND (SP) TO POORLY GRADED SAND WITH SILT (SP-SM), tan, moist to wet, loose to medium dense			2-3-2-3 N=5	4.4		1.5
				▽ (approx. 7 ft)	2-3-3-4 N=6			
		gray with stone fragments from 8 feet			4-5-9-12 N=14			
					7-6-11-10 N=17			
	13.0		0.5					
		CLAYEY SAND (SC), tan, wet, medium dense			8-8-7-7 N=15			
	18.0		-4.5					
3		**SANDY FAT CLAY (CH)**, dark gray, wet, medium stiff			1-2-3-3 N=5	35.5		65.5
	20.0		-6.5					

Boring Terminated at 20 Feet

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
▽ While drilling

Drill Rig
CME-45C

Hammer Type
Automatic

Driller
J. Hofler

Notes

Advancement Method
rotary "mud" wash

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Logged by
D. Morrison

Boring Started
04-03-2025

Boring Completed
04-03-2025

Terracon
106 Capital Trace, Unit E
Elizabeth City, NC

Boring Log No. P-01

Location: See Exploration Plan

Latitude: 35.9776° Longitude: -76.9460°

Approximate Elevation: 14 (Ft.)

Model Layer	Depth (Ft.)	Material Description	Elevation (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.5	**TOPSOIL**, 6 inches	13.5						
2	1.5	**SILTY SAND (SM)**, tan, moist	12.5						
2	2.5	**CLAYEY SAND (SC)**, tan, moist	11.5						
2	7.0	**POORLY GRADED SAND (SP) TO POORLY GRADED SAND WITH SILT (SP-SM)**, tan, moist to very moist	7						

Boring Terminated at 7 Feet

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations

Drill Rig

Driller
CM

Notes

Advancement Method
hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
DAM

Boring Started
03-28-2025

Boring Completed
03-28-2025

Terracon
106 Capital Trace, Unit E
Elizabeth City, NC

Boring Log No. P-02

Location: See Exploration Plan

Latitude: 35.9773° Longitude: -76.9456°

Approximate Elevation: 12 (Ft.)

Model Layer	Graphic Log	Depth (Ft.) / Description	Elevation	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		**TOPSOIL**, 12 inches 1.0	11							
2		**SANDY LEAN CLAY (CL)**, tan, moist 4.0	8					13.2	25-15-10	57.2
		POORLY GRADED SAND (SP), tan, very moist 5.0	7	5						
		Boring Terminated at 5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations

Drill Rig

Driller
CM

Notes

Advancement Method
hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
DAM

Boring Started
03-28-2025

Boring Completed
03-28-2025

Terracon
106 Capital Trace, Unit E
Elizabeth City, NC

Boring Log No. P-03

Location: See Exploration Plan

Latitude: 35.9770° Longitude: -76.9457°

Model Layer	Graphic Log	Depth (Ft.)	Description	Approximate Elevation: 12 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1		0.5	**TOPSOIL**, 18 inches	11.5							
2		1.5	**SILTY SAND (SM)**, tan, moist	10.5							
2		5.0	**CLAYEY SAND (SC)**, tan, moist to very moist	7	5						
			Boring Terminated at 5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations

Drill Rig

Driller
CM

Notes

Advancement Method
hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
DAM

Boring Started
03-28-2025

Boring Completed
03-28-2025

Terracon
106 Capital Trace, Unit E
Elizabeth City, NC

Boring Log No. P-04

Location: See Exploration Plan

Latitude: 35.9771° Longitude: -76.9464°

Approximate Elevation: 14 (Ft.)

Model Layer	Depth (Ft.)	Material Description	Elevation (Ft.)	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.5	**TOPSOIL**, 18 inches	13.5			
2	4.0	**SILTY SAND (SM)**, tan, moist to very moist	10	7.8	NP	24.1
2	6.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, tan, very moist	8			

Boring Terminated at 6 Feet

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Notes

Water Level Observations

Advancement Method
hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig

Driller
CM

Logged by
DAM

Boring Started
03-28-2025

Boring Completed
03-28-2025

DCP TEST DATA

Project: *Bertie County - New 911 Facility*
Date: 3/28/2025
Location: 206 County Farm Road
Soil Type(s): SAND (SP-SM, SM, SC)
Project #: K5255001
Surficial Thickness: 6 inches Topsoil
(Concrete, Asphalt, Stone, Topsoil, etc.)
Test Starting Depth: 44mm

