AE Design Repair G703 and HP185

Geotechnical Engineering Report

MCAS New River & MCB Camp Lejeune, North Carolina

November 25, 2025 | Terracon Project No. K6255085

Prepared for:

MBF Architects, P.A.
317-C Pollock Street
New Bern, North Carolina 25860

Terracon
Explore with us

Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

2108 Capital Drive
Wilmington, North Carolina 28405
P (910) 478-9915
North Carolina Registered Firm: F-0869
Terracon.com

November 25, 2025

MBF Architects, P.A.
317-C Pollock Street
New Bern, North Carolina 25860

Attn: John Schmied
P: (252) 637-6373
E: schmied@mbfarchitects.com

Re: Geotechnical Engineering Report
AE Design Repair G703 and HP185
MCAS New River & MCB Camp Lejeune, North Carolina
Terracon Project No. K6255085

Dear Mr. Schmied:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Task Order N4008525F0820 dated September 2, 2025. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of 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

NORTH CAROLINA PROFESSIONAL SEAL 056487 ENGINEER

11/25/2025

Michael P. Delaney, PE
Project Engineer
Registered, NC 056487

Chris M. Caton, PE, PG, PMP
Principal Engineer
Registered, NC 038365

Table of Contents

1.0 Introduction 3
2.0 Project Description 4
3.0 Site Conditions 5
4.0 Project Setting 6
4.1 Geologic Setting 6
4.2 Site History 6
5.0 Geotechnical Characterization 7
5.1 Field Exploration 7
5.2 Soil Profile 7
5.3 Groundwater Conditions 8
6.0 Geotechnical Overview 9
7.0 Earthwork 9
7.1 Demolition 10
7.2 Site Preparation 10
7.3 Subgrade Preparation 10
7.4 Soil Stabilization 11
7.5 Possible Uncontrolled Fill Material 12
7.6 Excavation Considerations 12
7.7 Fill Material Types 13
7.8 Fill Placement and Compaction Requirements 15
7.9 Pipe Bedding and Trench Backfill 16
7.10 Subgrade Protection 16
7.11 Construction Observation and Testing 16
8.0 Pavements 17
8.1 General Pavement Comments 17
8.2 Pavement Subgrade Support Characteristics 17
8.3 Traffic Loading Assumptions 18
8.4 Pavement Section Thicknesses 19
8.5 Pavement Drainage 20
8.6 Pavement Maintenance 20
9.0 General Comments 21

A-0 Attachments

A-1.0 Exploration and Testing Procedures
A-2.0 GeoModel
A-3.0 Photography Log – Pavement Condition
A-4.0 Site Location and Exploration Plans
A-5.0 Exploration Results
A-6.0 Laboratory Results
A-7.0 Supporting Information

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.

1.0 Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed to evaluate pavements associated with the rehabilitation for buildings G703 and HP185 at MCAS New River and MCB Camp Lejeune, respectively. The purpose of these services was to provide information and geotechnical engineering recommendations related to:

- Exploration Logs with field and laboratory data
- Stratification based on visual classification and laboratory testing
- Groundwater levels observed during and/or after the completion of drilling
- Site location and exploration plans
- Subsurface exploration procedures
- Earthwork recommendations including site/subgrade preparation
- Recommended pavement options and engineering design parameters

The geotechnical engineering Scope of Services for this project included pavement cores, the advancement of hand auger borings, Dual-Mass (Kessler) Dynamic Cone Penetrometer (DCP) testing, documentation of existing pavement conditions, laboratory testing, engineering analysis, and the preparation of this report.

Drawings showing the site and exploration locations are shown in Attachment **A-4.0 Site Location and Exploration Plans**. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the exploration logs in Attachment **A-5.0 Exploration Results** and as separate graphs in Attachment **A-6.0 Laboratory Results**.

2.0 Project Description

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Project information was obtained via email correspondence on August 13, 2025. Terracon was provided with site locations, the G703 As-Built drawings dated June 27, 1997, and the HP185 As-Built drawings dated September 20, 1977.
Project Description	Terracon understands that the project includes the renovation of two (2) buildings and their associated pavements. Terracon's Scope of Geotechnical Engineering services is limited to the evaluation of pavements, including their existing condition, thickness, and shallow subgrade composition. This information is used herein to provide Terracon's opinion of minimum pavement section thickness and evaluate the feasibility of mill and overlay processes versus full section replacement.
Pavements	Terracon understands that the parking areas for G703 and HP185 will be resurfaced. The traffic loading assumptions and subgrade parameters used in our analysis are summarized in Section **8.0 Pavements**. The pavement thickness analysis was performed using PCASE.
Grading/Slopes	Terracon assumes that proposed asphalt surface elevations are to match existing grade, excluding remedial grading requirements.
Exclusions	No shallow foundations, slabs, below-grade structures, free-standing retaining walls, or stormwater control measures are indicated in the provided information or included in the geotechnical engineering Scope of Services associated with this report.
Applicable Codes and Standards	2024 International Building Code (IBC) UFC 3-220-01 FC 1-300-09N

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

3.0 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	**G703:** The site is located along 8th Street at BEQ G703 at MCAS New River in Jacksonville, North Carolina. Approximate coordinates: 34.7323°N, 77.4556°W **HP185:** The site is located along A Street at MCB Camp Lejeune in Jacksonville, North Carolina. Approximate coordinates: 34.6727°N, 77.3588°W See Attachment **A-4.0 Site Location and Exploration Plans**
Existing Improvements	The sites are currently asphalt paved parking areas for the associated BEQs.
Current Ground Cover	Asphalt
Existing Topography	Based on the provided topographic surveys, the sites are generally flat. Current elevations within the pavement footprints were interpolated from the provided site plans as follows: ▪ G703 – 18 feet (NAVD88) ▪ HP185 – 23 feet to 24 feet (NAVD88)

4.0 Project Setting

4.1 Geologic Setting

The project site is located within the Atlantic Coastal Plain physiographic province. Bedrock of the Late Mesozoic age is present at depths of greater than 1,000 ft, and is overlain by Lower and Upper Cretaceous, Tertiary, Pleistocene and Recent Sediments. The Coastal Plain soils consist mainly of marine sediments that were deposited during successive periods of fluctuating sea level and moving shoreline. The soils include sands, silts, and clays with irregular deposits of shells, which are typical of those lain down in a shallow sloping sea bottom. Recent alluvial sands, silts, and clays are typically present near rivers and creeks.

According to USGS Mineral Resources On-Line Spatial Data based on the 1998 digital equivalent of the 1985 Geologic Map of North Carolina, the Belgrade Formation (Tertiary) underlies site HP185, and the River Bend Formation (Tertiary) underlies site G703. These formations generally consist of cemented sands, shell fragments, and limestone.

4.2 Site History

G703: Based on historical aerial imagery, the site previously had a building and parking area that appears to have been demolished between January of 1999 and July of 2002. The existing parking area was constructed by July of 2002.

HP185: Based on the provided as-built drawings dated 1977, the site previously contained Building 122. Based on historical aerial imagery, Building 122 was demolished between July 2010 and December of 2011; and the existing parking area was constructed by December of 2011.

Due to the way the site has been modified in the past, and as evident in the hand auger boring logs, Possible Uncontrolled Fill Materials are likely present at each site. Risks associated with construction upon or above such materials is discussed in Section **7.5 Possible Uncontrolled Fill Material**.

5.0 Geotechnical Characterization

5.1 Field Exploration

In order to explore the general subsurface soil conditions, document existing pavement conditions, and to aid in developing the associated pavement designs, the following exploration program was performed at six (6) locations across both sites:

- A pavement coring machine was used to core through the existing asphalt at each location. Each core was measured in thickness at three (3) points along its circumference and returned to our laboratory.
- Following the pavement core process, the underlying Aggregate Base Course (ABC) was penetrated via hammer drill, pickaxe and hand auger. The ABC thickness was recorded in the field to the nearest ¼ inch.
- After penetrating the pavement base course, the Dual-Mass (Kessler) Dynamic Cone Penetrometer (DCP) was used to evaluate the density of the pavement subgrade to a depth of up to 3 feet beneath top of pavement. The penetration resistances are then recorded and plotted.
- Following the DCP test, a hand auger was advanced to depths ranging from 6 feet to 7 feet beneath top of asphalt to visually classify near-surface soils, observe groundwater depth, and obtain samples for laboratory testing.

Please refer to Attachment **A-1.0 Exploration and Testing Procedures** for a detailed account of the testing procedures used for this project. Hand auger boring logs, DCP test results, and photographs of each pavement core are included in Attachment **A-5.0 Exploration Results**. The approximate exploration locations are shown in Attachment **A-4.0 Site Location and Exploration Plans**.

5.2 Soil Profile

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 Attachment **A-5.0 Exploration Results** and the GeoModel can be found in Attachment **A-2.0 GeoModel**.

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	**Surface Materials**	2 inches to 3 inches of Asphalt underlain by 3 inches to 9 inches of Aggregate Base Course (ABC)
2	**Possible Uncontrolled Fill Material**	SAND with varying amounts of Silt, Clay, and Gravel; variable density
3	**Sand**	Loose to Medium Dense, SAND (SP, SP-SM, SM, SC) with varying amounts of Silt and Clay
4	**Clay and Clayey Sand**	Soft to Medium Stiff, CLAY (CL); and Very Loose to Loose, Clayey SAND (SC)

5.3 Groundwater Conditions

The initial groundwater level was estimated at the boring locations as observed through the relative wetness of the recovered soil samples during the drilling operations. Observed groundwater depths are summarized in the following table.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, sidewalks, etc.). Seasonal groundwater fluctuations of ± 2 feet are common in the project's area; however, greater fluctuations have been documented. We recommend that the contractor determine the actual groundwater levels at the time of construction to determine groundwater impact on the construction procedures.

Location ID	Observed Water Depth (ft) [1]	Observed Water Table Elevation (ft) [2]
G703-01	4.5	13.5
G703-02	4.5	13.5
HP185-01	5.5	17.5
HP185-02	6	17
HP185-03	5.5	18.5
HP185-04	6	18

1. Referenced from existing ground surface at the time of exploration
2. Elevation Reference: NAVD 88

The groundwater observations presented above are also noted in the exploration logs in Attachment **A-5.0 Exploration Results**.

6.0 Geotechnical Overview

The following recommendations are based upon the observed pavement condition, pavement thickness, and pavement subgrade at each site, as well as our calculations for minimum pavement section thickness.

G703: The parking lot for site G703 will require full depth reconstruction due to insufficient ABC thickness, as observed at location G703-02 (3.25”). The existing ABC can be segregated, stockpiled, and reused following the required excavation of subgrade soils.

HP185: The parking lot for site HP185 appears suitable for a partial depth reconstruction. Terracon recommends the pavement sections include a minimum 4 inches of asphalt underlain by a minimum 8 inches of ABC. The field exploration indicated that the ABC thickness exceeded the design minimum. Thus, it is recommended to remove the existing asphalt and remove enough ABC to both maintain existing elevations and accommodate the minimum recommended pavement section.

Effective drainage should be completed early in the construction sequence and maintained throughout the life of the proposed development to avoid potential issues associated with a wet subgrade. 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. Further details are provided in Section **7.0 Earthwork**.

The recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, and our current understanding of the proposed project. Section **9.0 General Comments** provides an understanding of the report limitations.

7.0 Earthwork

Earthwork is anticipated to include demolition, shallow subgrade 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 sites in the state considered in our geotechnical engineering evaluation for pavements.

7.1 Demolition

Where necessary, site preparation should begin with the demolition of the existing structures/pavements and debris removal. Existing utilities that are to be abandoned should be removed or filled with grout. The excavations resulting from utility removal should be properly backfilled with compacted structural fill as described in the following subsections. Utilities that are to remain in service should be accurately located horizontally and vertically to minimize conflict with new pavement construction.

7.2 Site Preparation

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

Although no evidence of 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 underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

7.3 Subgrade Preparation

7.3.1 Densification: Once any areas of cut have been excavated to proposed subgrade or subbase elevation, the newly exposed subgrade and/or subbase should be densified in place using a medium weight vibratory roller. The purpose of the vibratory rolling is to densify the exposed subgrade and/or subbase for pavement support. The roller should make at least six passes across the site, with the second set of three passes perpendicular to the first set of three passes with intermittent vibration activated. If water is brought to the surface by the vibratory rolling, the operation should be discontinued until the water subsides. Vibratory rolling should be completed during dry weather. Static rolling and additional repairs should be anticipated for areas too wet for vibratory rolling.

7.3.2 Proofrolling: After the vibratory rolling, proofrolling should be performed on the exposed subgrade and/or subbase with a loaded, tandem-axle dump truck (15 to 20 ton total vehicle weight) or similar rubber-tired construction equipment. Proofrolling is recommended as a means of detecting areas of soft or unstable subgrade and/or subbase. The proofrolling should be performed during a period of dry weather to avoid degrading an otherwise suitable subgrade. The proofrolling operations should be observed by a representative of the geotechnical engineer. Subgrade and/or subbase area that exhibit excessive rutting or deflection during proofrolling should be repaired as directed by the field representative.

7.4 Soil Stabilization

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction; or removal of unstable materials and replacement with select granular fill (with or without geosynthetics). The appropriate method of improvement, if required, would be dependent on factors such as design grades, schedule, weather, the size of area to be stabilized, effectiveness of construction dewatering methods implemented by the contractor (such as temporary ditches), and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Effectively dewatering the relatively shallow groundwater on this site during construction and performing site grading operations during warm seasons and dry periods would help reduce the amount of subgrade stabilization required.

If the exposed subgrade and/or subbase is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

- **Scarification and Recompaction** - It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.

- **Undercut and Replace** - The use of undercutting and backfilling with structural fill is a common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 12 to 24 inches below finished subgrade elevation. The use of high modulus geosynthetics (i.e., geotextiles or geogrid) beneath pavements could also be considered after underground work such as utility construction is completed. Prior to placing the fabric or geogrid, we recommend that all below grade construction, such as utility line installation, be completed to avoid damaging the fabric or geogrid. Equipment should not be operated above the fabric or geogrid until one full lift of granular fill is placed above it. The maximum particle size of granular material placed over geotextile fabric or geogrid should not exceed 1-1/2 inches.

Further evaluation of the need and recommendations for subgrade and/or subbase stabilization can be provided during construction as the geotechnical conditions are exposed.

7.5 Possible Uncontrolled Fill Material

As noted in Section **5.0 Geotechnical Characterization**, Possible Uncontrolled Fill Materials were encountered in the upper 2 feet to 4 feet of each site. The soils appear to consist of a relatively clean (free of deleterious debris) granular soil with little Clay and Silt. Based on the field exploration (in-situ DCP testing) these soils appear to have been placed in a controlled manner, but we have no records to indicate the degree of control. Support of pavements on or above existing these soils is discussed in this report. However, even with the recommended construction procedures, inherent risk exists for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered.

Based on observations of pavement condition and the soils encountered, Possible Uncontrolled Fill Materials at the site can generally be evaluated during proofrolling. Areas of excessively yielding soils should be examined with test pits to evaluate the nature and lateral extent of instability. Additional test pits and/or compaction testing of the existing soils could be used to further substantiate the decision to leave Possible Uncontrolled Fill Materials in place.

7.6 Excavation Considerations

We anticipate that excavations for the proposed construction can generally be accomplished with conventional earthmoving equipment.

Excavation Safety: 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.

Excavations or other activities resulting in ground disturbance have the potential to affect nearby structures, pavements, and utilities. 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 should be monitored or instrumented for potential ground movements that could negatively affect nearby structures, pavements, and utilities.

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.

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.

Construction Dewatering: The groundwater table could affect excavation efforts, especially for overexcavation and replacement of lower strength soils, if needed. 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. Backfill consisting of clean gravel (such as AASHTO Size No. 57 stone) wrapped in geotextile fabric is often most suitable for undercut depths exceeding that of the water table.

The responsibility for dewatering of construction excavations and preventing excessive damage of existing and new buildings, structures, utilities, and other site improvements due to dewatering should lie solely with the contractor. This information is provided only as a service and under no circumstance should Terracon be assumed to be responsible for the effectiveness of the construction dewatering method(s) selected by the contractor.

7.7 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 10 feet of structures, pavements, or constructed slopes. General fill is material used to achieve grade outside of these areas.

