# ADDENDUM #1

May 3, 2024

PROJECT: **Bailey Road Park Expansion – Phase 1**
**Cornelius, North Carolina**

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## Changes and Clarifications – General

1. Project Scope Clarification:
    a. Phase 1 of construction includes all proposed grades shown on the plans. Rough grading for six (6) tennis courts and thirty-five (35) parking spaces to be constructed during Phase 2 is included; however, the fine grading of those future Phase 2 areas is excluded. Generally, the proposed features shown in black on the Site Plan sheets are to be constructed during Phase 1 and proposed features shown greyed back on the Site Plan sheets are to be constructed during Phase 2.
    b. Phase 1 utility construction includes converting an existing irrigation water service over to domestic use, the construction of water service lines to the future Phase 2 restroom building location and the extension of an existing sewer lateral to the future Phase 2 restroom building location.
    c. Site lighting is being constructed under a separate contract. Please note, the contractor is responsible for coordinating with the lighting and electric utility providers during rough grading of the site to install electrical conduits for site lighting and electrical service to the restroom building.

2. A formal substitution request was submitted to Dewberry Engineers Inc. regarding the use of PlexiPave and DecoColor court surfacing products. After reviewing information provided by the vendor, PlexiPave and DecoColor will be an allowable court surfacing system. However, the following conditions apply:
    a. Mesh silica sand provided in the product or mixed on site shall meet the specifications provided in Section 32 18 10 Pickleball and Tennis Courts of the technical specifications.
    b. Application rates of the product shall be based on manufacturer recommendations but shall also meet the minimums stated in Section 32 18 10 Pickleball and Tennis Courts of the technical specifications.

## Response to Bidder Questions

1. QUESTION: Do we have to order the plans from TPM to be put on the bidders list?
    a. RESPONSE: You are not required to order plans from TPM. However, please note that there is a mandatory pre-bid meeting being held on the project site. See section 00 11 16 – Invitation to Bid of the technical specifications for more info on the pre-bid meeting.

2. QUESTION: Can you provide the Geotechnical report? It is referenced as Appendix A of the technical specifications, but it is not provided.
    a. RESPONSE: See attached for the Geotechnical report.

3. QUESTION: Will the Town or the Contractor be responsible for the Construction Testing?
    a. RESPONSE: Per section 01 40 00 Quality Requirements of the technical specifications, the contractor shall generally provide all quality-control services specified and required by authorities having jurisdiction. The Town will provide quality-control services for items where it is indicated as Owner's responsibility in the technical specifications.

## Changes and Clarifications to Drawings

1. No Changes.

**Changes and Clarifications to the Specifications**

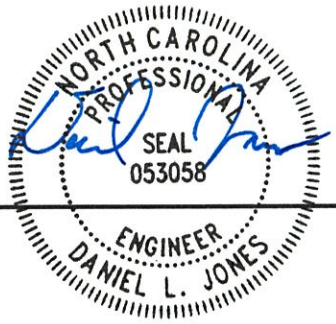
1. Update to 00 42 13 Proposal Form – Stipulated Sum (Single-Prime Contract) to include Alternate #1 – Sand Filter Conversion – see attached specification to this addendum.

2. Updated 01 23 00 Alternates to include Alternate #1 – Sand Filter Conversion – see attached specification to this addendum.

**All other terms, conditions and descriptions remain the same. Contractor must acknowledge issuance of this addendum in their Single Prime General Contract Proposal. The bid closing date remains Thursday, May 30, 2024 at 3:00 PM.**

**Attachments:**

1. **00 42 13 Proposal Form – Stipulated Sum (Single-Prime Contract)**
2. **01 23 00 Alternates**
3. **Substitution Request #1 – Court Surfacing System**
4. **Carolinas Geotechnical Group, "Geotechnical Engineering Report: Bailey Road Park Tennis Courts", dated May 5, 2023**




05/03/2024

**Daniel L. Jones, PE NC Lic. # 053058**

**End of Addendum 1**

**SINGLE PRIME CONTRACT**
**GENERAL CONSTRUCTION**
**PROPOSAL**

Bailey Road Park Expansion
Phase 1
for Town of Cornelius
Cornelius, North Carolina.
PREPARED BY:

Dewberry Engineers Inc.
9300 Harris Corners Parkway, Suite 220
Charlotte, NC 28269
Phone (704) 264-1275

Bid Date: _____

TO: Town of Cornelius
North Carolina

From: _____
Name of Bidder

The undersigned Bidder hereby declares that his Proposal is made without connection with any other person, company, or parties making a similar bid or proposal, and that it is in all respect fair and in good faith, without collusion or fraud. It is the Bidder's intention & purpose to enter into a Contract with the Town of Cornelius. The Bidder signifies that his bid is all-inclusive to perform the Work to construct the Bailey Road Park Expansion – Phase 1 as illustrated in the Contract Document prepared by Dewberry Engineers Inc. dated April 24, 2024. The Bidder has carefully examined the Contract Document and Proposal Form and is familiar with the scope, details, intent, and conditions under which the Work, or any part of it, is to be done, and the conditions which must be fulfilled in the furnishing and/or erection or construction of any or all items of the Work.

The Bidder hereby proposes to furnish all labor, materials, equipment and services necessary to perform the Work required in the Construction Document and terms of this Proposal for the amounts listed below.

**BASE BID:** $_____ (LS)

Base bid consists of converting three (3) existing tennis courts into ten (10) pickleball courts, the construction of six (6) new tennis courts, the expansion of an existing parking lot, the construction of a new parking lot, the expansion of an existing dry detention pond, construction of a new sand filter BMP, rough grading for tennis courts and parking to be constructed during Phase 2, and water/sewer service extensions to serve a restroom building to be constructed during Phase 2, with associated clearing, demolition, erosion control, grading, stormwater, landscaping, and concrete work.

**Allowance #1 –** Unsuitable Soil Undercut and Replacement with Structural Fill:

Based on report titled: "Geotechnical Engineering Report: Bailey Road Park Tennis Courts" prepared by Carolinas Geotechnical Group dated May 5, 2023, we anticipate the presence of unsuitable soils on site and the need to undercut unsuitable soils under structural and pavement limits as outlined in the Geotechnical Report. This allowance shall be paid for as noted and as specified in the Contract Documents to include, but not limited to, all fees and costs to provide all equipment, material, and manpower to dispose of unsuitable soil legally on-site, backfill with acceptable material within the limits of excavation, compact, and test the soil in the project limits. The contractor shall be responsible to review the Geotechnical Report referenced above prior to bid.

**2600 CY @** $_____**/CY =** $_____

**TOTAL BID (Base Bid + Allowance #1):**
$_____

The Town reserves the right to award the contract based on Base Bid only, or combination of Base Bid and any/all of the Alternate Bid Items below. The Bidder shall indicate if the Alternate is an add or deduct for the overall bid. If the Alternate is left blank, then the Alternate will not change the Base Bid if accepted. The Bidder agrees to provide the Alternates as described in the Contract Documents for the following prices:

**Alternate #1 (Deduct)** – Sand Filter Conversion $_____ (LS)
Convert proposed skimmer sediment basin into final Sand Filter BMP configuration. Scope of work shall also include an as-built BMP survey provided by the contractor that meets the requirements of the Mecklenburg County Post-Construction Storm Water Ordinance.

The undersigned further agrees to begin the work promptly upon receipt of Notice to Proceed and to pursue the work with an adequate work force to substantially complete the work within two hundred and seventy (270) calendar days of Notice to Proceed. Five Hundred Dollars ($500.00) per calendar day is hereby agreed upon as the Liquidated Damages.

Check, Cash, or Bond is attached in the amount of $_____.

The undersigned Bidder further proposes and agrees to commence the work promptly upon notice to proceed, with adequate forces.