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Test Identification: P-01

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	44	
2	166	1
2	216	1
3	263	1
3	309	1
4	370	1
2	411	1
3	501	1
1	546	1
1	599	1
1	645	1
1	686	1
1	727	1
1	765	1
2	828	1
2	887	1
1	915	1
2	955	1
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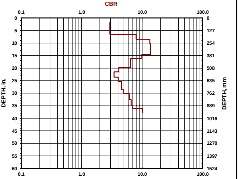

DCP TEST DATA

Project: *Bertie County - New 911 Facility* **Date:** 3/28/2025
Location: 206 County Farm Road **Soil Type(s):** CLAY (CL)
Project #: K5255001
Surficial Thickness: 12 Inches Topsoil **Test Starting Depth:** 55mm
(Concrete, Asphalt, Stone, Topsoil, etc.)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Test Identification: **P-02**

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	55	
1	116	1
1	157	1
2	216	1
1	271	1
2	338	1
1	399	1
1	466	1
2	551	1
1	652	1
1	712	1
2	795	1
1	839	1
1	885	1
1	918	1
1	955	1
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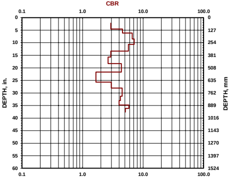

DCP TEST DATA

Project: *Bertie County - New 911 Facility* **Date:** 3/28/2025
Location: 206 County Farm Road **Soil Type(s):** SAND (SM, SC)
Project #: K5255001
Surficial Thickness: 18 Inches Topsoil (Concrete, Asphalt, Stone, Topsoil, etc.) **Test Starting Depth:** 71mm

Hammer: ○ 10.1 lbs. ● 17.6 lbs. ○ Both hammers used

Test Identification: **P-03**

Soil Type: ○ CH ○ CL ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	71	
1	157	1
1	198	1
1	222	1
1	286	1
2	346	1
2	417	1
1	461	1
1	506	1
1	556	1
1	594	1
2	653	1
2	699	1
2	778	1
1	873	1
1	955	1
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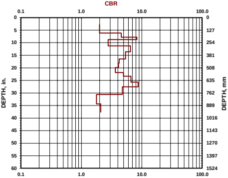

DCP TEST DATA

Project: *Bertie County - New 911 Facility* Date: 3/21/2025
Location: 206 County Farm Road Soil Type(s): SAND (SM)
Project #: K5255001
Surficial Thickness: 18 Inches Topsoil Test Starting Depth: 47mm
(Concrete, Asphalt, Stone, Topsoil, etc.)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Test Identification: P-04

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	47	
1	114	1
2	176	1
2	226	1
2	277	1
2	331	1
1	364	1
1	407	1
1	459	1
1	519	1
1	581	1
1	645	1
1	719	1
1	799	1
1	883	1
1	955	1
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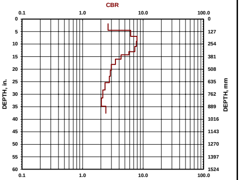