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)	3 inches
Fines content	Not limited	<20%
Plasticity	Not limited	Maximum Liquid Limit (LL) of 30 Maximum Plasticity Index (PI) of 8

Earthen materials used for structural or general fill should meet the following material property requirements:

Soil Type[1]	USCS Classification	Acceptable Location for Placement
Imported Soil	GW, GP, GM, GC, SM, SP, SP-SM, SP-SC, SC-SM	All locations and elevations
On-Site Soils	SP, SP-SM, SM	All locations and elevations
	SC[2], CL[3]	General fill only (>10 feet outside of construction footprint)

1. Structural fill should consist of approved materials free of organic matter and debris. Frozen materials should not be used, and fill should not be placed on frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. Reuse of clayey sand (SC) material could lead to delays in construction depending on moisture conditions at the site at that time.
3. Fine-grained soils such as clays and silts should not be reused as structural fill due to their moisture sensitivity when compared to the sandier soils available.

7.8 Fill Placement and Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	8 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. trench roller, jumping jack, or plate compactor) is used	Same as structural fill
Minimum Compaction Requirements [1,2,3]	98% of maximum	92% of max.
Water Content Range [1, 3]	Within 2 percent of optimum moisture content	As required to achieve min. compaction requirements

1. Fill should be tested for moisture content and compaction during placement. If in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the tests should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. It is not necessary to achieve 98% compaction on the existing ground prior to placing fill or beginning construction. However, the subgrade should be evaluated by the Geotechnical Engineer prior to placing fill or beginning construction.
3. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
4. Materials not amenable to density testing should be placed and compacted to a stable condition observed by the Geotechnical Engineer or representative.

7.9 Pipe Bedding and Trench Backfill

Pipe bedding and trench backfill should be in accordance with the applicable public works standard details and specifications for the type of pipe to be supported. (For example, the NCDOT has published standard pipe bedding and backfilling details for flexible and rigid pipe for normal earth foundation, rock foundation, and unsuitable material foundation conditions.) Backfill materials, placement, and testing should be in accordance with the publics works requirements, state DOT standards, or the earthwork recommendations given in this report, whichever are more stringent. If open-graded materials, such as No. 78 or No. 57 stone, are used, they should be completely wrapped in a woven geotextile that can be used for both separation and filtration (e.g., Mirafi HP270).

Where the applicable public works specifications do not provide guidance on minimum thickness for utility/pipe bedding materials, pipe bedding materials should be installed to a minimum depth equal to the greater of 6 inches or 1/6th the inner diameter of the pipe, per the NCDOT Section 300 Specification. Utility structures should be underlain by a minimum 12 inches of NCDOT No. 57 stone, extending 12 inches laterally from the edge of the structure, wrapped in woven geotextile fabric. Existing pavement sections removed during utility installation should be reconstructed to their original thicknesses.

7.10 Subgrade Protection

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 pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent surface water from ponding 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.

7.11 Construction Observation and Testing

The earthwork efforts should be observed by the Contracting Officer or their designated representative. Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of Possible Uncontrolled 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 Contracting Officer or their designated representative, 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 5,000 square feet (minimum of 3 tests per lift) in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 50 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

8.0 Pavements

8.1 General Pavement Comments

The pavement design is provided for the traffic conditions and pavement life conditions as noted in the following sections of this report. A critical aspect of pavement performance is site preparation. The pavement design noted in this section must be applied to the site which has been prepared as recommended in Section **7.0 Earthwork**.

8.2 Pavement Subgrade Support Characteristics

A California Bearing Ratio (CBR) value of 7 was used for Asphaltic Concrete (AC) pavement designs. A modulus of subgrade reaction of 100 pci was used for Portland Cement Concrete (PCC) pavement designs. These values were empirically derived based upon our experience with the sandy subgrade soils encountered, historical laboratory CBR data, and our expectation of the quality of the subgrade as prescribed by the **Subgrade Preparation** conditions as outlined in Section **7.0 Earthwork**. A modulus of rupture of 650 psi was used in the design for the concrete based on correlation to a minimum 28-day compressive strength between 4,000 psi and 5,000 psi.

8.3 Traffic Loading Assumptions

Based on the provided plans, light-duty asphalt parking lots and drive aisles are proposed. The pavement design life is 25 years. The following table summarizes the derivation of the traffic loading conditions for the various pavement usages.

Pavement Design Criteria

Assumed Traffic Loading		**Annual Average Daily Traffic (AADT), 25 Years**
Vehicle	Frequency	
POV – Passenger Car (3,000 lbs)	240/day[1]	2,190,000
POV – Pickup (7,500 lbs)	240/day[1]	2,190,000
Truck; 3-Axle (Trash Truck)	2/week	2,400
Truck; 5-Axle	2/month	600
P-23 Crash Truck (Fire Truck)	2/month	600
Total AASHTO Estimated Single-Axle Loads (ESALs)[2]		Asphalt – 3,500 Concrete – 6,069

1. Estimated based on number of parking spaces
2. Based on controlling vehicle

The traffic quantities assumed above are in excess of those anticipated for site G703. Please note however, that the traffic volumes and CBR values used in our analysis generally yield minimum pavement section thicknesses per UFC 3-220-01. Terracon recommends a minimum 4 inches of asphalt surface in all pavement sections for future remediation that may be required throughout the lifespan of the proposed pavements.

8.4 Pavement Section Thicknesses

Terracon's opinion of minimum pavement section thickness for each site is presented in the following table, based on both the results of our analyses performed using PCASE and considerations regarding constructability.

Minimum Pavement Sections

Pavement Section	Hot Mix Asphalt		Concrete	Aggregate Base Course (ABC) [1]	Subgrade [2]
	Surface (S-9.5C) [3]	Intermediate (I-19.0B) [4]			
Light-Duty Asphalt	1.5 inches	2.5 inches	--	8 inches	Non-yielding
Concrete Apron and Dumpster Pads	--	--	8 inches	4 inches	

1. NCDOT aggregate base course stone, compacted to a dry density of at least 100% of the Standard Proctor maximum dry density (ASTM D698).
2. Subgrade soils compacted to a dry density of at least 98% of the Standard Proctor maximum dry density (ASTM D698) to a depth of 18 inches below existing grades. For partial reconstruction procedures (removal of asphalt only), this can be verified via proofrolling.
3. 1.5-inch minimum lift thickness per NCDOT Pavement Design Procedure 2019
4. 2.5-inch minimum lift thickness per NCDOT Pavement Design Procedure 2019

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 18 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 structural fill in accordance with the recommendations of this report. The inspection of these phases should be performed by the Contracting Officer or their designated 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.

8.5 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.

8.6 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.

9.0 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 affect 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.

A-0 Attachments

Contents:

A-1.0 Exploration and Testing Procedures (2 pages)
A-2.0 GeoModel (2 pages)
A-3.0 Photography Log – Pavement Condition (2 pages)
A-4.0 Site Location and Exploration Plans (4 pages)
A-5.0 Exploration Results (17 pages)
A-6.0 Laboratory Results (4 pages)
A-7.0 Supporting Information (6 pages)

Note: All attachments are one page unless noted above.

A-1.0 Exploration and Testing Procedures

A-1.1 Field Exploration

Number of Borings (denotation)	Approximate Boring Depth (feet) [1]	Location
2 (G703-xx)	6	Site G703 – Proposed Pavement Resurfacing
4 (HP185-xx)	6 to 7	Site HP185 – Proposed Pavement Resurfacing

1. Referenced from existing ground surface.

Exploration Layout and Elevations: The test locations were determined in coordination between Terracon, MBF Architects, and Avolis Engineering. Terracon personnel provided the exploration layout using handheld GPS equipment (estimated horizontal accuracy of about ±15 feet) and referencing existing site features. Approximate ground surface elevations were obtained by interpolation from the provided drawings. If elevations and a more precise exploration layout are desired, we recommend our locations be surveyed.

Subsurface Exploration Procedures: The subsurface exploration was performed via pavement coring, hand auger borings, and Dual-Mass (Kessler) Dynamic Cone Penetrometer Testing (DCP) testing.

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.

Dual-Mass Dynamic Cone Penetrometer (DCP) Testing: The dual-mass (Kessler) DCP test consists of a 5/8-inch diameter steel rod with a steel cone attached. The rod is continuously driven into the subgrade by dropping a 17.6-pound hammer from a height of 22.6-inches and incremental penetrations are recorded. The angle of the cone is 60 degrees and the diameter of the base of the cone is 0.79-inches.

A-1.2 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 and US Army Corps of Engineers certified Wilmington, North Carolina laboratory. The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Grain-Size Analysis (Wash #200 sieve)
- Atterberg Limits

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 Attachment **A-5.1 Unified Soil Classification System**. Results of the index testing are provided in Attachment **A-6.0 Laboratory Results**.

A-2.0 GeoModel

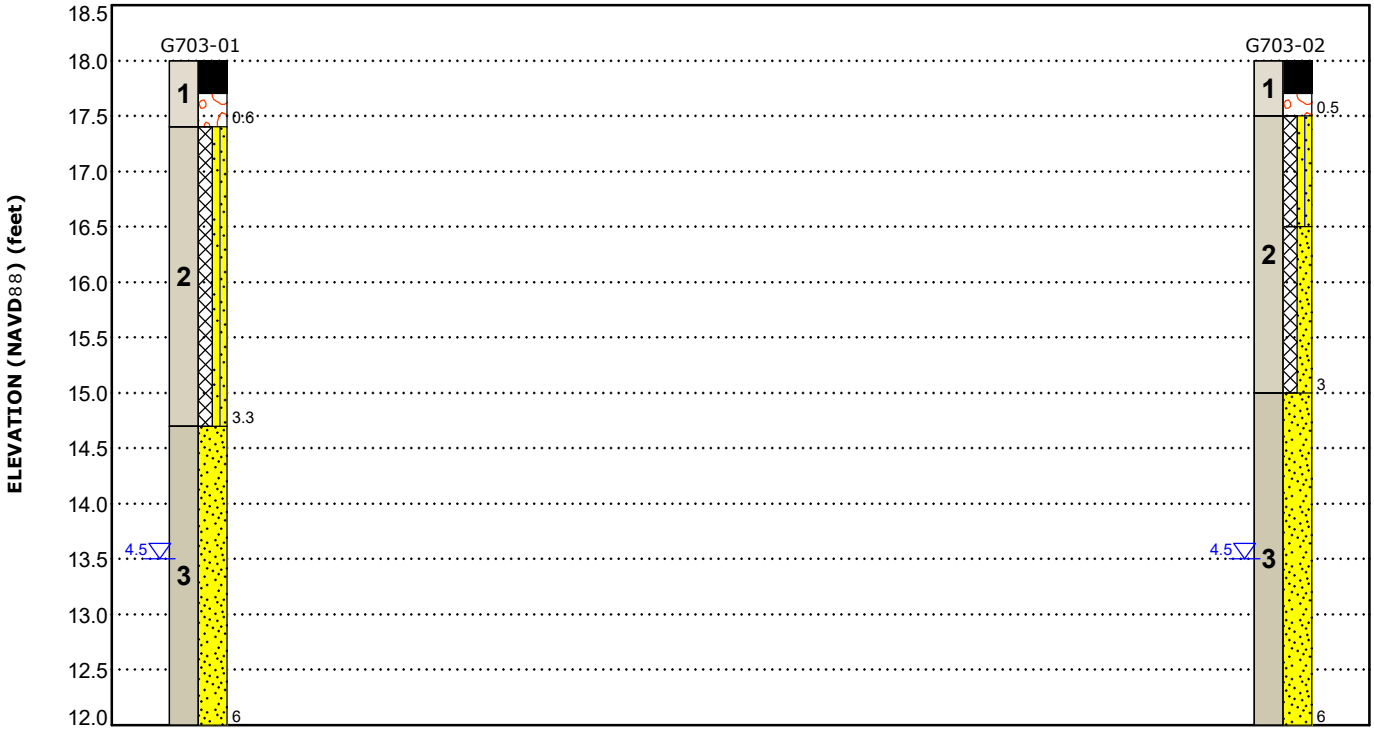
Contents:

A-2.1 Site G703
A-2.2 Site HP185

Note: All attachments are one page unless noted above.

Terracon
2108 Capital Dr, Ste 103
Wilmington, 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	Surface Materials	2 inches to 3 inches of Asphalt underlain by 3 inches to 9 inches of Aggregate Base Course (ABC)
2	Possible Uncontrolled Fill Material	SAND with varying amounts of Silt, Clay, and Gravel; variable density
3	Sand	Loose to Medium Dense, SAND (SP, SP-SM, SM, SC) with varying amounts of Silt and Clay
4	Clay and Clayey Sand	Soft to Medium Stiff, CLAY (CL); and Very Loose to Loose, Clayey SAND (SC)

Legend

- Asphalt
- Aggregate Base Course
- Silty Sand
- Poorly-graded Sand

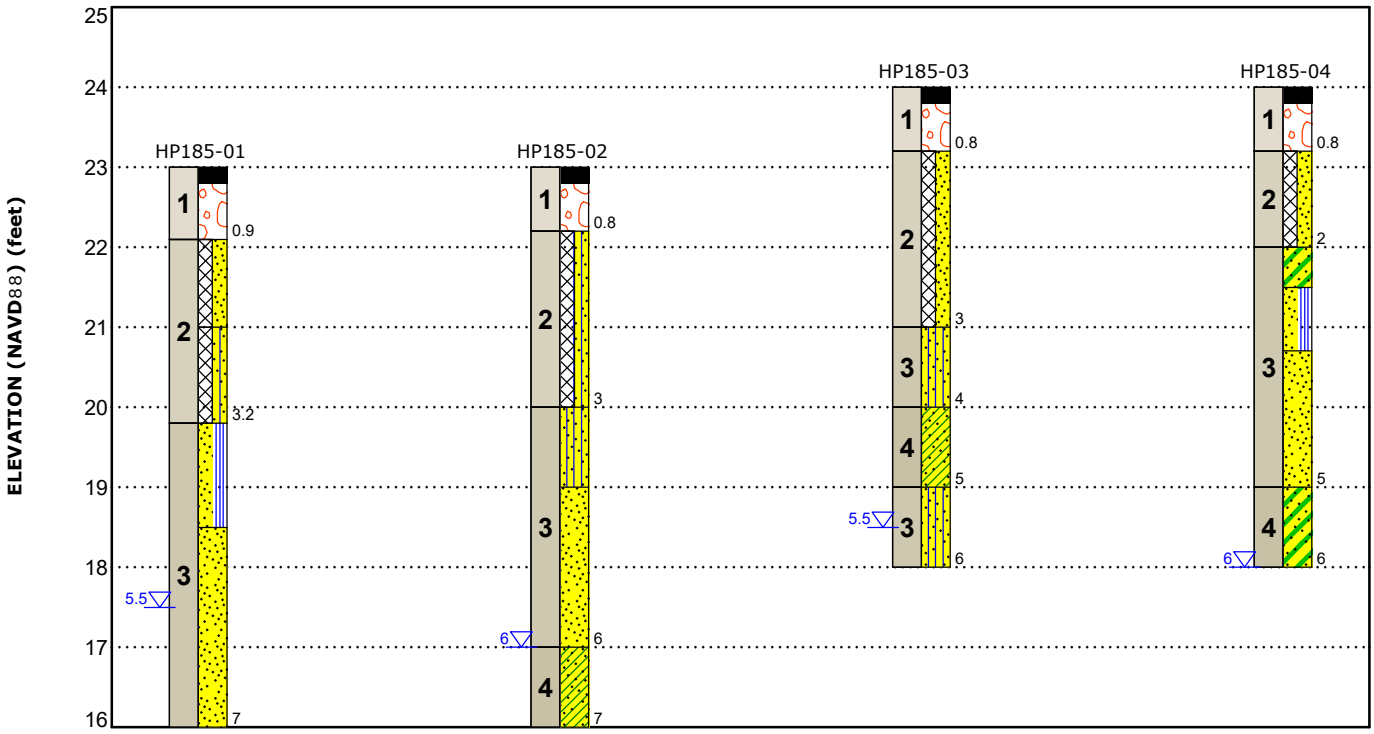
First Water Observation

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.

Terracon
2108 Capital Dr, Ste 103
Wilmington, 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	**Surface Materials**	2 inches to 3 inches of Asphalt underlain by 3 inches to 9 inches of Aggregate Base Course (ABC)
2	**Possible Uncontrolled Fill Material**	SAND with varying amounts of Silt, Clay, and Gravel; variable density
3	**Sand**	Loose to Medium Dense, SAND (SP, SP-SM, SM, SC) with varying amounts of Silt and Clay
4	**Clay and Clayey Sand**	Soft to Medium Stiff, CLAY (CL); and Very Loose to Loose, Clayey SAND (SC)

Legend

- Asphalt
- Aggregate Base Course
- Poorly-graded Sand
- Silty Sand
- Poorly-graded Sand with Silt
- Sandy Lean Clay
- Clayey 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.