The Bidder acknowledges receipt of the following addenda:
Addendum No.___ Dated _____
Addendum No.___ Dated _____
Addendum No.___ Dated _____
Addendum No.___ Dated _____
Addendum No.___ Dated _____

The undersigned has enclosed the following with this Proposal:
_____ Bid Bond or Bid Deposit
_____ M/WBE Form I or Form II
_____ Certificate of Nondiscrimination
_____ Certificate of Compliance with the Americans With Disabilities Act
_____ MWBE Good Faith Form

CONTRACTOR:_____

ADDRESS:_____

_____

_____

BY: _____

TTTLE:_____

Print Name:_____

N.C. License Number:_____

SECTION 01 23 00 – ALTERNATES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide all labor, materials, necessary equipment and services to complete the Total Base Bid and Alternates work, as indicated on the drawings, as specified herein or both except as for items specifically indicated as "NIC ITEMS". Contractors are responsible for payment of all applicable fees and taxes in association with their contract.

1.02 USE OF ALTERNATES

A. Submit alternate/total base bid proposals as described herein and in the "Bid Form" stating the total difference in cost to the stipulated Lump Sum Bid for adding or deducting the following alternates to that specified and/or shown on the drawings.

1. Include all applicable omissions, additions, and adjustments of all other applicable trades as required.

1.03 DESCRIPTION OF UNIT PRICES (See Single Prime General Contract Proposal)

A. Include on the Form of Proposal the proposed Total Base Contract Sum, which shall represent the total cost of the Work, including all allowances but excluding all alternates. Also show separately on the Form of Proposal the amounts proposed to be added to or deducted from the Total Base Contract Sum if the Owner accepts particular alternates.

B. Limits of Total Base Bid and Alternates: Alternates are outlined below for the purpose of overall coordination. Note: all contractors shall include in the base bid amounts any and all expense anticipated for the project including all taxes and fees.

C. The Owner reserves the right to accept any alternate and to amend the Contract accordingly, provided the order to proceed with such alternative Work is issued within 60 days after execution of the Contract.

PART 2 - PRODUCTS

2.01 SCHEDULE OF ALTERNATES

A. Alternate #1 (Deduct) – Sand Filter Conversion
   a. Convert proposed skimmer sediment basin into final Sand Filter BMP configuration. Scope of work shall also include an as-built BMP survey provided by the contractor that meets the requirements of the Mecklenburg County Post-Construction Storm Water Ordinance.

2.02 ACCEPTABLE MANUFACTURERS AND MATERIALS

A. The bidder shall utilize all materials and products specified for the base bid in all of the construction for the accepted alternates, or pre-approved equal.

PART 3 - EXECUTION

3.01 A. All construction shall be in strict accordance with manufacturer's printed standards, recommendations and specifications.

END OF SECTION 01 23 00

# SUBSTITUTION REQUEST
(During the Bidding/Negotiating Stage)

| | | | |
|---|---|---|---|
| Project: | Bailey Road Park Expansion - Phase 1 | Substitution Request Number: | Spec-0057236 |
| | Cornelius, NC | From: | Paulette Hogan, ICP Building Solutions Group |
| To: | Troy Fitzsimmons , Town of Cornelius | Date: | 04/30/2024 |
| | tfitzsimmons@cornelius.org, 7048926031 | A/E Project Number: | |
| Re: | Pickleball & Tennis Courts_ | Contract For: | Town of Cornelius |

Specification Title: Pickleball & Tennis Courts_ Description: Acrylic Surfacing System Materials

Section: 321810 Page: 225 Article/Paragraph: Part 2, 2.4

Proposed Substitution: Plexipave , DecoColor

Manufacturer: ICP Building Solutions Group Corporate HQ: 150 Dascomb RD. Andover, MA 01810 Phone: (800) 225-1141

Trade Name: Plexipave , DecoColor Model No.: N/A

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

**The Undersigned certifies:**

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.

Submitted by: Paulette Hogan

Signed by: Paulette Hogan

Firm: ICP Building Solutions Group

Address:

, MA

Telephone: , phogan@icpgroup.com

**A/E' s REVIEW AND ACTION**

☐ Substitution approved - Make submittals in accordance with Specification Substitution Procedures.

☒ Substitution approved as noted - Make submittals in accordance with Specification Substitution Procedures.

☐ Substitution rejected - Use specified materials.

☐ Substitution Request received too late - Use specified materials.