BULK SOIL SAMPLE CBR TESTING

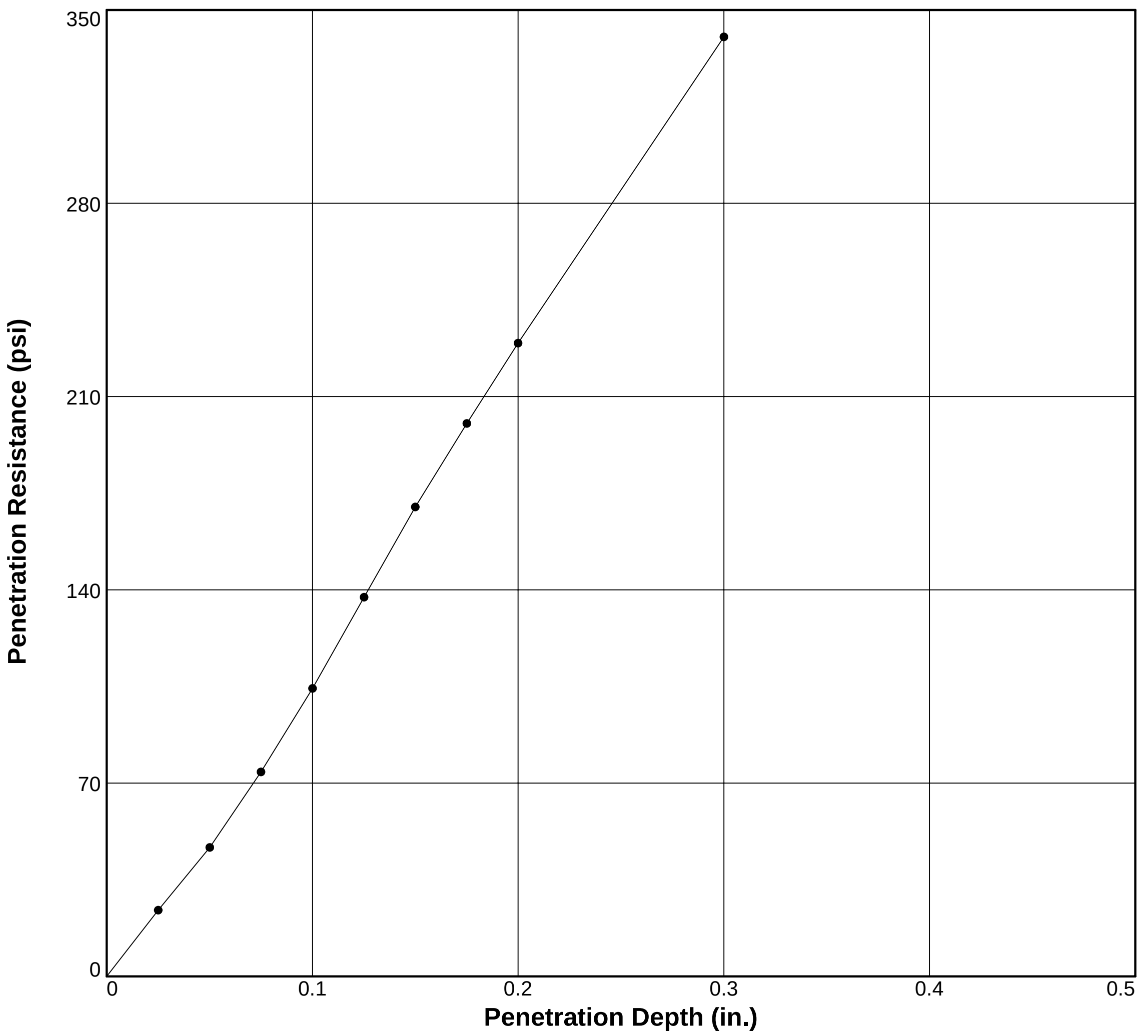
The bulk soil samples were subjected to Standard Proctor and CBR testing in general accordance with ASTM D698 and ASTM D1883, respectively. The stress-strain curves were plotted. If necessary, the stress-strain curve was corrected by adjusting the location of the origin for concave shaped curves. CBR results were compared for 0.1-inch and 0.2-inch penetration, and subsequently, the CBR value was selected at 0.1-inch penetration using the corrected load values. These test results are provided in the Table below.

Summary of CBR Test Results

Sample No	Boring ID	Depth Below Grade (ft)	USCS	w_N (%)	Pass #200 Sieve (%)	A.L. (LL/PL/PI)	Max. Dry Density (pcf)	Optimum Moisture (%)	CBR Value	Swell (%)
CBR-1	P-2	1 - 2	CL	13.2	57.2	25/15/10	121.7	10.6	13.3	0.0
CBR-2	P-4	1 - 2	SM	7.8	24.1	NL/NP [1]	120.2	10.7	18.7	0.0

1. NL/NP = Non-Liquid / Non-Plastic.

BEARING RATIO TEST REPORT
ASTM D1883-16



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	121.1	99.5	11.0	121.1	99.5	10.8	13.3	16.9	0.021	10	0
2 ▲											
3 ■											

Material Description	AASHTO	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Tan Clay with Sand	A-4(3)	121.7	10.6	25	10

Project No: K5255001

Project: Bertie County - New 911 Facility

Sample Number: P-2 **Depth:** -1'