A-3.0 Photography Log – Pavement Condition

Photos taken during site visit on October 2, 2025

Photo 1: Minor cracking observed by intersection of 8th street and B street, facing South (G703)

Photo 2: Minor cracking observed by East side of parking lot, facing Southeast (G703)

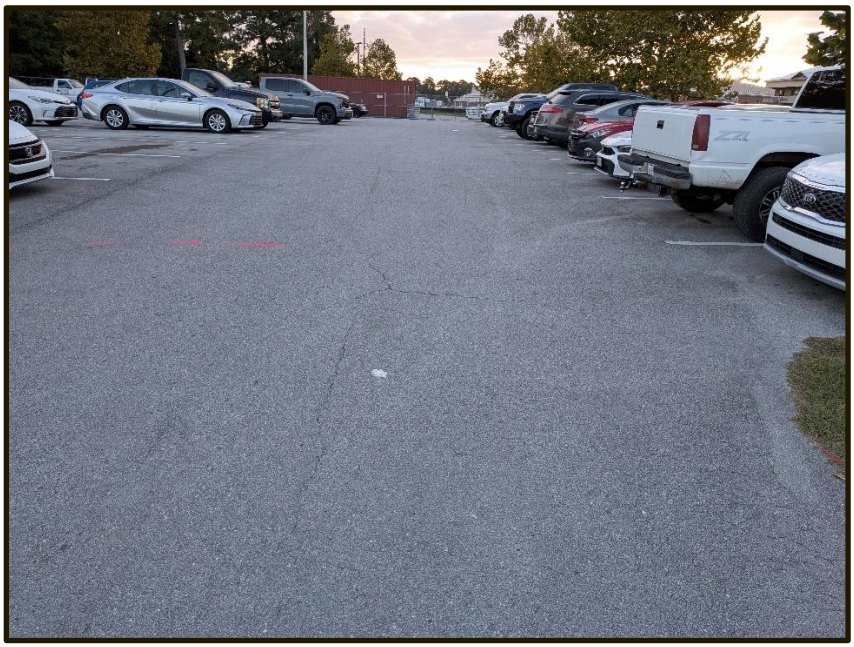


Photo 3: Existing pavement condition – near location HP185-03, facing ENE

Photo 4: Existing pavement condition – near location HP185-02, facing NNW

A-4.0 Site Location and Exploration Plans

Contents:

A-4.1 Site Location Diagram – G703
A-4.2 Site Location Diagram – HP185
A-4.3 Exploration Plan – G703
A-4.4 Exploration Plan – HP185

Note: All attachments are one page unless noted above.

A-4.1 Site Location – G703

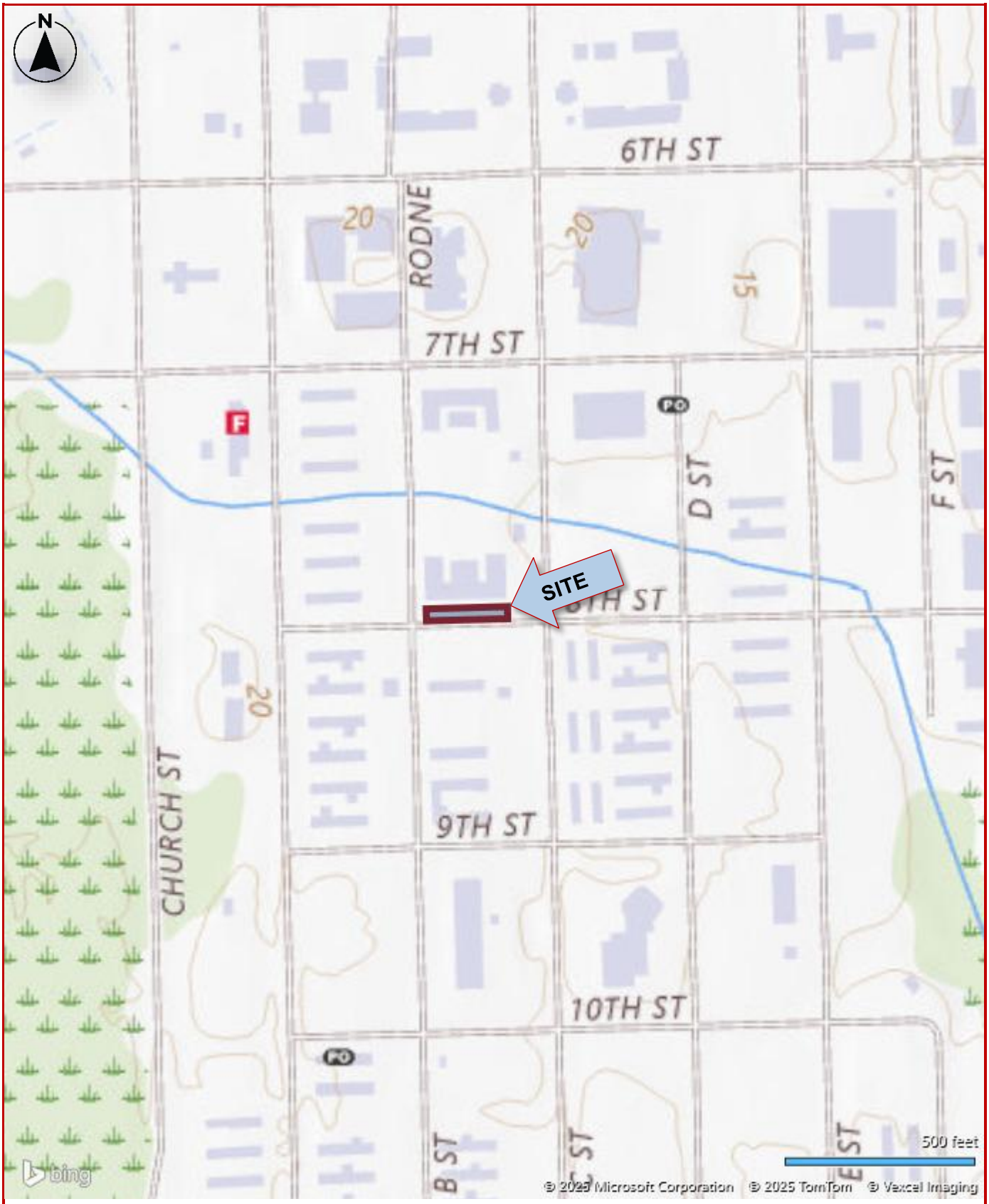


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY USGS, 2020

A-4.2 Site Location – HP185

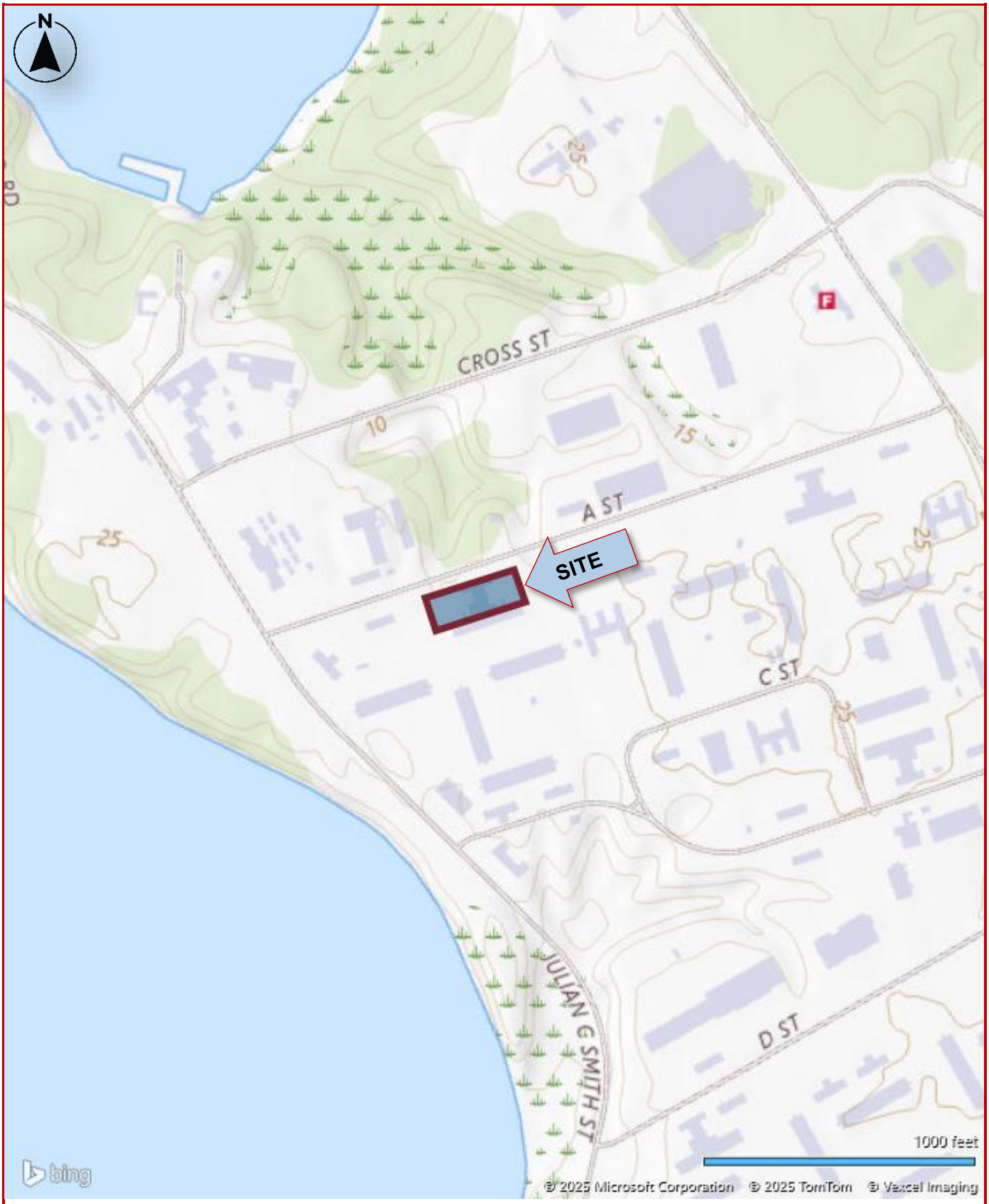
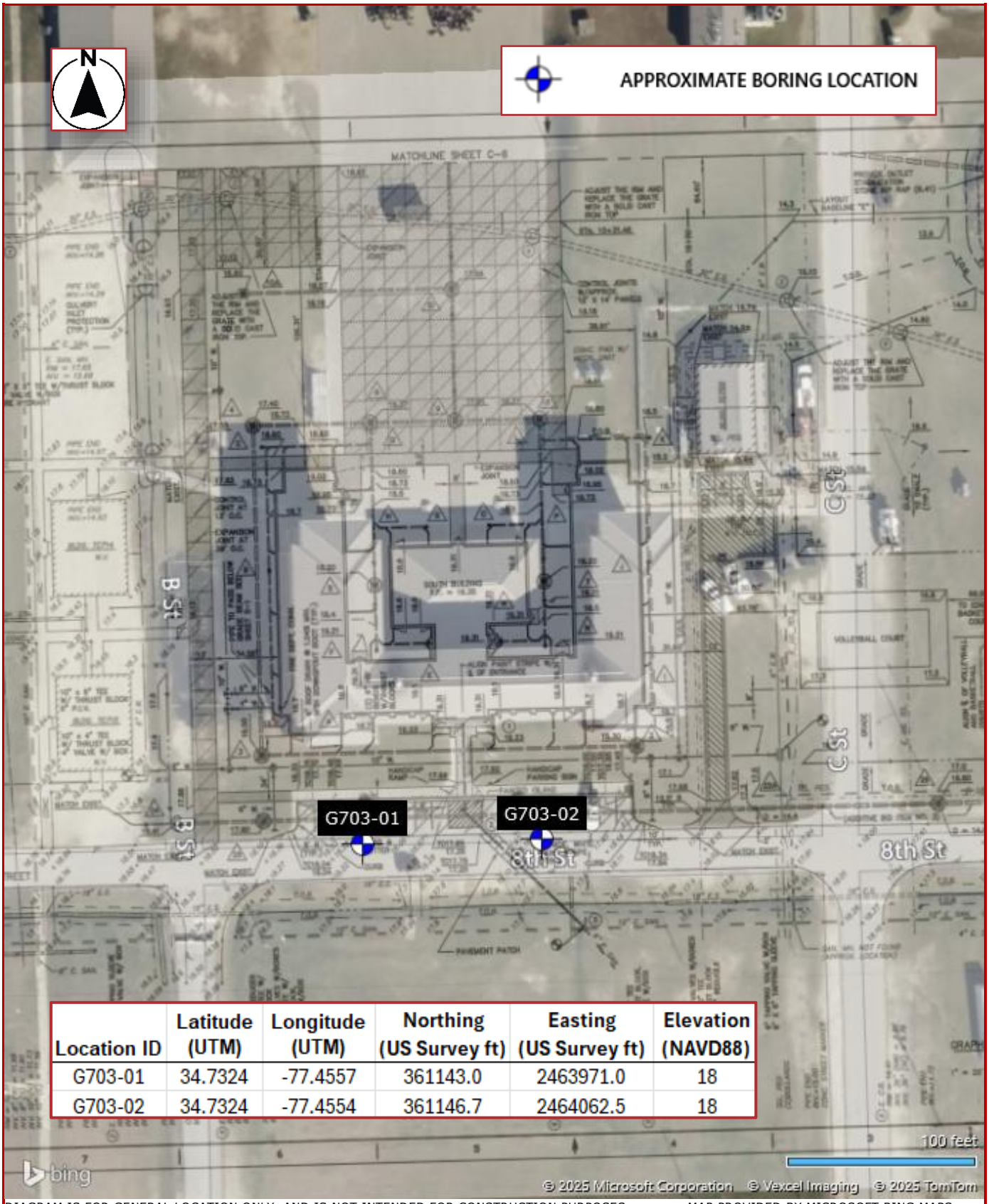


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY USGS, 2020

A-4.3 Exploration Plan – G703

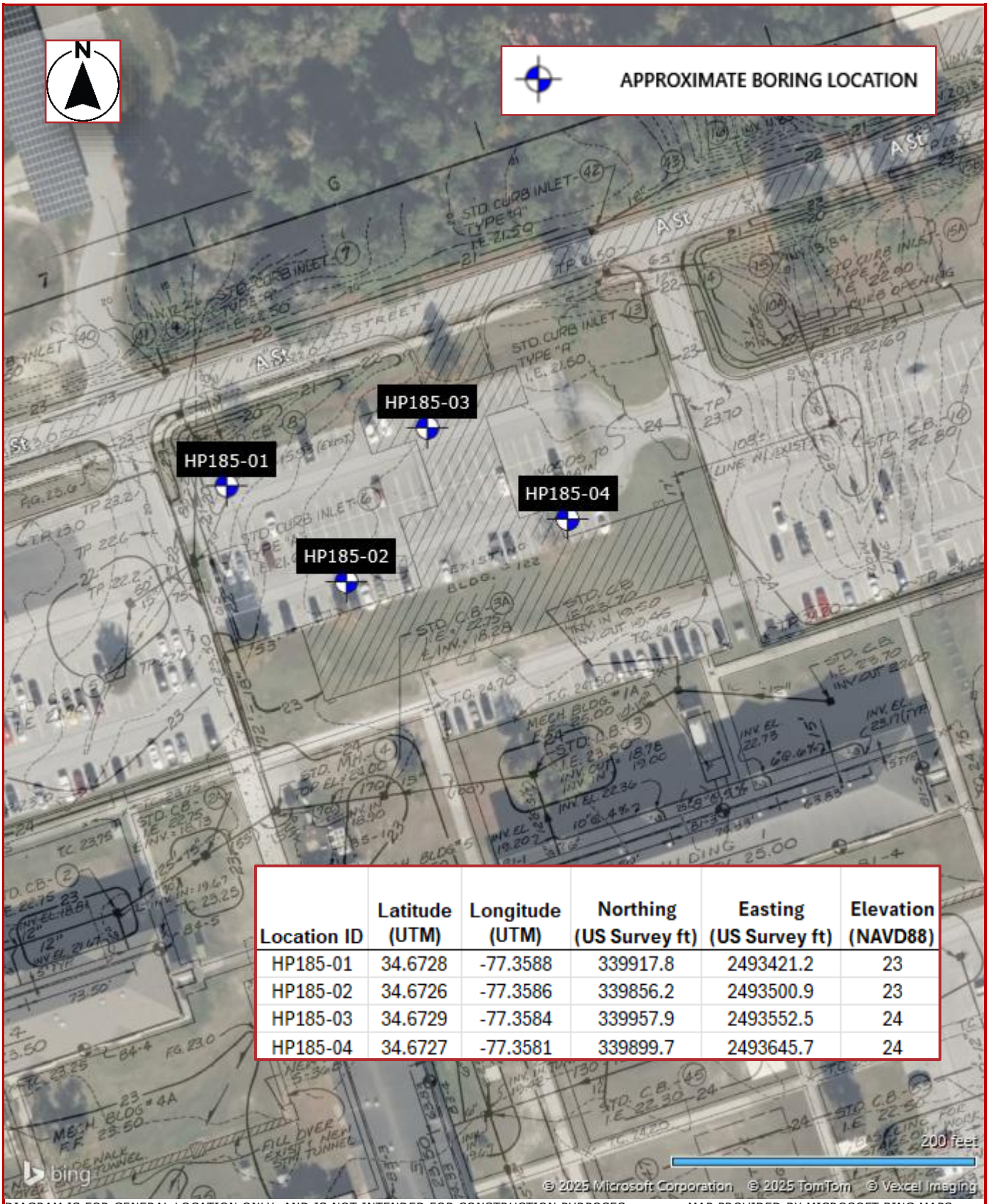


Location ID	Latitude (UTM)	Longitude (UTM)	Northing (US Survey ft)	Easting (US Survey ft)	Elevation (NAVD88)
G703-01	34.7324	-77.4557	361143.0	2463971.0	18
G703-02	34.7324	-77.4554	361146.7	2464062.5	18