**Signed by:** Daniel Jones, PE **Date:** 2024.05.03

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☒ Addendum #1

**CSI Form 13.1A**

# GEOTECHNICAL ENGINEERING REPORT

BAILEY ROAD PARK TENNIS COURTS

CORNELIUS, NORTH CAROLINA

**PREPARED FOR:**

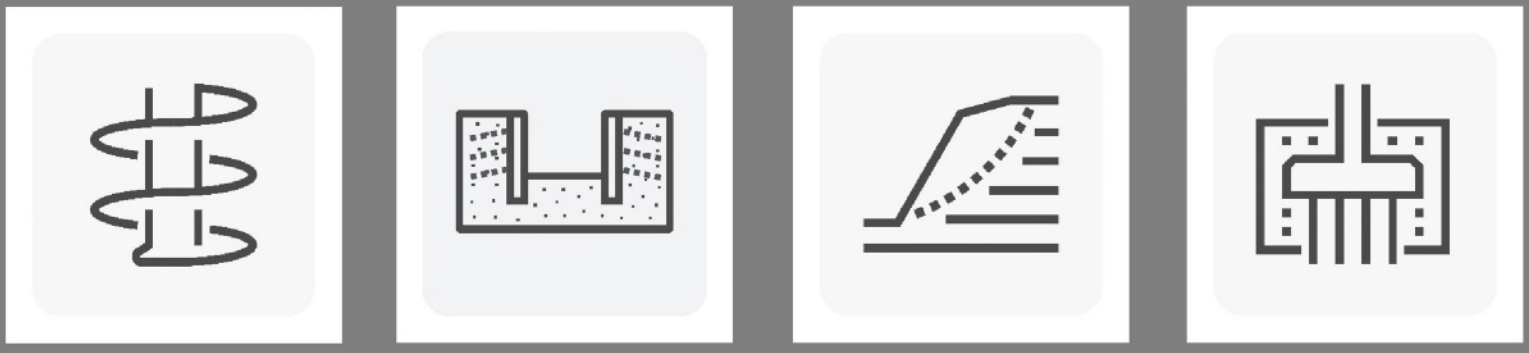
TOWN OF CORNELIUS

P.O BOX 399

CORNELIUS, NORTH CAROLINA 28031

MAY 5, 2023

CG2 PROJECT NUMBER: 240023184



CAROLINAS GEOTECHNICAL GROUP

CAROLINAS GEOTECHNICAL GROUP

N.C. Firm License: P-1904

2400 Crownpoint Executive Drive
Suite 800
Charlotte, NC 28227

(980) 339-8684
contact@carolinasgeotech.com
www.carolinasgeotech.com

May 5, 2023

Mr. Adam Abernathy
Town of Cornelius
P.O. Box 399
Cornelius, North Carolina

SUBJECT: **Geotechnical Engineering Report**
**Bailey Road Park Tennis Courts**
Cornelius, North Carolina
CG2 Project No.: 240023184

Dear Mr. Abernathy:

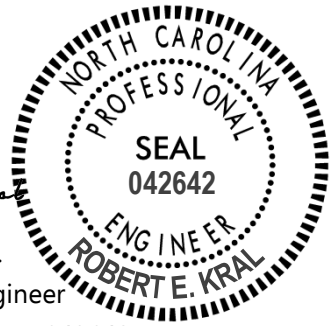
Carolinas Geotechnical Group, PLLC (CG2) has completed the subsurface exploration for the proposed project in Cornelius, North Carolina. Our services were performed in general accordance with CG2 Proposal No. 2023245, Revision No. 1 dated March 10, 2023, and Professional Services Contract between Town of Cornelius and CG2 executed on March 14, 2023. This report contains the results of our subsurface exploration, site characterization, engineering analyses, and geotechnical recommendations for the proposed construction based on the project information provided.

We have enjoyed assisting you and look forward to working with you again on future projects. If you have any questions concerning this report, please contact us.