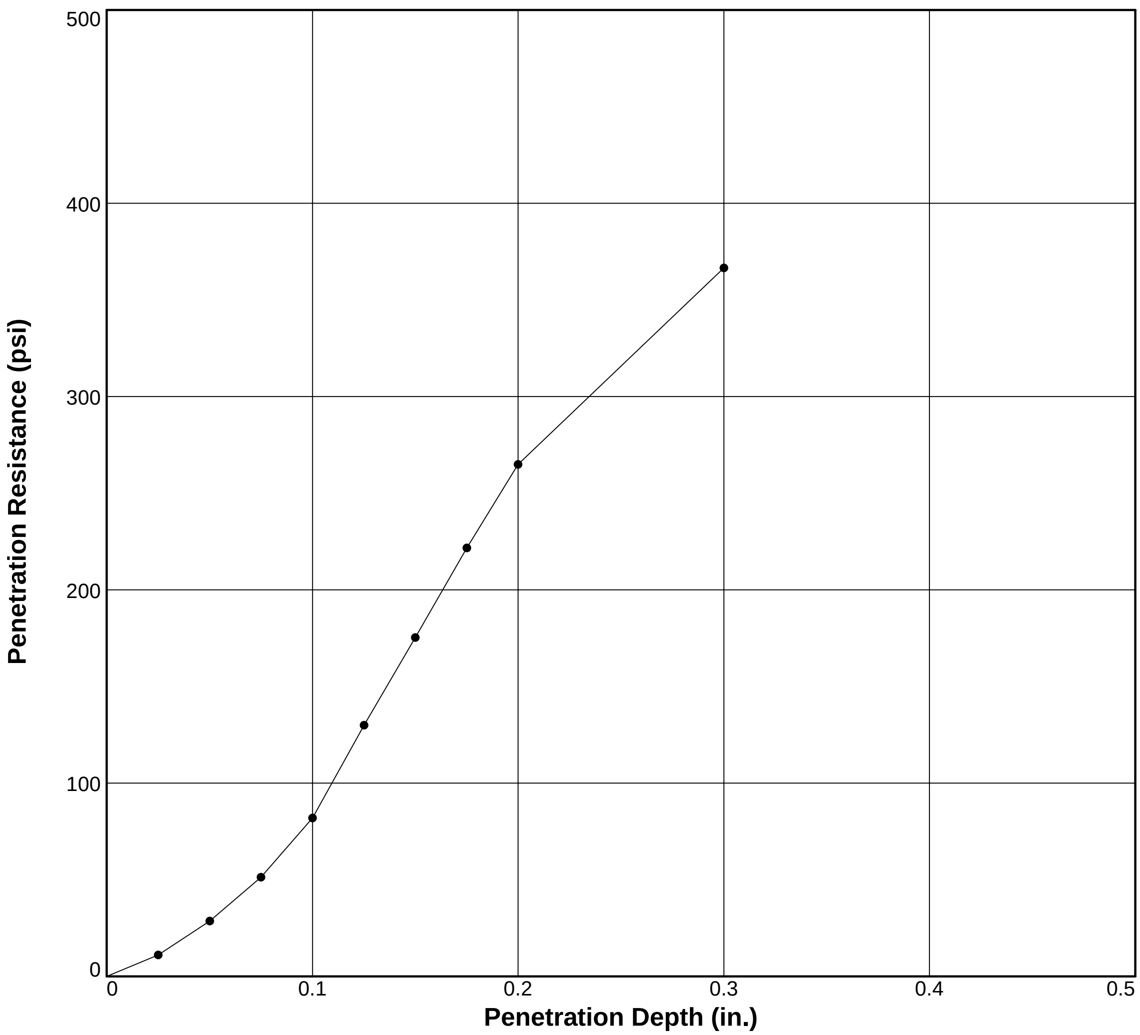
Date:

Terracon

Test Remarks:

Figure ________

BEARING RATIO TEST REPORT
ASTM D1883-16



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	121.5	101.1	10.6	121.5	101.1	10.7	18.7	21.5	0.056	10	0
2 ▲											
3 ■											

Material Description	AASHTO	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Orange Silty SAND	A-2-4(0)	120.2	10.7	NV	NP

Project No: K5255001

Project: Bertie County - New 911 Facility

Sample Number: P-4 **Depth:** -1'