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

MAP PROVIDED BY MICROSOFT BING MAPS
SITE PLAN PROVIDED BY MBF ARCHITECTS

A-4.4 Exploration Plan – HP185



Location ID	Latitude (UTM)	Longitude (UTM)	Northing (US Survey ft)	Easting (US Survey ft)	Elevation (NAVD88)
HP185-01	34.6728	-77.3588	339917.8	2493421.2	23
HP185-02	34.6726	-77.3586	339856.2	2493500.9	23
HP185-03	34.6729	-77.3584	339957.9	2493552.5	24
HP185-04	34.6727	-77.3581	339899.7	2493645.7	24

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

MAP PROVIDED BY MICROSOFT BING MAPS
SITE PLAN PROVIDED BY MBF ARCHITECTS

A-5.0 Exploration Results

Contents:

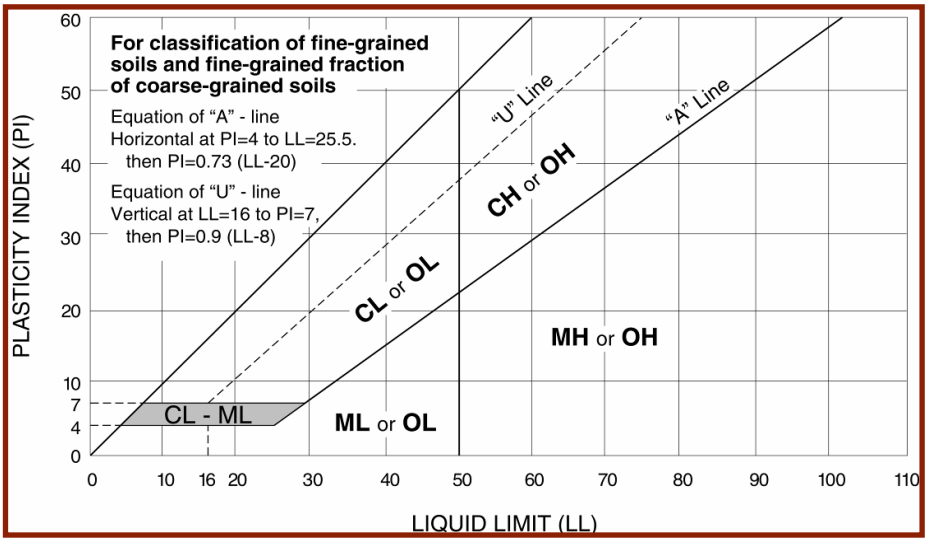
A-5.1 Unified Soil Classification System
A-5.2 General Notes
A-5.3 G703 Exploration Logs:
-Hand Auger Boring Logs and Dual-Mass DCP Results (4 pages)
-Pavement Core Photography Log
A-5.4 HP185 Exploration Logs:
-Hand Auger Boring Logs and Dual-Mass DCP Results (8 pages)
-Pavement Core Photography Log (2 pages)

Note: All attachments are one page unless noted above.

A-5.1 Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	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:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	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:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	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.



Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

A-5.2 General Notes

Sampling	Water Level	Field Tests
Grab Sample	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.	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	5 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	9 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	16 - 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.

Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Boring Log No. G703-01

Location: See Exploration Plan

Latitude: 34.7324° Longitude: -77.4557°
Northing: 361143.041 Easting: 2463970.977

Depth (Ft.) | Approximate Elevation: 18 (Ft.)

Model Layer	Depth (Ft.)	Description	Elevation	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.3	**ASPHALT**, 3 inches	17.7					
	0.6	**AGGREGATE BASE COURSE**, 4.25 inches	17.4					
2	3.3	**POSSIBLE UNCONTROLLED FILL MATERIAL - SILTY SAND**, fine to medium, brown and black, moist -Hardpan noted from a depth of 2.5' to 3.0' -Color change to tan	14.7			15.6	NP	15.9
3	6.0	**POORLY GRADED SAND (SP)**, fine to medium, dark brown, moist to wet	12					
		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.

Water Level Observations
At completion of augering
Cave-In

Drill Rig
N/A

Hammer Type
Dual-Mass (17.6-lb) DCP

Driller
N. Lindley

Notes
Elevation Reference: Approximate elevations were interpolated from the provided 50% Civil Drawings (NAVD88)
Pavement surface cored via 4" core barrel
ABC penetrated via hammer drill, pickaxe, hand auger, prior to DCP

Advancement Method
Hand Auger

Abandonment Method
Boring backfilled with soil cuttings
Surface capped with asphalt

Logged by
N. Lindley

Boring Started
10-02-2025

Boring Completed
10-02-2025

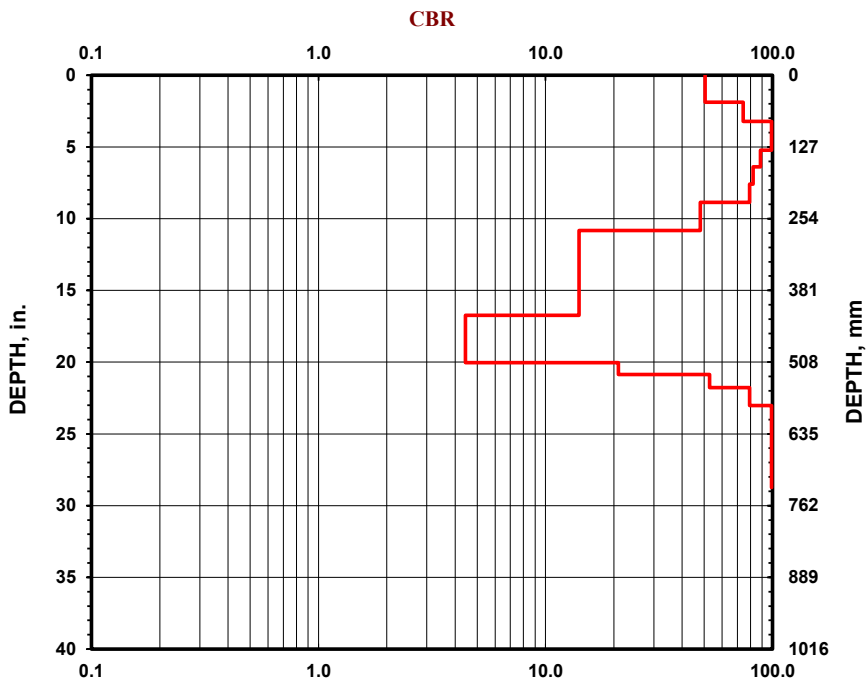
DCP TEST DATA

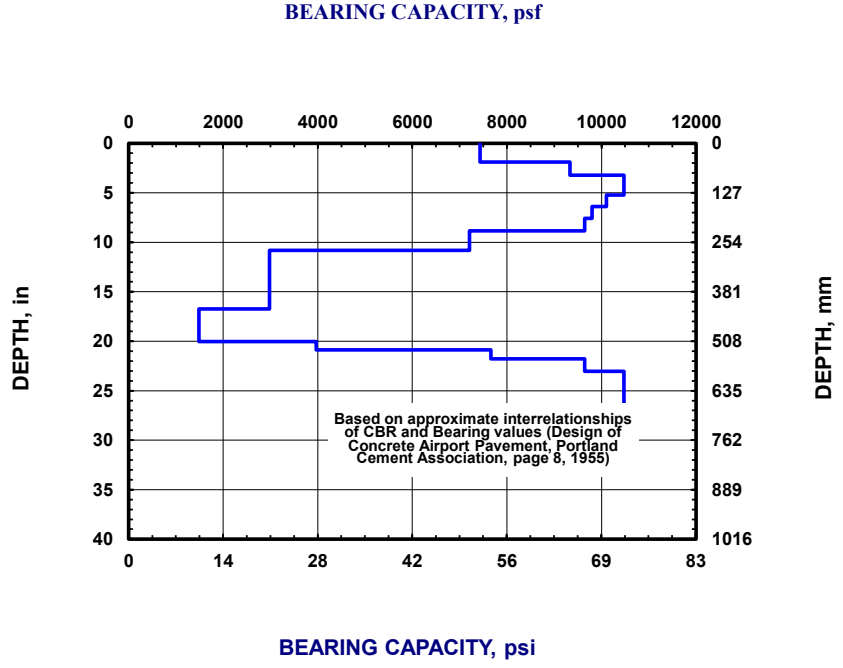
Project: Repair BEQ: G703
Location: G703-01
Date: 10/2/2025
Soil Type(s): Sand

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

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

No. of Blows	Accumulative Penetration	Type of Hammer
0	0	1
10	48	1
10	82	1
10	108	1
10	133	1
10	162	1
10	193	1
10	225	1
10	275	1
10	425	1
2	509	1
2	530	1
5	553	1
10	585	1
10	608	1
10	626	1
10	641	1
10	659	1
10	682	1
10	706	1
10	730	1





Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Boring Log No. G703-02

Location: See Exploration Plan

Latitude: 34.7324° Longitude: -77.4554°
Northing: 361146.711 Easting: 2464062.478

Approximate Elevation: 18 (Ft.)

Model Layer	Depth (Ft.)	Description	Elevation	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.3	**ASPHALT**, 3 inches	17.7						
	0.5	**AGGREGATE BASE COURSE**, 3.25 inches	17.5						
2	1.5	**POSSIBLE UNCONTROLLED FILL MATERIAL - SILTY SAND**, fine to medium, orange, moist	16.5	1			8.7	NP	15.1
2	3.0	**POSSIBLE UNCONTROLLED FILL MATERIAL - POORLY GRADED SAND**, fine to medium, orange and tan, moist	15	2					
3	6.0	**POORLY GRADED SAND (SP)**, fine to medium, gray and orange, moist to wet	12	3					
		Boring Terminated at 6 Feet		4					
				5					
				6					

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
At completion of augering
Cave-In

Drill Rig
N/A

Hammer Type
Dual-Mass (17.6-lb) DCP

Driller
N. Lindley

Notes
Elevation Reference: Approximate elevations were interpolated from the provided 50% Civil Drawings (NAVD88)
Pavement surface cored via 4" core barrel
ABC penetrated via hammer drill, pickaxe, hand auger, prior to DCP

Advancement Method
Hand Auger

Abandonment Method
Boring backfilled with soil cuttings
Surface capped with asphalt

Logged by
N. Lindley

Boring Started
10-02-2025

Boring Completed
10-02-2025

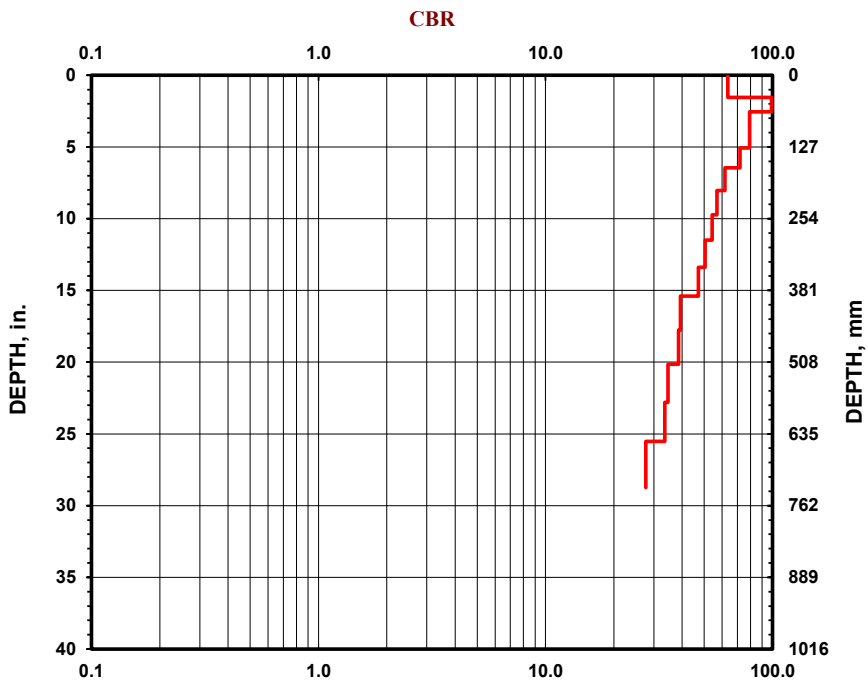
DCP TEST DATA

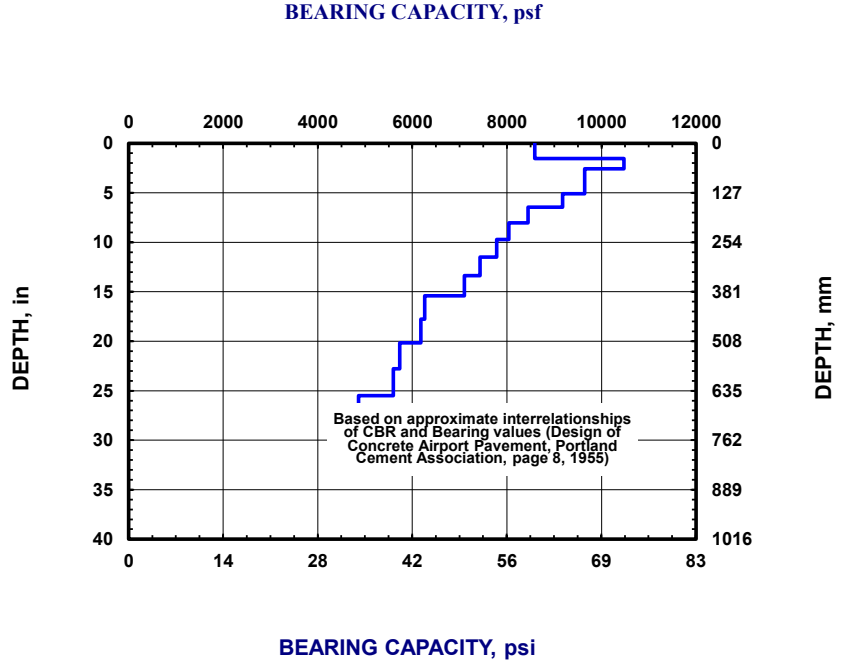
Project: Repair BEQ: G703
Location: G703-02
Date: 10/2/2025
Soil Type(s): Sand

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

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

No. of Blows	Accumulative Penetration	Type of Hammer
0	0	1
10	39	1
10	65	1
10	97	1
10	129	1
10	164	1
10	204	1
10	247	1
10	292	1
10	340	1
10	391	1
10	451	1
10	512	1
10	579	1
10	648	1
10	730	1