Sincerely,
**Carolinas Geotechnical Group, PLLC**

DocuSigned by:
C. Tyler Wenner
4FD0DB3B7114451...
C. Tyler Wenner, P.G.
Project Manager

DocuSigned by:
Robert E Kral
8AD703B2A8484F4...
Robert E. Kral, P.E.
Senior Project Engineer
N.C. Registration No. 042642



## TABLE OF CONTENTS



**Attachments:**

Test Location Plan with Site Vicinity Map, Figure 1
Key to Symbols
Test Boring Records

## SCOPE OF WORK

CG2 was requested to perform a total of eleven (11) Standard Penetration Test (SPT) borings at the locations shown on "Test Location Plan with Site Vicinity Map," Figure No. 1 in the Appendix. This report presents our exploration and testing procedures, findings and geotechnical recommendations, and includes the following:

- A brief description of the project site,
- Information on the site conditions encountered during the exploration and geologic information relevant to the project area,
- A description of the field exploration methodology and summary of the subsurface conditions encountered,
- Our opinions and evaluations of the encountered on-site soils and their suitability for use as structural fill, support of shallow foundations, support of slab-on-grade, tennis court and parking and driveway pavement considerations, and,
- Our recommendations for site preparation and testing during construction activities.

The scope of this geotechnical exploration did not include an environmental site assessment (ESA), wetlands delineation, seismic site classification, retaining wall design, or pavement design.

## PROJECT AND SITE INFORMATION

Our understanding of the project is based on civil plans titled, "Bailey Road Park – Tennis Court Concept Plan" prepared by ColeJenest & Stone dated October 13, 2022, received via email on March 10, 2023, from Mr. Adam Abernathy with the Town of Cornelius. We understand plans are to improve the site at 11536 Bailey Road in Cornelius, North Carolina with 12 tennis courts, a restroom building, parking areas, drives, and associated infrastructure. One retaining wall is planned to provide proper grade separation at the northwest corner of the site (reference the attached Test Location Plan with Site Vicinity Map, Figure 1). Proposed retaining wall height, grading information, and/or anticipated structural loading of the proposed structures have not been provided to us at this time. The site is currently wooded with open grassed areas to the south. Existing topography slopes to the northwest with elevations ranging from 778 to 812 feet MSL.

## EXPLORATION SUMMARY AND PROCEDURES

Test locations were located in the field by a representative of CG2 using a handheld GPS. The location information shown on the soil test boring records in the Appendix was not surveyed and should be considered approximate. Prior to our mobilization to the site, utilities in the vicinity of the test locations were located by NC 811 One-Call.

CG2 performed eleven (11) SPT soil test borings, designated as B-1 through B-11, to depths ranging from approximately 15 to 25 feet below the existing ground surface (bgs). A CME 550X drill rig, equipped with an automatic hammer, was used to mechanically advance hollow-stem augers to the boring depths. The SPT soil test borings were drilled in general accordance with ASTM D-1586, "*Penetration Test and Split-Barrel Sampling of Soils.*" At regular intervals, the drilling tools were removed, and soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-spoon sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling approximately 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance" or "N-Value." The N-Value, when properly interpreted, is an index to the soil strength and density.

Representative portions of the soil samples were placed in plastic bags and transported to our office for potential laboratory testing and classification by a CG2 geologist in general accordance with the Unified Soil Classification System (USCS) and ASTM D 2488

Soil test boring records, included in the Appendix, graphically show the penetration resistances and groundwater levels, and present the soil descriptions for the collected samples. The stratification lines and depth designations on the soil test boring records represent the approximate boundaries between different soil types, which may not be representative of the actual boundaries.

## LABORATORY SERVICES

Three (3) representative soil samples obtained during the exploration were subject to laboratory testing. Laboratory tests performed included:

- Atterberg limits
- Grain size distribution (with hydrometer)
- Natural moisture content

Laboratory test results are summarized in Table No. 1 and are attached in the Appendix.