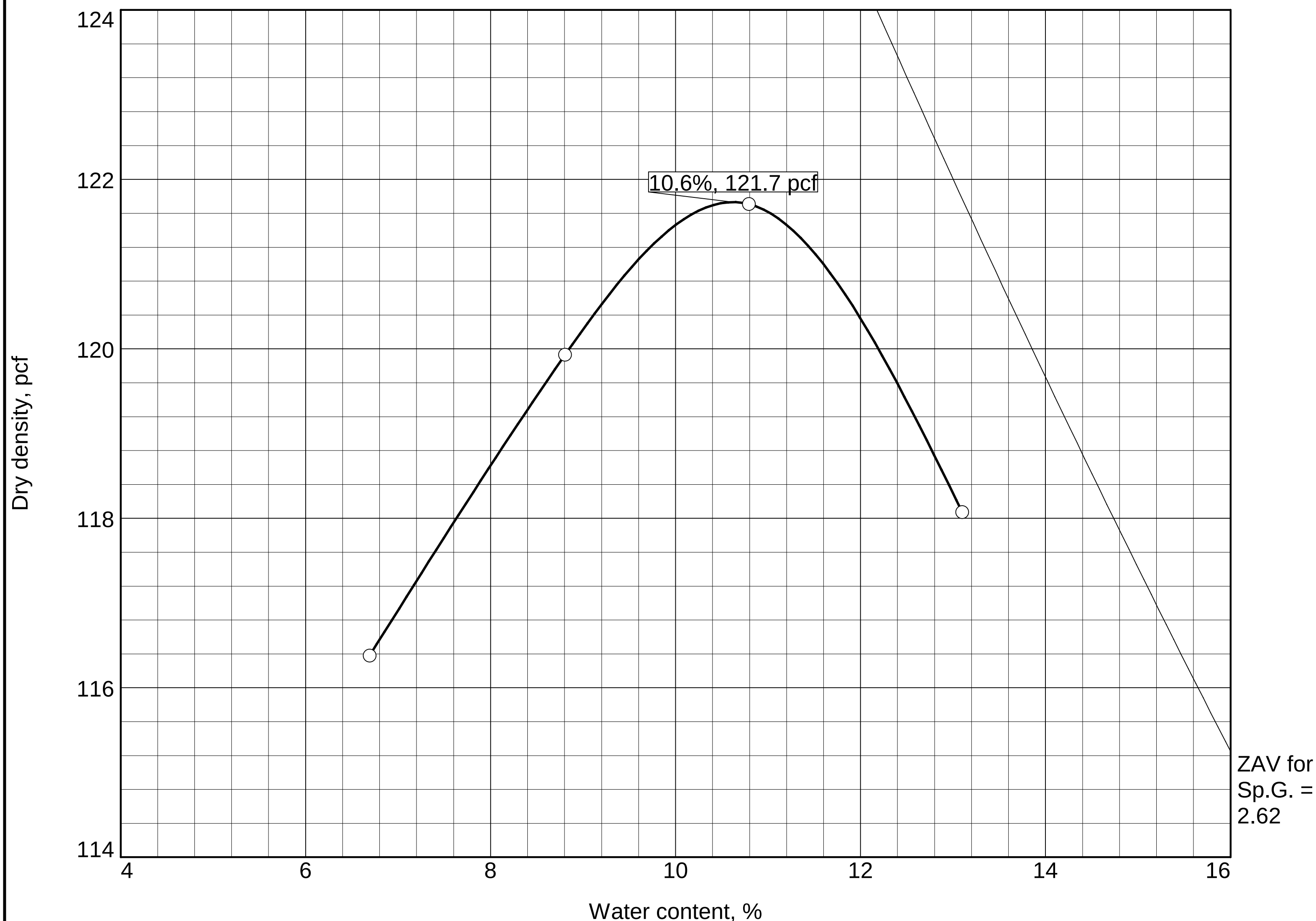
Date:

Terracon

Test Remarks:

Figure ________

MOISTURE DENSITY RELATIONSHIP TEST REPORT



Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
-1'	CL	A-4(3)	13.2		25	10	0.0	57.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 121.7 pcf Optimum moisture = 10.6 %	Tan Clay with Sand

Project No. K5255001 **Client:** Schrader Group Architecture

Project: Bertie County - New 911 Facility

Date:

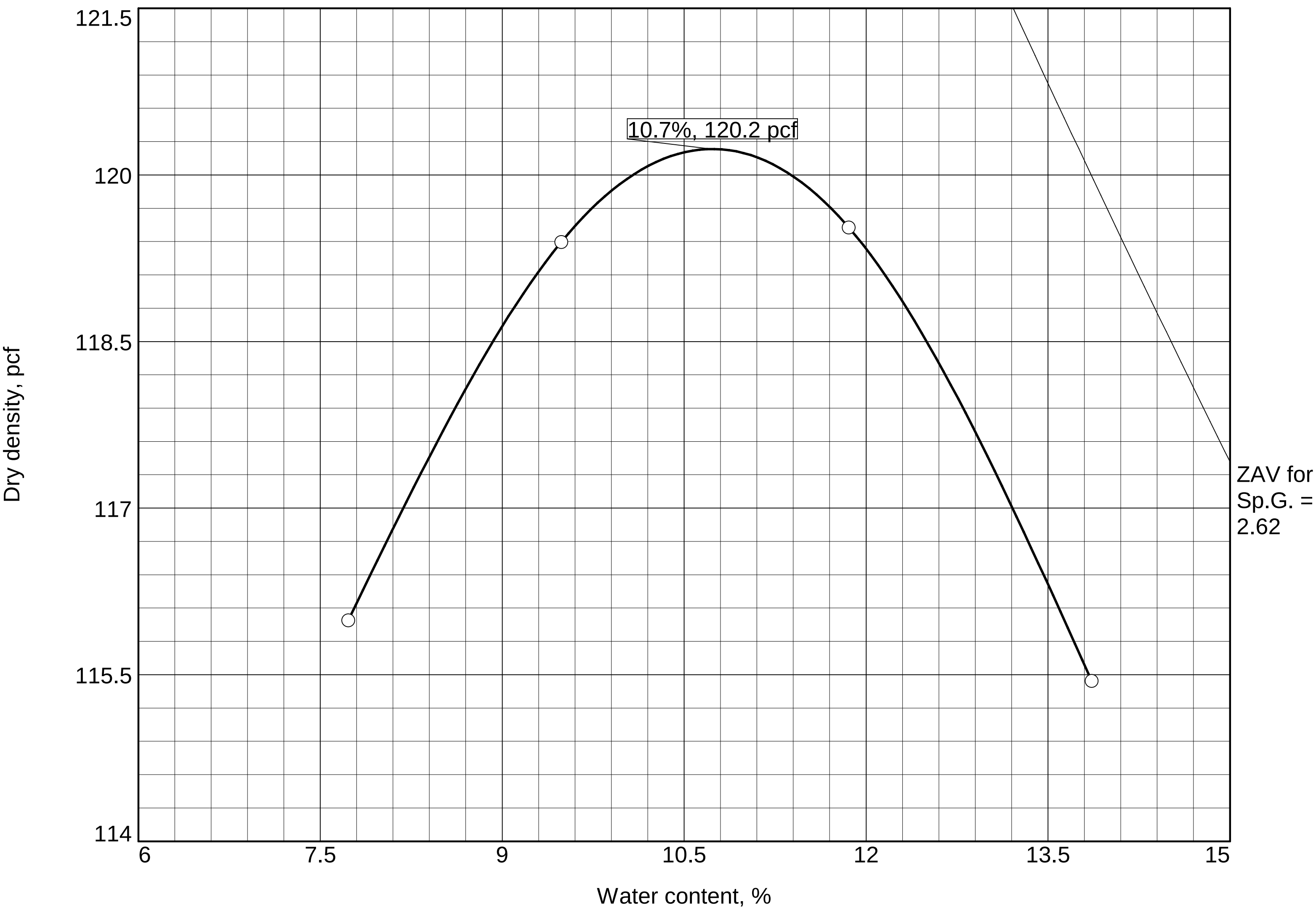
○ **Sample Number:** P-2

Terracon

Remarks:

Figure

MOISTURE DENSITY RELATIONSHIP TEST REPORT



Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
-1'	SM	A-2-4(0)	7.8		NV	NP	0.0	24.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 120.2 pcf Optimum moisture = 10.7 %	Orange Silty SAND

Project No. K5255001 **Client:** Schrader Group Architecture

Project: Bertie County - New 911 Facility

Date:

○ **Sample Number:** P-4

Remarks:

Figure

Supporting Information

Contents:

Note: All attachments are one page unless noted above.

SUPPORTING INFORMATION SHEETS

106 Capital Trace, Unit E
Elizabeth City, NC

General Notes

Sampling

Auger Cuttings

Dynamic Cone Penetrometer

Water Level

Water Initially Encountered

Water Level After a Specified Period of Time

Water Level After a Specified Period of Time

Cave In Encountered

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

Field Tests

N	Standard Penetration Test Resistance (Blows/Ft.)
(HP)	Hand Penetrometer
(T)	Torvane
(DCP)	Dynamic Cone Penetrometer
UC	Unconfined Compressive Strength
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		**Consistency of Fine-Grained Soils** (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Relative Density	**Standard Penetration or N-Value (Blows/Ft.)**	**Consistency**	**Unconfined Compressive Strength Qu (tsf)**	**Standard Penetration or N-Value (Blows/Ft.)**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$(LL\ oven\ dried)/(LL\ not\ dried) < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	<	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.