Photography Log – Pavement Cores

Photo 1: G703-01 pavement core

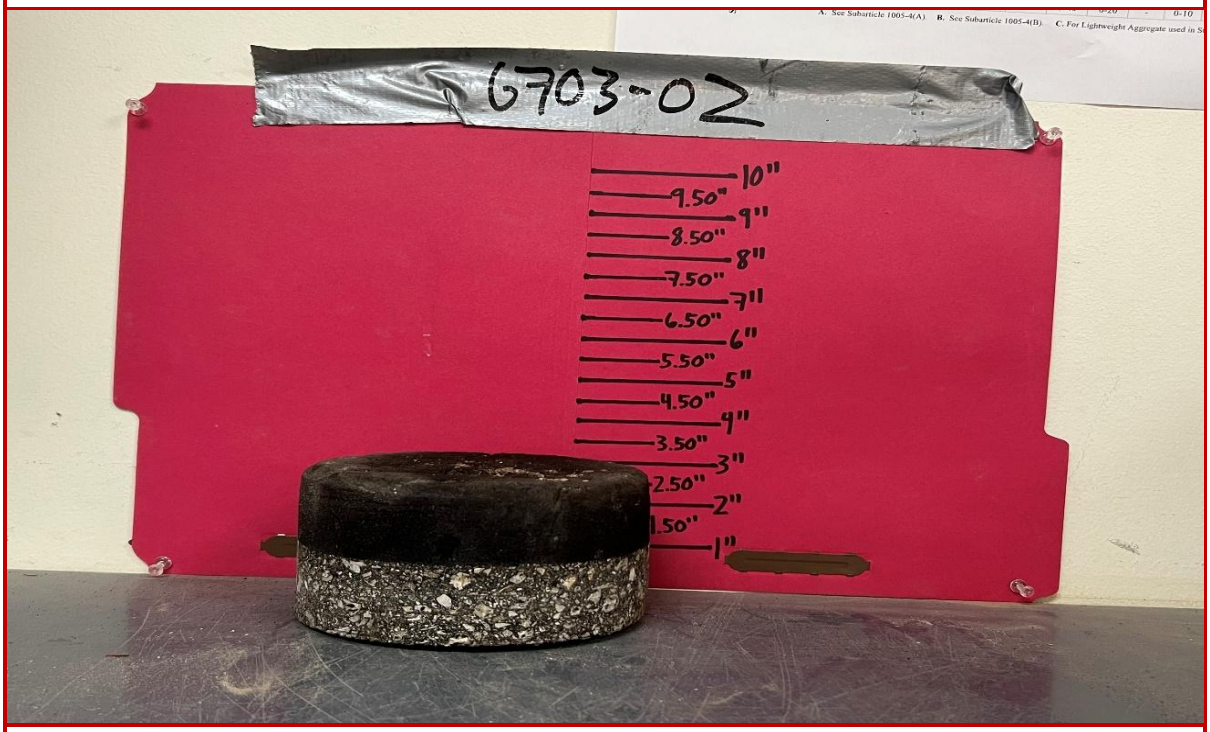


Photo 2: G703-02 pavement core

Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Boring Log No. HP185-01

Location: See Exploration Plan

Latitude: 34.6728° Longitude: -77.3588°
Northing: 339917.845 Easting: 2493421.163

Approximate Elevation: 23 (Ft.)

Model Layer	Depth (Ft.)	Description	Elevation	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
	0.2	**ASPHALT**, 2 inches	22.8						
1	0.9	**AGGREGATE BASE COURSE**, 8.5 inches	22.1						
2	2.0	**POSSIBLE UNCONTROLLED FILL MATERIAL - POORLY GRADED SAND**, fine to medium, brown, moist	21	1					
2	3.2	**POSSIBLE UNCONTROLLED FILL MATERIAL - SILTY SAND**, trace clay and gravel, fine to medium, brown, moist	19.8	2			10.3		
3	4.5	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine to medium, brown, moist	18.5	3					
3	7.0	**POORLY GRADED SAND (SP)**, fine to medium, tan, moist to wet	16	4					
		Boring Terminated at 7 Feet		5					
				6					
				7					

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
At completion of augering

Drill Rig
N/A

Hammer Type
Dual-Mass (17.6-lb) DCP

Driller
N. Lindley

Notes

Elevation Reference: Approximate elevations were interpolated from the provided 50% Civil Drawings (NAVD88)

Pavement surface cored via 4" core barrel

ABC penetrated via hammer drill, pickaxe, hand auger, prior to DCP

Advancement Method
Hand Auger

Abandonment Method
Boring backfilled with soil cuttings
Surface capped with asphalt

Logged by
N. Lindley

Boring Started
10-02-2025

Boring Completed
10-02-2025

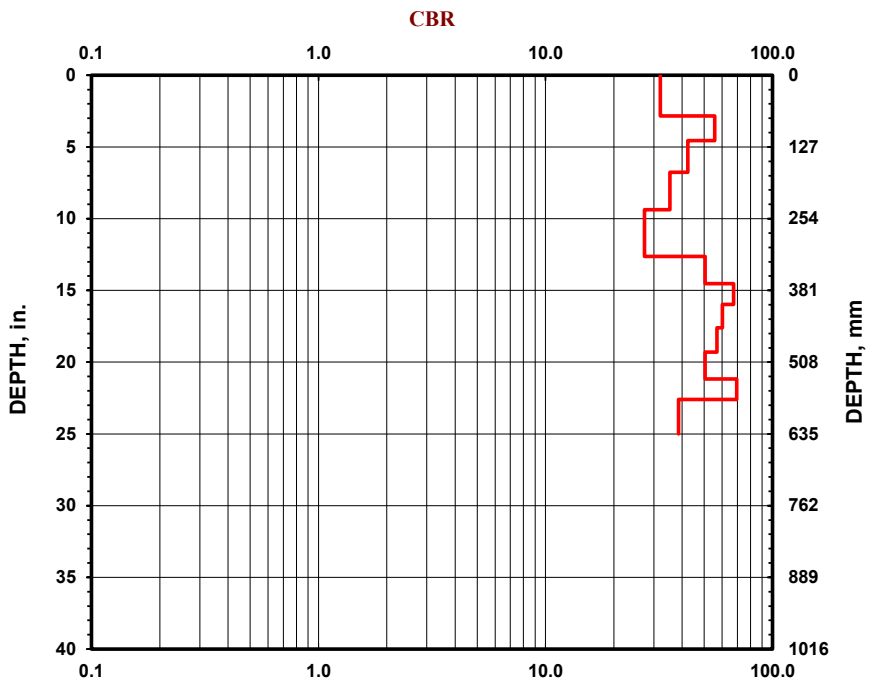
DCP TEST DATA

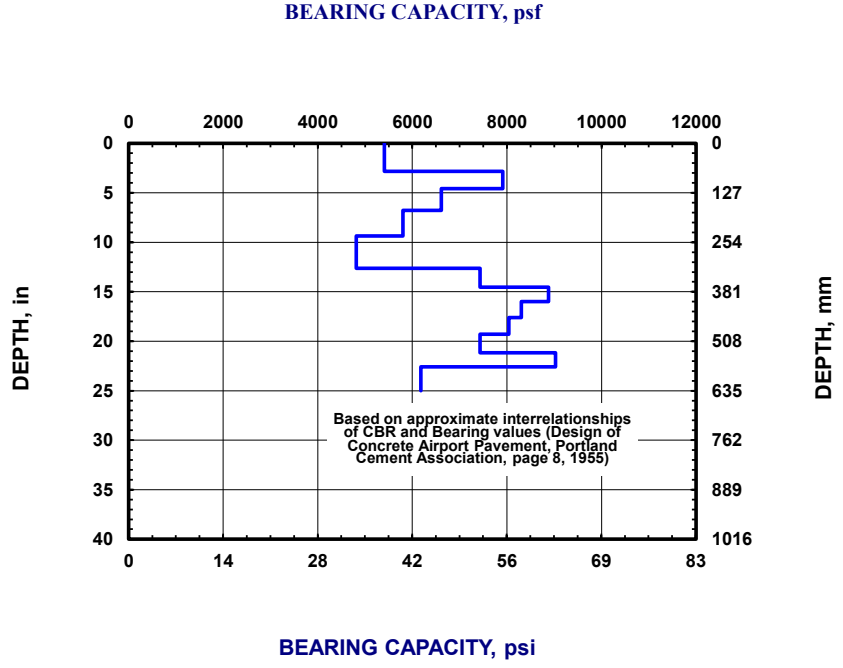
Project: Repair BEQ: HP185
Location: HP185-01
Date: 10/2/2025
Soil Type(s): Sand

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

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

No. of Blows	Accumulative Penetration	Type of Hammer
0	0	1
10	72	1
10	116	1
10	172	1
10	238	1
10	321	1
10	369	1
10	406	1
10	447	1
10	490	1
10	538	1
10	574	1
10	635	1





Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Boring Log No. HP185-02

Location: See Exploration Plan

Latitude: 34.6726° Longitude: -77.3586°
Northing: 339856.217 Easting: 2493500.901

Approximate Elevation: 23 (Ft.)

Model Layer	Depth (Ft.)	Description	Elevation	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.2	**ASPHALT**, 2.5 inches	22.8						
	0.8	**AGGREGATE BASE COURSE**, 7.5 inches	22.2						
2	3.0	**POSSIBLE UNCONTROLLED FILL MATERIAL - SILTY SAND**, fine to medium, brown, moist -Color change to tan	20	1 2			11.2	NP	20.9
3	4.0	**SILTY SAND (SM)**, trace clay, fine to medium, tan and gray, moist	19	3					
	6.0	**POORLY GRADED SAND (SP)**, fine to medium, gray, moist -Root fragments noted from a depth of 5.3' to 6.0'	17	4 5					
4	7.0	**SANDY LEAN CLAY (CL)**, with root fragments, gray, wet	16	6 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
▽ At completion of augering

Drill Rig
N/A

Hammer Type
Dual-Mass (17.6-lb) DCP

Driller
N. Lindley

Notes
Elevation Reference: Approximate elevations were interpolated from the provided 50% Civil Drawings (NAVD88)
Pavement surface cored via 4" core barrel
ABC penetrated via hammer drill, pickaxe, hand auger, prior to DCP

Advancement Method
Hand Auger

Abandonment Method
Boring backfilled with soil cuttings
Surface capped with asphalt

Logged by
N. Lindley

Boring Started
10-02-2025

Boring Completed
10-02-2025

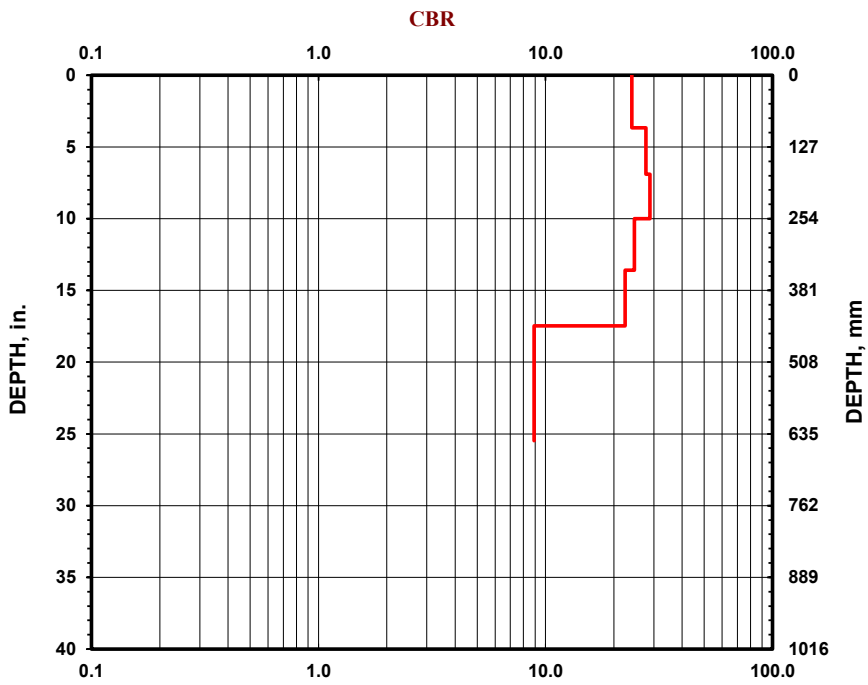
DCP TEST DATA

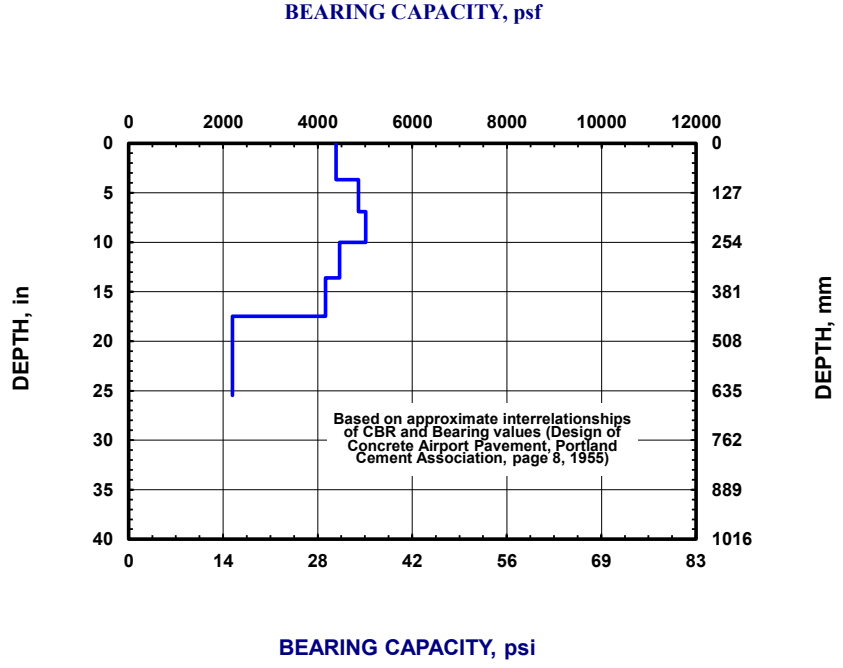
Project: Repair BEQ: HP185
Location: HP185-02
Date: 10/2/2025
Soil Type(s): Sand

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

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

No. of Blows	Accumulative Penetration	Type of Hammer
0	0	1
10	93	1
10	175	1
10	254	1
10	345	1
10	444	1
9	647	1





Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Boring Log No. HP185-03

Location: See Exploration Plan

Latitude: 34.6729° Longitude: -77.3584°
Northing: 339957.914 Easting: 2493552.453

Approximate Elevation: 24 (Ft.)

Model Layer	Depth (Ft.)	Description	Elevation	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.2	**ASPHALT**, 2 inches	23.8						
1	0.8	**AGGREGATE BASE COURSE**, 8 inches	23.2						
2	3.0	**POSSIBLE UNCONTROLLED FILL MATERIAL - POORLY GRADED SAND**, fine, tan, moist	21	1, 2			11.1		
3	4.0	**SILTY SAND (SM)**, trace clay, fine to medium, gray and tan, moist	20	3					
4	5.0	**SANDY LEAN CLAY (CL)**, gray and brown, moist	19	4			28.8	42-13-29	56.9
3	6.0	**SILTY SAND (SM)**, trace clay, fine to medium, brown, moist to wet	18	5	▽				
		Boring Terminated at 6 Feet		6					

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
▽ At completion of augering

Drill Rig
N/A

Hammer Type
Dual-Mass (17.6-lb) DCP

Driller
N. Lindley

Notes

Elevation Reference: Approximate elevations were interpolated from the provided 50% Civil Drawings (NAVD88)

Pavement surface cored via 4" core barrel

ABC penetrated via hammer drill, pickaxe, hand auger, prior to DCP

Advancement Method
Hand Auger

Abandonment Method
Boring backfilled with soil cuttings
Surface capped with asphalt