*Table No. 1: Laboratory Test Results*

| Sample Location | Depth (ft.) | USCS Classification | L.L. (%) | P.I. (%) | Fines (%) | Natural Moisture (%) |
|---|---|---|---|---|---|---|
| B-4 | 1.0-2.5 | MH | 78 | 41 | 78.8 | 28.2 |

| Sample Location | Depth (ft.) | USCS Classification | L.L. (%) | P.I. (%) | Fines (%) | Natural Moisture (%) |
|---|---|---|---|---|---|---|
| B-8 | 3.5-5.0 | MH | 62 | 17 | 84.2 | 29.4 |
| B-10 | 6.0-7.5 | MH | 55 | 10 | 81.5 | 29.7 |

## SUBSURFACE CONDITIONS

*Local Physiographic Conditions and Geology*

The project site is located within the Piedmont Physiographic Province of North Carolina. The Piedmont Physiographic Province generally consists of mountain ranges and valleys which are intertwined with an established system of draws and streams. The Piedmont Physiographic Province is predominately underlain by metamorphic rock (formed by heat, pressure and/or chemical action), which was initially formed during the Late Paleozoic era. According to the 1985 Geologic Map of North Carolina, the project site is underlain by metamorphosed quartz diorite.

Much of the topography found throughout the Piedmont Physiographic Province has developed from differential weathering of predominantly metamorphic rock formations. Due to the continued chemical and physical weathering, the parent rock in the Piedmont Physiographic Province is generally covered with a mantle of soil that has weathered in-place from the parent rock below. These soils have variable thicknesses and are commonly referred to as residual soils. Residual soils in this area typically contain higher fines content near the ground surface due to more advanced weathering and contain larger particle sizes with increasing depth becoming more coarse-grained as the amount of weathering decreases. As weathering decreases with depth, residual soils generally retain the overall appearance, texture, gradation, and foliations of the parent rock. The boundary between soil and rock is not sharply defined and is termed "partially weathered rock" (PWR). PWR is normally found overlying the parent bedrock. PWR is defined, for engineering purposes, as residual material with N-Values in excess of 50 blows per 6 inches, or 100 blows per foot (bpf). Weathering is facilitated by fractures, joints, and the presence of less resistant rock types. The profile of PWR and bedrock is quite irregular and erratic, even over short horizontal distances. It is also common to find lenses and boulders of hard rock and zones of PWR within the soil mantle above the general bedrock level.

*Interpreted Subsurface Profile*

Subsurface conditions as indicated by the borings generally consist of topsoil underlain by fill or residual soils. The generalized subsurface conditions at the site are described below and are shown on the attached soil test boring records. For more detailed soil descriptions and stratifications at a particular test location, the associated soil test boring record should be reviewed.

A layer of topsoil approximately 6 inches thick was encountered in each boring (B-1 through B-11). The thickness of topsoil or similar organic laden materials may be greater or less between the relatively widely spaced boring locations.

Fill soils are those that were placed or manipulated by man prior to this exploration. Existing fill soils were encountered in Borings B-1 and B-11 to depths of approximately 3.0 and 5.5 feet bgs, respectively. The fill soils encountered consisted of very stiff elastic silts (MH). N-Values obtained in the existing fill soils ranged from 21 to 23 bpf.

Residual soils were encountered underlying the topsoil in Borings B-2 through B-10 and the existing fill in Borings B-1 and B-11. The residual soils encountered generally consisted medium stiff to very stiff sandy silt (ML), elastic silt (MH), and clay (CL), and loose to very dense silty sand (SM) and clayey sand (SC). N-Values obtained in the residual soils ranged from 8 to 51 bpf, with the majority greater than 10 bpf. Each boring was terminated within the residual soils at depths ranging from approximately 15 to 25 feet bgs.

*Groundwater*

Groundwater level measurements were attempted at the completion of each boring, at which time the borings were dry. Borings B-1, B-2, B-5, B-6, B-8, and B-11 were left open until the end of the workday and Borings B-3, B-4, B-7, B-9, and B-10 were left open for at least 24-hours, at which time water level measurements were attempted and each boring remained dry. The borings were backfilled with auger cuttings to match existing grades following completion of water level measurements. Moisture descriptions of the soil samples encountered in the borings were noted as dry to moist. The presence of moist/wet soils can indicate the proximity to the natural groundwater elevation. Also, soils that are observed to be moist or wet sometimes require additional manipulation of the soil moisture during construction to obtain the specified level of compaction.

We observed bottom of borehole/cave-in depths within the borings ranging from 12.4 to 22.7 feet bgs. Cave-in depth may be an indicator of the presence of groundwater. Water levels tend to fluctuate with seasonal and climatic variations, as well as with some types of construction operations. Therefore, groundwater may be encountered during construction at depths not indicated by the borings.

## SITE PREPARATION AND EARTHWORK

Vegetation, root systems, topsoil, loose/soft soils, cobbles and boulders, and other deleterious non-soil materials should be stripped from proposed construction areas. After clearing and stripping, areas intended to support structures, including new fill, should be carefully assessed by a qualified geotechnical engineer or their representative.

Excavations created below subgrade levels during the construction should be backfilled with compacted soil or aggregate fill placed in accordance with the recommendations of this report.

We recommend proof rolling subgrades for roadways, parking areas, building pads, retaining walls, tennis court areas, and areas to receive compacted fill (if practical) as discussed below to identify soft subgrade areas. Proof rolling should be done after a suitable period of dry weather to avoid degrading an otherwise acceptable

subgrade. Proof rolling should be performed with a heavily loaded dump truck or with similar approved construction equipment. The proof rolling equipment should make at least four passes over each section, with the last two passes perpendicular to the first two where practical.

We recommend exposed subgrades and proof rolling operations be observed and documented by qualified geotechnical personnel. We recommend actual subgrade stabilization requirements, if deemed necessary, be determined at the time of site preparation, based on observations of the subgrade and the stability of the subgrades as determined during proof rolling or other methods determined at time of construction. Loose, soft, organic, highly plastic, excessively wet soils that pump, rut, or wave during site grading or proof rolling operations should be removed or stabilized.

If soft soils are encountered in roadways, parking areas, building pads, retaining walls, tennis court areas, and areas to receive compacted fill, they are typically mitigated by undercutting the soft soils to expose competent soils and then backfilling with compacted fill to plan subgrade levels or by undercutting poor subgrade soils to some depth and then placing a high-modulus geotextile, geogrid, and/or layer of aggregate or other approved granular material to establish a stable platform upon which to backfill with compacted fill. We anticipate that some undercutting and/or stabilization may be required during site grading.

Fine-grained silty and clayey soils that may be encountered near the ground surface will not support construction traffic as they get wet. Therefore, where these soils are encountered the contractor should anticipate additional subgrade stabilization will be required during and shortly after wet periods to repair fine-grained soil subgrade areas damaged by construction traffic.

*Previous Site Development*

Based on a review of aerial imagery dating back to 1985 and our observations while on-site, it appears the site was previously cleared and utilized for agricultural purposes. Unexpected conditions can exist with previously developed sites, which may include abandoned foundations and slabs, active or abandoned utility lines, potential septic systems, water wells, underground storage tanks, previously placed fill which has the potential to be debris-laden or poorly compacted, deleterious materials, cultivated soils, and other unforeseen adverse subsurface conditions. We recommend the site be thoroughly evaluated by a representative of the geotechnical engineer at the time of construction to reduce the risk associated with such conditions. The evaluation may include additional soil test borings, test pit excavations, hand auger borings with DCP testing, and/or proof rolling.

*Existing Fill*

Existing fill was encountered in Borings B-1 and B-11 to depths of approximately 3 and 5.5 feet bgs, respectively. The fill soils encountered consisted of very stiff elastic silts (MH). N-Values obtained in the existing fill soils ranged from 21 to 23 bpf and did not appear to contain organics, debris, or other deleterious material. Due to the limited exploration performed and the relatively wide spacing of the borings, the possibility of

deleterious inclusions cannot be ruled out. If existing fill soils are encountered during construction that contain deleterious materials, organics, debris, voids, or soft lenses, there is an increased risk of excessive long-term settlement of structures and/or pavement distress. In the opinion of CG2, the existing fill presents a relatively low risk to the proposed development, however, based on manual manipulation and visual classification, the fill consists of MH. See the *Expansive Soils* section of this report for additional information regarding highly plastic/elastic soils.

We recommend that the extent and consistency of existing fill soils be thoroughly evaluated during construction for this property through soil test borings, test pits, or other methods. If engineering records indicating soil compaction testing of the existing fill are available, we request the opportunity to review any available soil test records for the project site.