Logged by
N. Lindley

Boring Started
10-02-2025

Boring Completed
10-02-2025

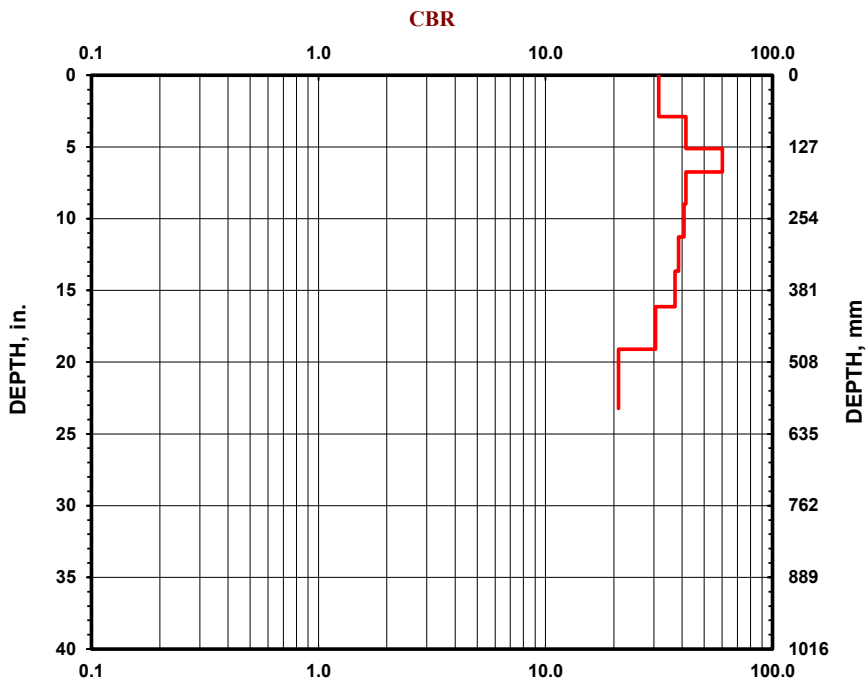
DCP TEST DATA

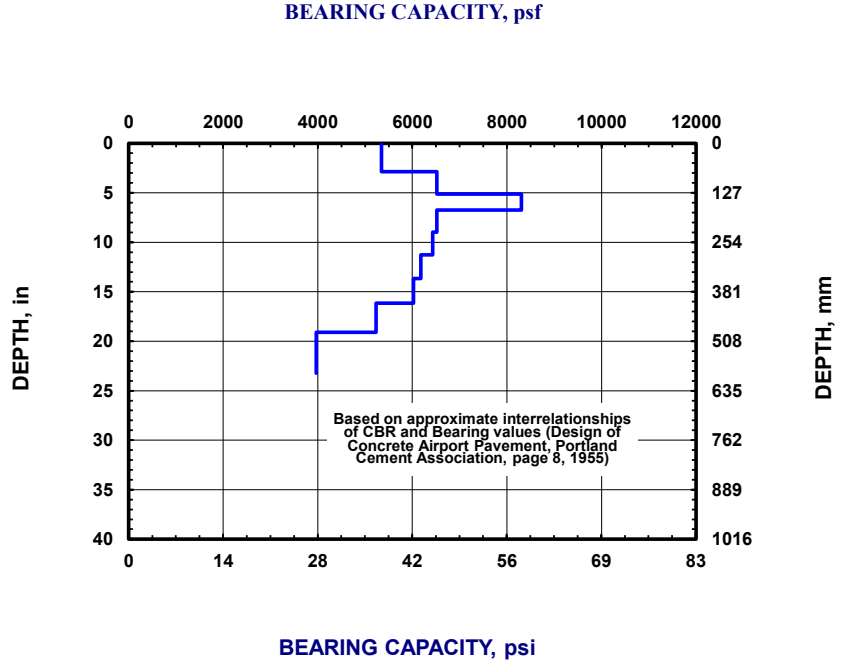
Project: Repair BEQ: HP185
Location: HP185-03
Date: 10/2/2025
Soil Type(s): Sand

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

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

No. of Blows	Accumulative Penetration	Type of Hammer
0	0	1
10	73	1
10	130	1
10	171	1
10	228	1
10	286	1
10	347	1
10	410	1
10	485	1
10	590	1





Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Boring Log No. HP185-04

Location: See Exploration Plan

Latitude: 34.6727° Longitude: -77.3581°
Northing: 339899.719 Easting: 2493645.685

Approximate Elevation: 24 (Ft.)

Model Layer	Depth (Ft.)	Description	Elevation	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.2	**ASPHALT**, 2.5 inches	23.8						
1	0.8	**AGGREGATE BASE COURSE**, 6.5 inches	23.2						
2	2.0	**POSSIBLE UNCONTROLLED FILL MATERIAL - POORLY GRADED SAND**, fine to medium, tan, moist	22	1					
3	2.5	**CLAYEY SAND (SC)**, fine to medium, brown, moist	21.5	2			16.6	27-16-11	29.6
3	3.3	**POORLY GRADED SAND WITH SILT (SP-SM)**, fine to medium, tan and gray, moist	20.7	3					
3	5.0	**POORLY GRADED SAND (SP)**, fine to medium, white and tan, moist	19	4					
4	6.0	**CLAYEY SAND (SC)**, fine to medium, gray and brown, moist to wet	18	5					
		Boring Terminated at 6 Feet		6					

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
At completion of augering

Drill Rig
N/A

Hammer Type
Dual-Mass (17.6-lb) DCP

Driller
N. Lindley

Notes

Elevation Reference: Approximate elevations were interpolated from the provided 50% Civil Drawings (NAVD88)

Pavement surface cored via 4" core barrel

ABC penetrated via hammer drill, pickaxe, hand auger, prior to DCP

Advancement Method
Hand Auger

Abandonment Method
Boring backfilled with soil cuttings
Surface capped with asphalt

Logged by
N. Lindley

Boring Started
10-02-2025

Boring Completed
10-02-2025

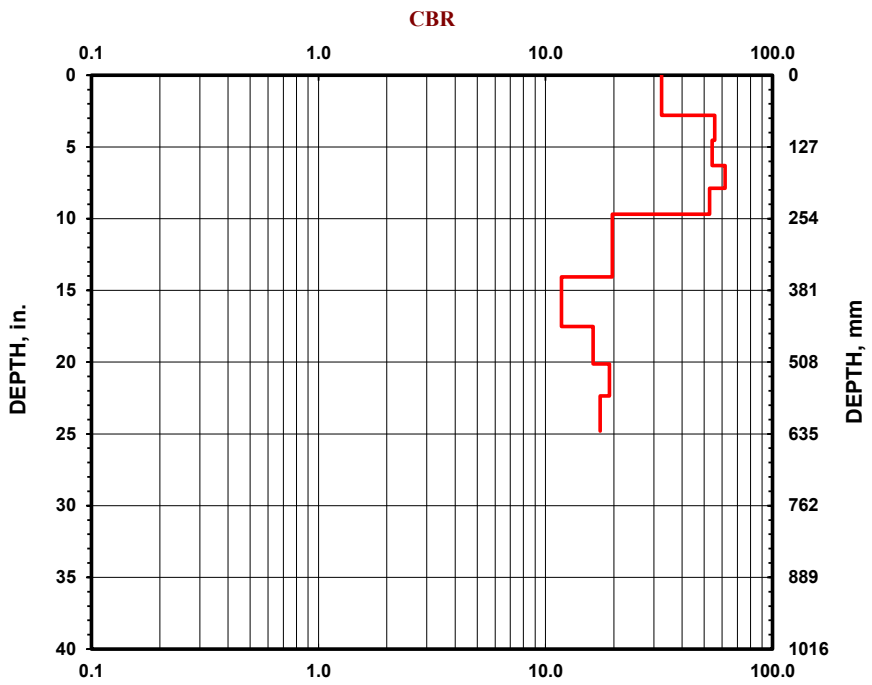
DCP TEST DATA

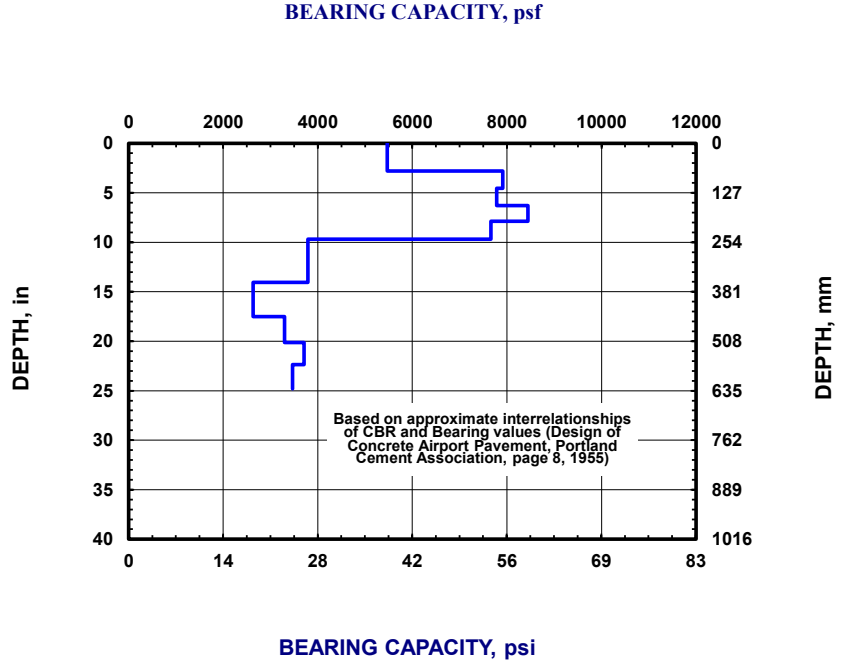
Project: Repair BEQ: HP185
Location: HP185-04
Date: 10/2/2025
Soil Type(s): Sand

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

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

No. of Blows	Accumulative Penetration	Type of Hammer
0	0	1
10	71	1
10	115	1
10	160	1
10	200	1
10	246	1
10	357	1
5	445	1
5	511	1
5	568	1
5	630	1





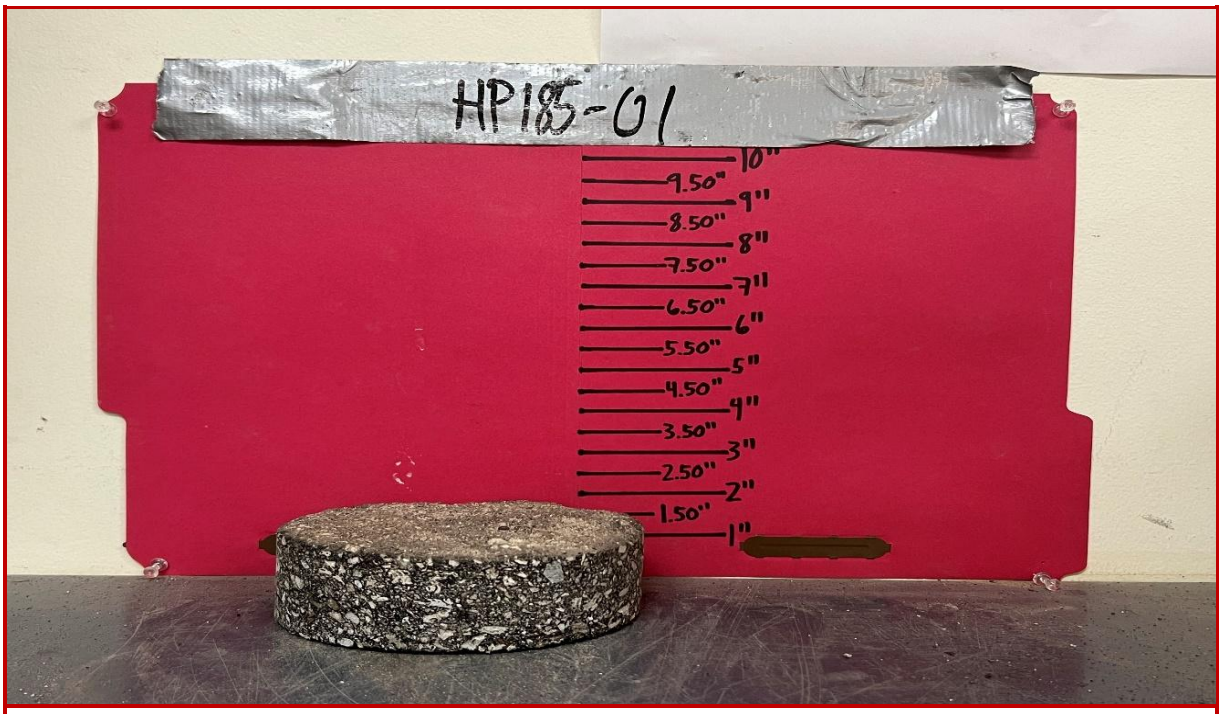


Photo 3: HP185-01 pavement core

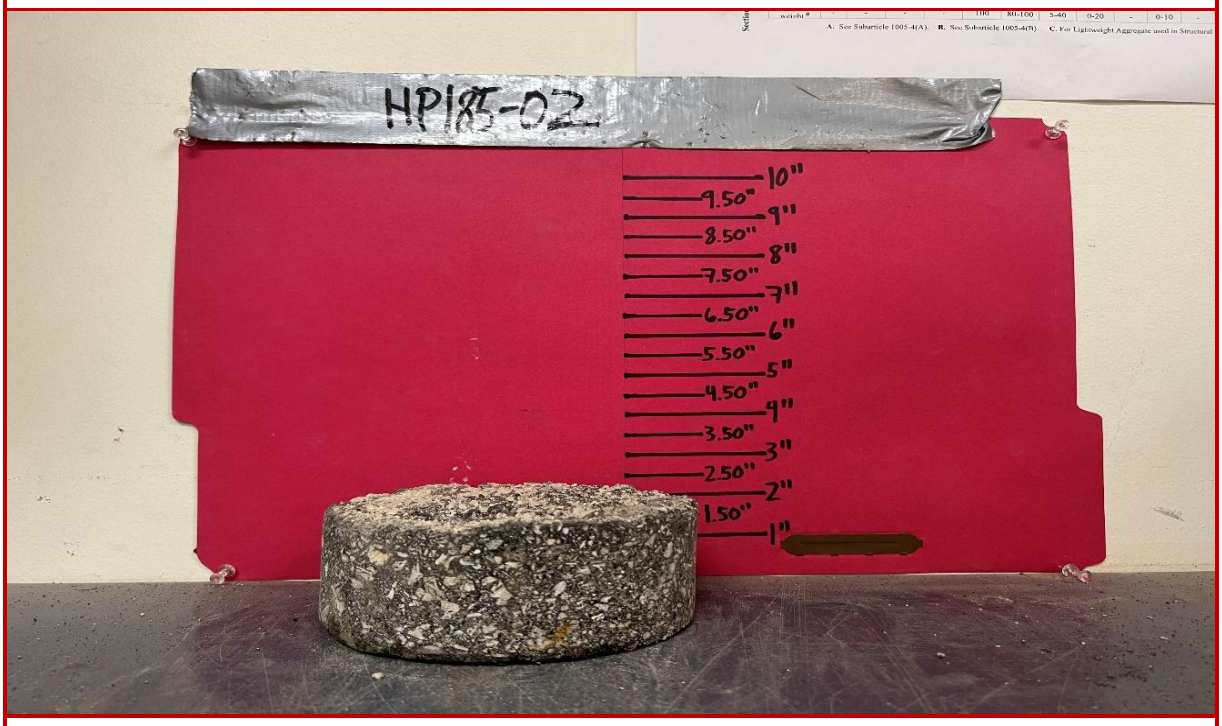


Photo 4: HP185-02 pavement core

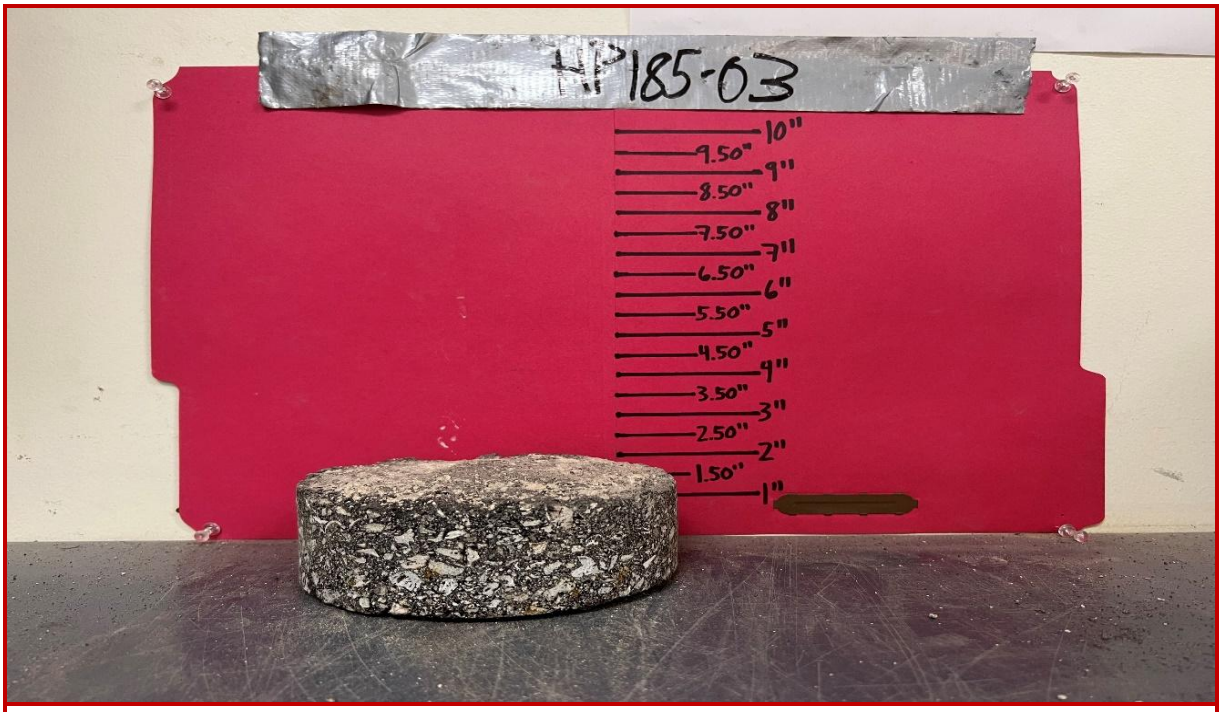


Photo 5: HP185-03 pavement core

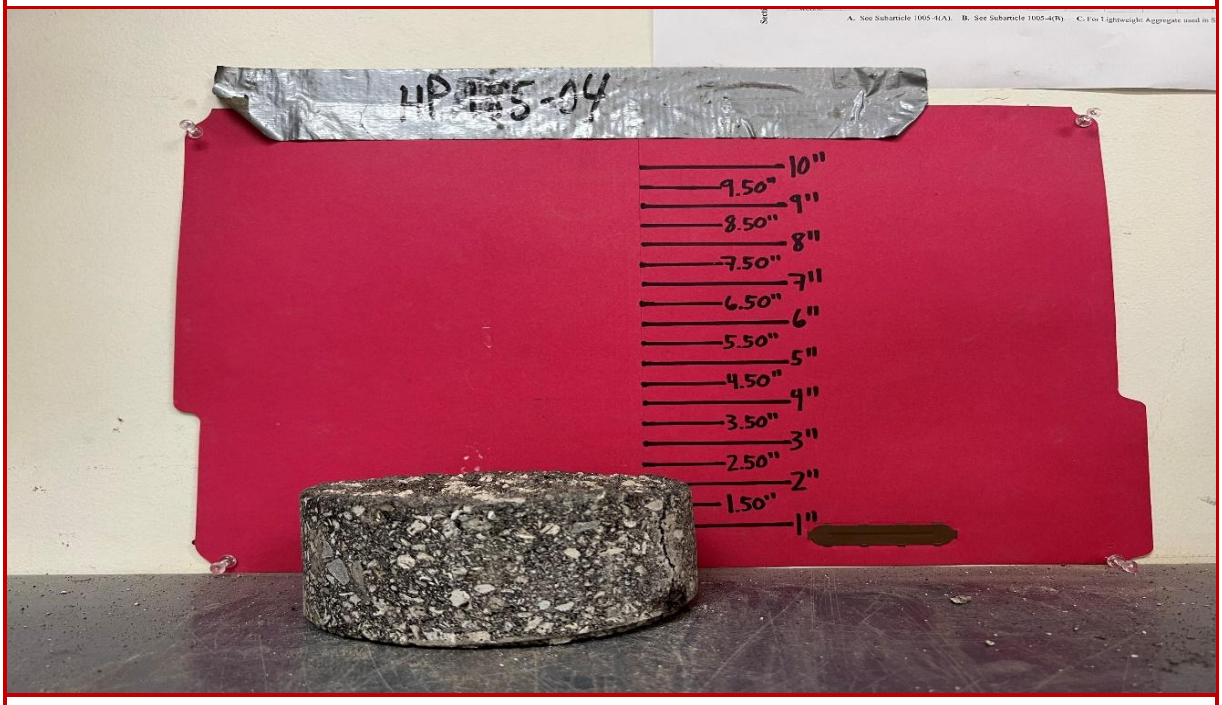


Photo 6: HP185-04 pavement core

A-6.0 Laboratory Results

Contents:

A-6.1 Summary of Laboratory Results
A-6.2 Grain Size Distribution (2 pages)
A-6.3 Atterberg Limits

Note: All attachments are one page unless noted above.

Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

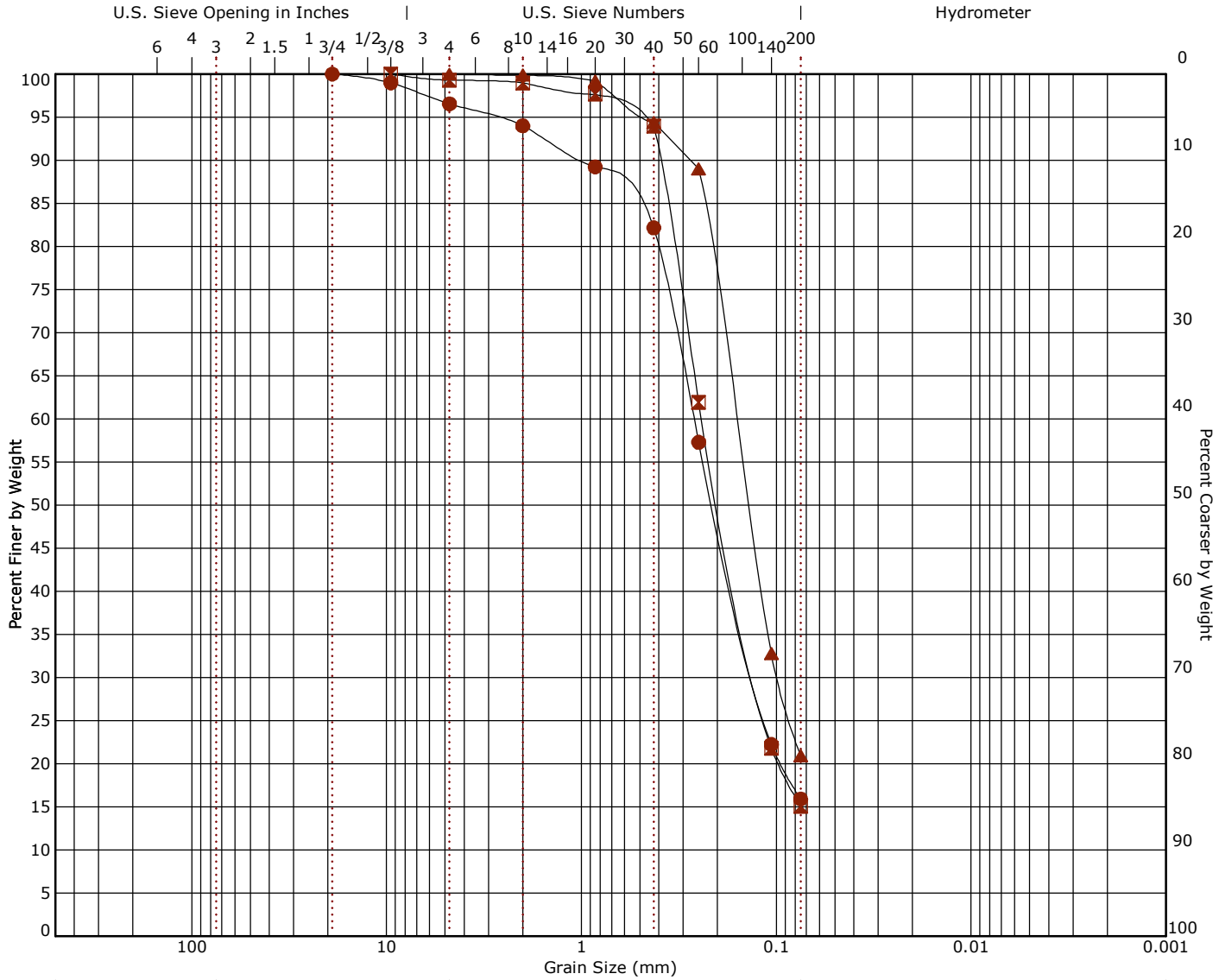
Summary of Laboratory Results

BORING ID	Depth (Ft.)	Soil Classification USCS	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Fines
G703-01	2-3	SILTY SAND(SM)	15.6	NP	NP	NP	15.9
G703-02	1-1.5	SILTY SAND(SM)	8.7	NP	NP	NP	15.1
HP185-01	2-3		10.3				
HP185-02	1-2	SILTY SAND(SM)	11.2	NP	NP	NP	20.9
HP185-03	1-2		11.1				
HP185-03	4-5	SANDY LEAN CLAY(CL)	28.8	42	13	29	56.9
HP185-04	2-2.5	CLAYEY SAND(SC)	16.6	27	16	11	29.6

Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	% Cobbles	% Gravel	% Sand	% Fines	% Silt	% Clay	USCS
●	G703-01	2 - 3	0.0	3.5	80.6	15.9			SM
⊠	G703-02	1 - 1.5	0.0	0.7	84.3	15.1			SM
▲	HP185-02	1 - 2	0.0	0.0	79.1	20.9			SM

	Description
●	SILTY SAND
⊠	SILTY SAND
▲	SILTY SAND

Remarks
●
⊠
▲

● Sieve	● % Finer	⊠ Sieve	⊠ % Finer	▲ Sieve	▲ % Finer
3/4"	100.0	3/8"	100.0	#4	100.0
3/8"	98.98	#4	99.31	#10	99.88
#4	96.55	#10	98.99	#20	99.18
#10	94.0	#20	97.66	#40	94.39
#20	89.24	#40	93.97	#60	89.03
#40	82.16	#60	61.92	#140	32.78
#60	57.29	#140	21.82	#200	20.95
#140	22.23	#200	15.05		
#200	15.91				

Grain Size	●	⊠	▲
D_{60}	0.265	0.24	0.161
D_{10}			

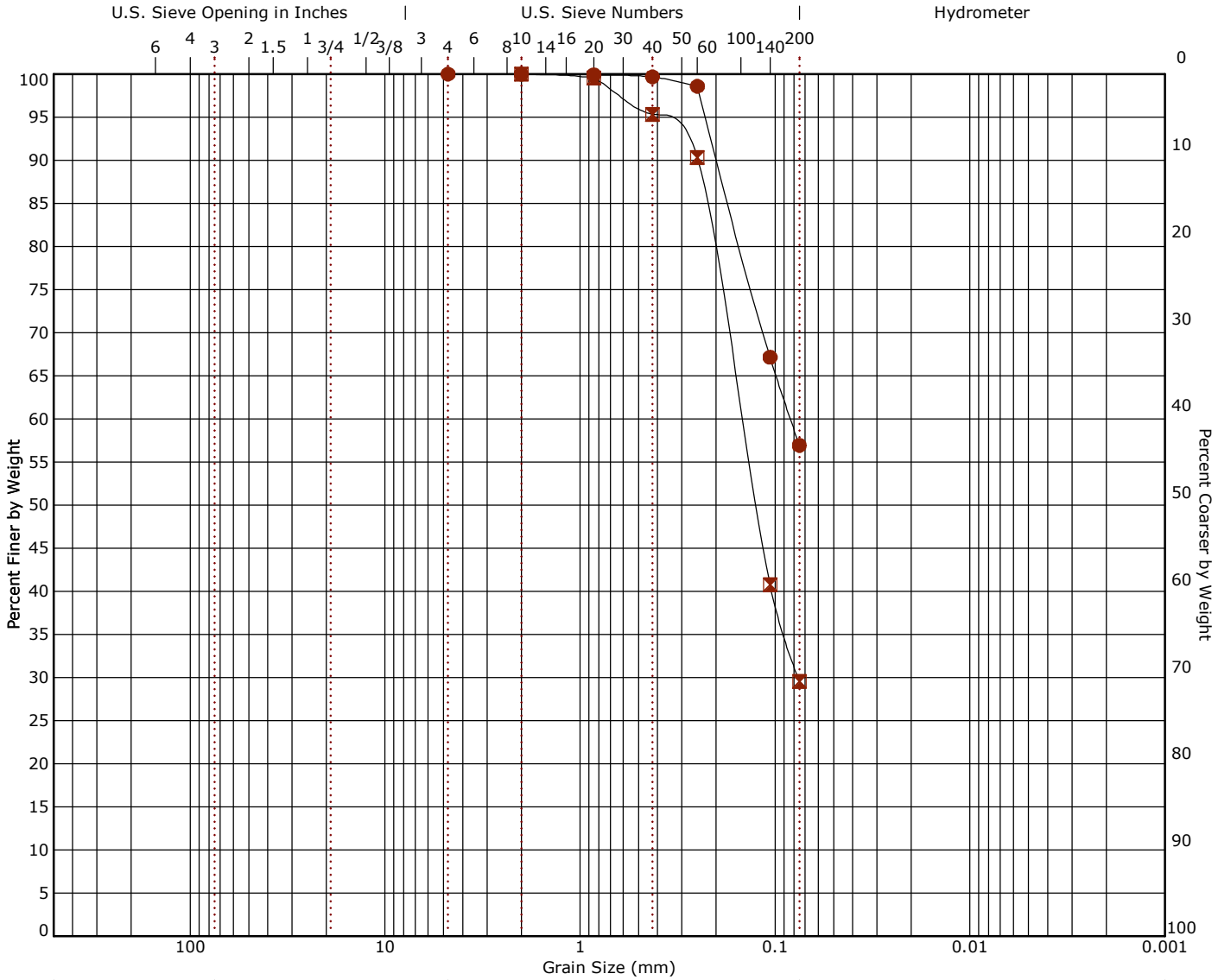
Coefficients	●	⊠	▲
C_C			
C_U			

AE Design Repair BEQ G703 and HP185
Marine Corps Base Camp Lejeune | Jacksonville, NC
Terracon Project No. K6255085

Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	% Cobbles	% Gravel	% Sand	% Fines	% Silt	% Clay	USCS
●	HP185-03	4 - 5	0.0	0.0	43.1	56.9			CL
⊠	HP185-04	2 - 2.5	0.0	0.0	70.4	29.6			SC

	Description
●	SANDY LEAN CLAY
⊠	CLAYEY SAND

Remarks
●
⊠

● Sieve	● % Finer	⊠ Sieve	⊠ % Finer	Sieve	% Finer
#4	100.0	#10	100.0		
#10	99.99	#20	99.56		
#20	99.91	#40	95.35		
#40	99.68	#60	90.35		
#60	98.58	#140	40.75		
#140	67.15	#200	29.56		
#200	56.93				

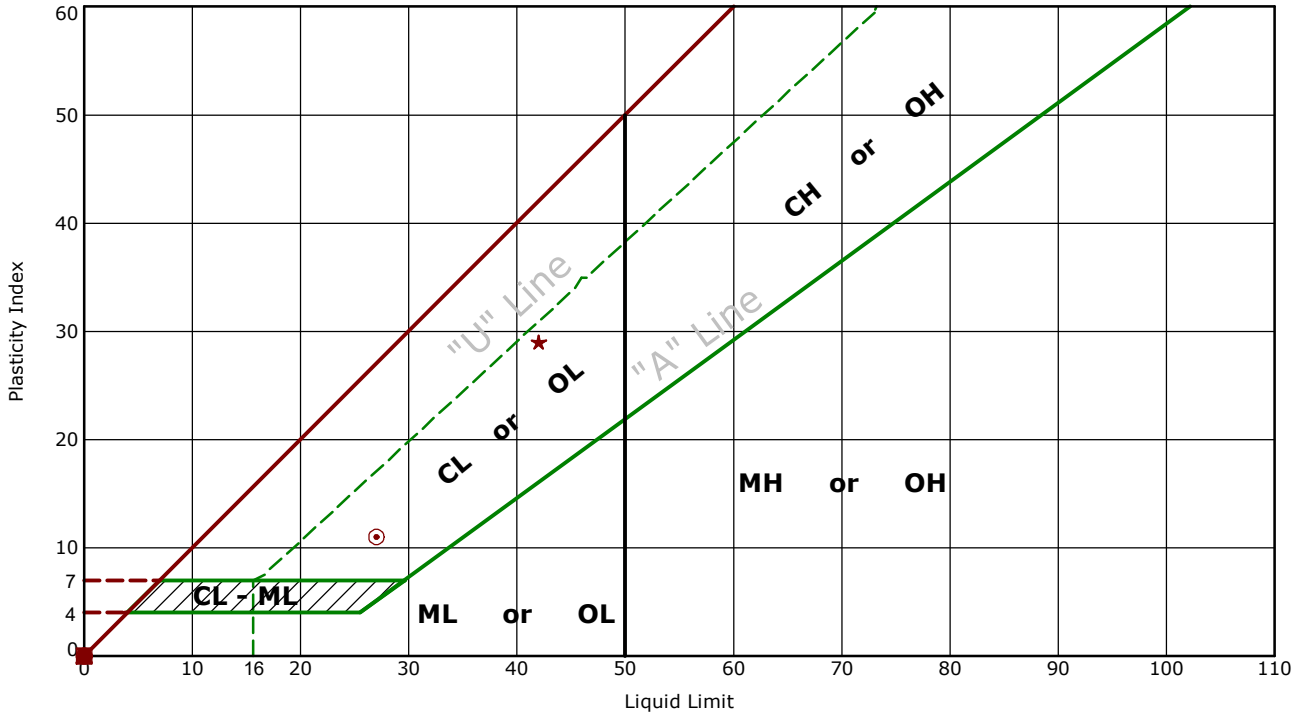
Grain Size	●	⊠
D_{60}	0.083	0.148
D_{10}		

Coefficients	●	⊠
C_C		
C_U		

Terracon
2108 Capital Dr, Ste 103
Wilmington, NC

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	G703-01	2 - 3	NP	NP	NP	15.9	SM	SILTY SAND
⊠	G703-02	1 - 1.5	NP	NP	NP	15.1	SM	SILTY SAND
▲	HP185-02	1 - 2	NP	NP	NP	20.9	SM	SILTY SAND
★	HP185-03	4 - 5	42	13	29	56.9	CL	SANDY LEAN CLAY
⊙	HP185-04	2 - 2.5	27	16	11	29.6	SC	CLAYEY SAND

A-7.0 Supporting Information

Contents:

A-7.1 Private Utility Locate Documentation
- -Competency Letter
- -Photography log (2 pages)
- -Utility sketches (3 pages)

Note: All attachments are one page unless noted above.

2108 Capital Drive, Suite 103
Wilmington, North Carolina 28405
P (910) 478-9915
North Carolina Registered, F-0869
Terracon.com

September 29, 2025

Job Site Competent Person
Nicholas Lindley
Terracon Consultants, Inc

Work Performed – Subsurface Utility Locate and Geotechnical Exploration
Location of Work Performed – MCAS New River & MCB Camp Lejeune, NC

The purpose of this letter is to designate Nicholas Lindley as the job site competent person while on the proposed work site, and to ensure that proper safety guidelines are followed at all times.

It is his responsibility to ensure:

1. Proper PPE is worn at all times.
2. Potential work hazards on the job site are identified and mitigated
3. Visual safety checks are performed on all work equipment and PPE
4. All safety guidelines are followed while on the job site.
5. All utility structures are securely closed
6. Work in progress is immediately halted when it is determined to be unsafe to continue.

It has been determined that Nicholas Lindley has received the proper safety training, can identify job site work safety hazards, and can take prompt measures to correct them.

Nicholas Lindley has demonstrated the knowledge for safety requirements and has the responsibility to ensure a safe job site.

Sincerely,

Justin L. DeNicola, PE
Office Manager – Wilmington, NC

Photography Log – Utility Locate

Photos taken during site visit on October 2, 2025

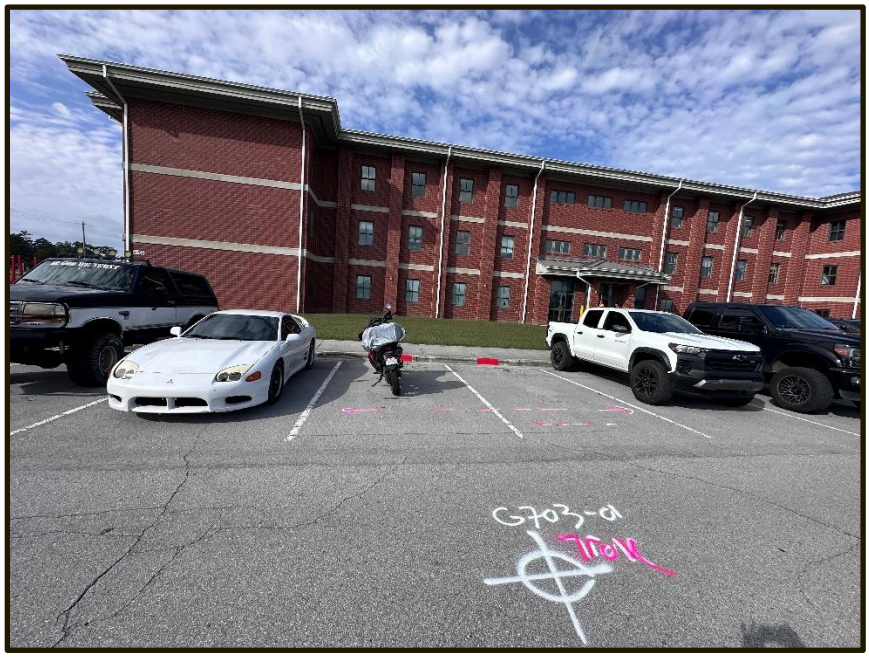


Photo 1: Location G703-01

Photo 2: Location G703-02

Photo 3: Location HP185-01

Photo 4: Location HP185-02

Photo 5: Location HP185-03

Photo 6: Location HP185-04

Private Utility Locate Report

Terracon

Project Number: KG255082
Project Name: BEQ G703-HP185
Site Location:
Project Manager: Nick Lindley
Second Contact:
Lead Locator: Melissa Byrum

Service Date: 10-1-25

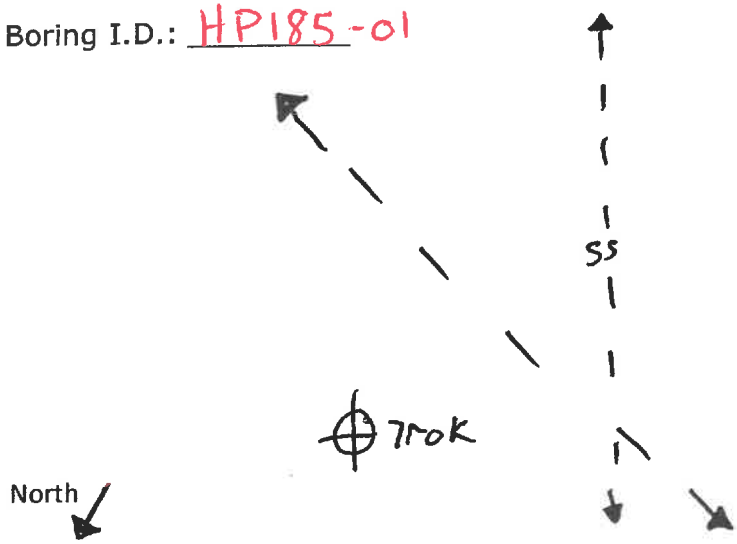
Equipment Used

- [x] Ground Penetraing Radar
- [x] Electromagnetic Line Locator
- [x] Metal Detector
- [ ] Other:

Field Work Summary

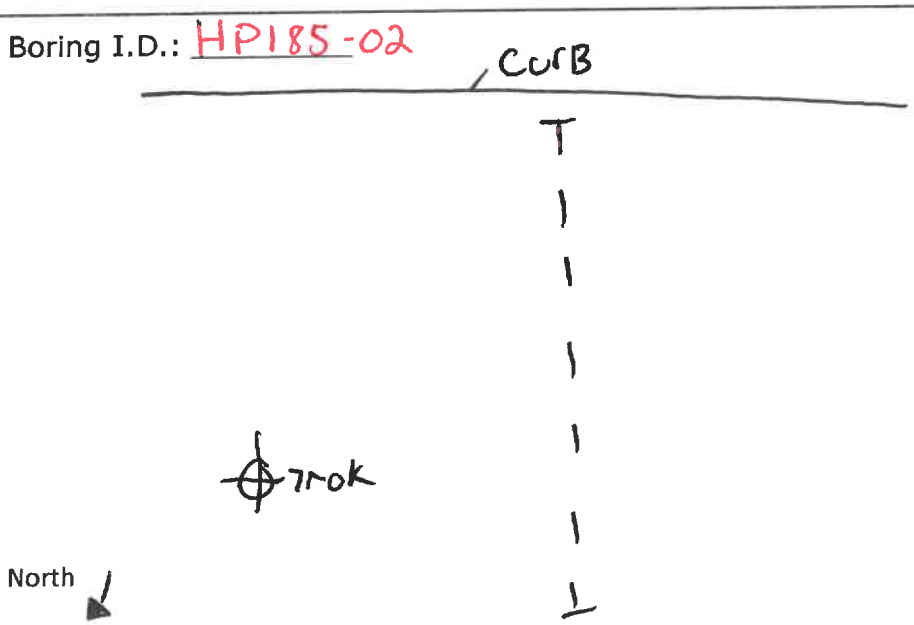
Boring I.D.: HP185-01

Comments:



Boring I.D.: HP185-02

Comments:



Legend

- Original Boring Location
- Alternate/Moved Boring Location
- Unknown Object to Avoid

Utility Types (if able to determine)

E	Electric	**SD**	Stormwater
C	Communication	**SS**	Sanitary
G	Natural Gas	**UU**	Unknown
W	Water		

Borings without utilities (within 20'):

Private Utility Locate Report

Terracon

Project Number: KG255082
Project Name:
Site Location:
Project Manager: NL
Second Contact:
Lead Locator: MB

Service Date: 10-1-25

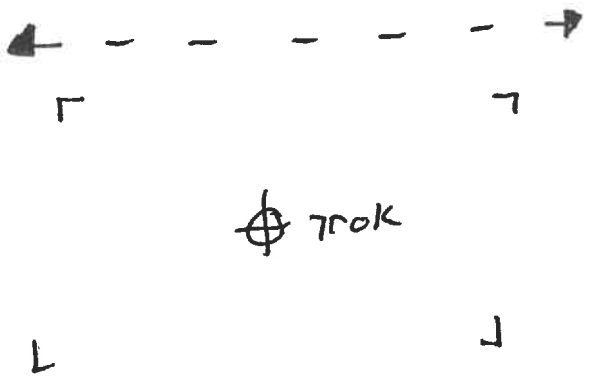
Equipment Used

- [x] Ground Penetraing Radar
- [x] Electromagnetic Line Locator
- [x] Metal Detector
- [ ] Other:

Field Work Summary

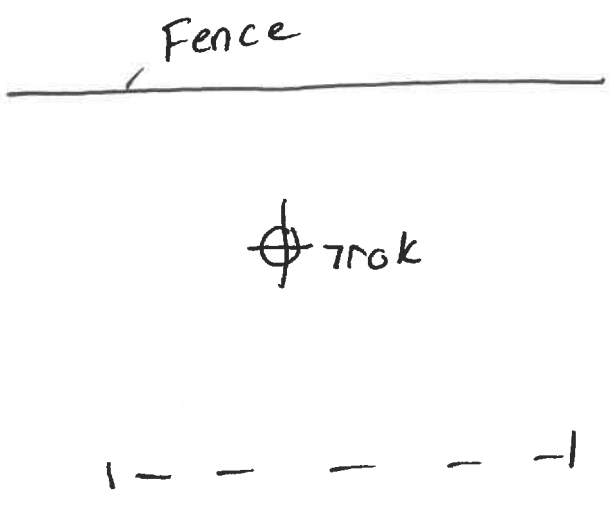
Boring I.D.: HP185-03

Comments:



Boring I.D.: HP185-04

Comments:



Legend

- Original Boring Location
- Alternate/Moved Boring Location
- Unknown Object to Avoid

Utility Types (if able to determine)

E	Electric	**SD**	Stormwater
C	Communication	**SS**	Sanitary
G	Natural Gas	**UU**	Unknown
W	Water		

Borings without utilities (within 20'):

Private Utility Locate Report

Terracon

Project Number: KG255082
Project Name:
Site Location:
Project Manager: NL
Second Contact:
Lead Locator: MB

Service Date: 10-1-25

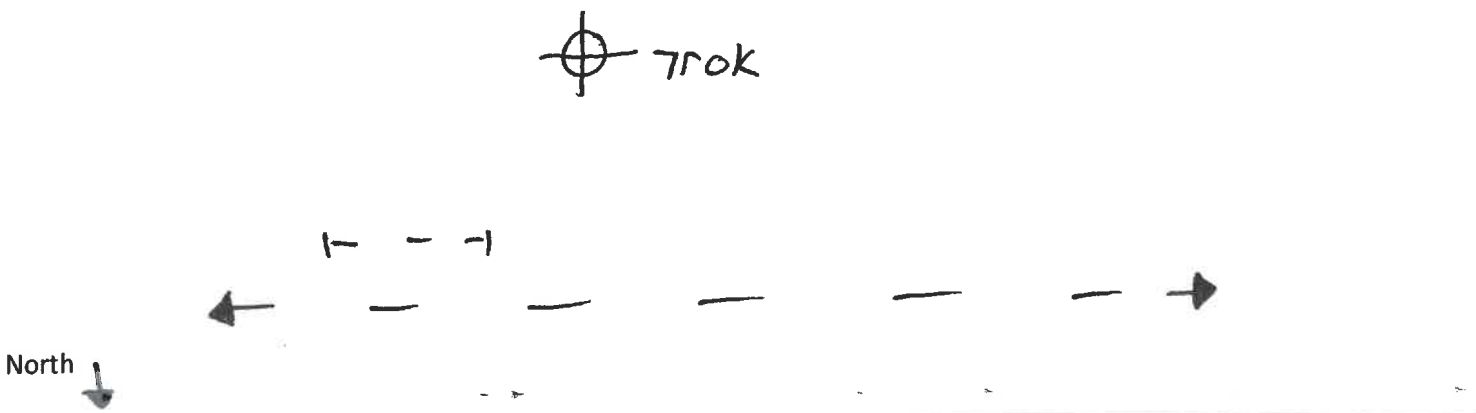
Equipment Used

- [x] Ground Penetraing Radar
- [x] Electromagnetic Line Locator
- [x] Metal Detector
- [ ] Other:

Field Work Summary

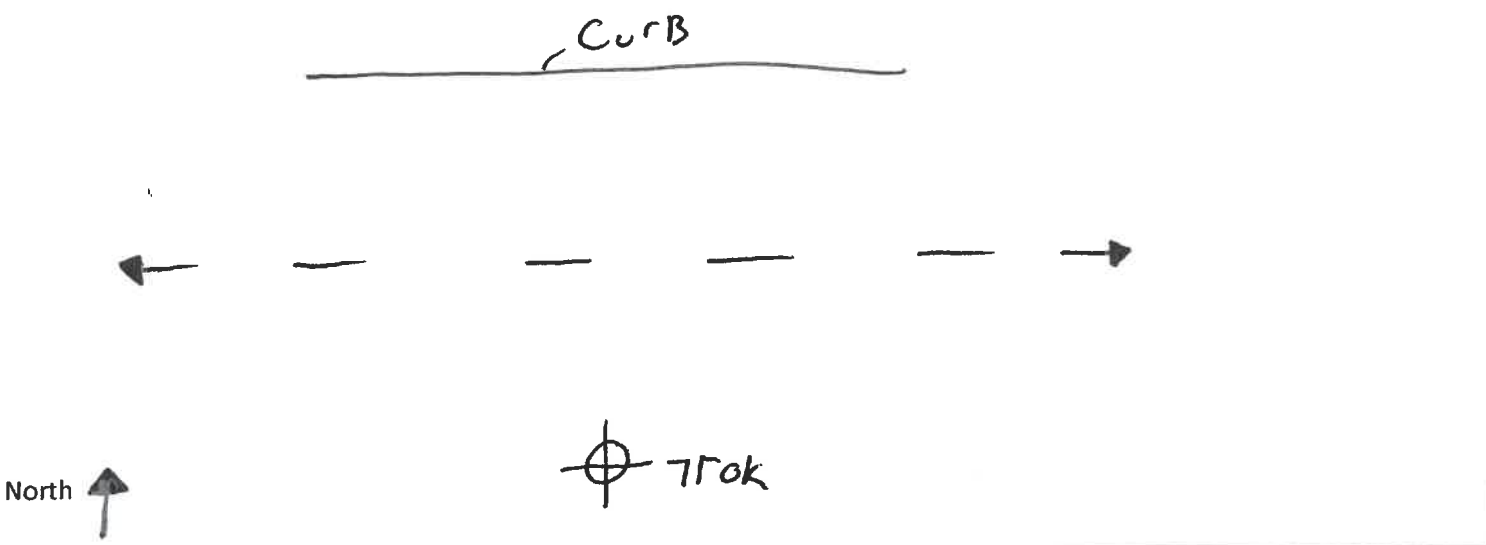
Boring I.D.: G703-01

Comments:



Boring I.D.: G703-02

Comments:



Legend

- Original Boring Location
- Alternate/Moved Boring Location
- Unknown Object to Avoid

Utility Types (if able to determine)

E	Electric	**SD**	Stormwater
C	Communication	**SS**	Sanitary
G	Natural Gas	**UU**	Unknown
W	Water		

Borings without utilities (within 20'):