### *Expansive Soils*

Based on laboratory testing as well as manual manipulation/visual classification of the soils recovered from the soil test borings, elastic (MH) fill and residual soils were encountered in Borings B-1, B-2, B-4 through B-6, B-8, and B-9 through B-11. The expansive soils extend to depths ranging approximately 5.5 to 20 feet bgs. Given the limited nature of the exploration, these soils may be present on-site in areas that were not explored during our field services. High plasticity/elasticity soils can undergo change in volume (shrink/swell) with changes in their moisture content. The presence of moderately to high plasticity material can adversely affect the performance of the foundations, slabs-on-grade, and pavements. Therefore, these materials should be carefully evaluated when encountered beneath the structures which could be affected by soil movement.

An evaluation by the geotechnical engineer's representative should be performed during construction to help reduce the potential of elastic/plastic materials from underlying structural areas. Based on our experience, high plasticity/elasticity soils are very sensitive to moisture variations and tend to break down under construction traffic when left exposed to inclement weather. We recommend providing and maintaining proper drainage in general accordance with the recommendations presented in the *Drainage Control* section of this report.

Where high plasticity soils are encountered in structural and pavement areas, we recommend the following options be considered:

- Undercut high plasticity soils to provide at least 3 feet of vertical separation between stable soils and foundation bearing elevations or 2 feet below pavement subgrade elevations. Undercut of high plasticity soils should extend (horizontally) 10 feet beyond structural limits and 5 feet beyond pavement limits, respectively. Separation material should consist of newly placed structural fill.
- Mix high plasticity with less plastic/elastic soils to lower the overall PI of the plastic/elastic soils. The success of mixing will be dependent on the means and methods used by the contractor. If the owner elects to mix soil types, representative samples of the mixed soil should be collected

for laboratory testing to determine the mixed soil suitability for reuse as structural fill. Based on the results of the Borings, soils suitable for use in mixing, such as SM, may be encountered on-site. Reference the *Fill Placement and Compaction* section of this report for structural fill parameters.

- Lime stabilization of high plasticity soils in the proposed structure and pavement subgrades.

Swell testing of high plasticity soils was beyond our scope of services; however, swell testing could be performed to determine the high plasticity soil susceptibility to shrink/swell with moisture variations.

### *Fill Placement and Compaction*

Prior to fill placement, representative samples of the proposed structural fill material(s) should be collected and tested by a qualified testing firm to determine the material's moisture-density characteristics (including, the maximum dry density, optimum water content, gradation, and Atterberg limits). These tests will aid in the quality control during construction.

Fill in structural areas should be relatively free of organics, roots, or other deleterious materials and should generally not be used in structural areas if the soils:

- Contain more than five percent (by weight) organic material;
- Have a liquid limit (LL) greater than 50 or plasticity index (PI) greater than 30;
- Contain particles greater than 4 inches in diameter; or
- Have a maximum dry density less than 90 pounds per cubic foot based on standard Proctor (ASTM D 698).

Soils meeting the criteria listed above may be used in landscaped or non-structural areas. Compacted structural fill should consist of material classified as CL, ML, SC, SM, or GW per ASTM D-2487. High plasticity soils such as CH and MH materials are generally not recommended for use as structural fill due to their low strength characteristics and moisture sensitivity. Soils imported from off-site sources should also meet similar classification requirements and be approved by the geotechnical engineer prior to use. Successful reuse of the excavated, on-site soils as compacted structural fill will depend on the water content and the plasticity of the soils encountered during excavation.

During fill placement, a qualified soils technician should perform field density tests to document the degree of compaction being obtained in the field. Structural fills should be placed in thin, 8-inch loose lifts and compacted to the following recommendations:

- Upper 12 inches below the final subgrade elevation:
  - 98% of the soil's standard Proctor maximum dry density (ASTM Test Method D-698) at or near optimum water content: maximum deviation of ±3 percent.

- Depths below 12 inches:
  - 95% of the soil's standard Proctor maximum dry density (ASTM Test Method D-698) at or near optimum water content: maximum deviation of ±3 percent.

Moisture conditioning may be required by the contractor during the construction to obtain the required percent compaction. Regular field verification should be performed to ensure the most representative Proctor curve is being selected. Density testing should be performed at regular intervals on a full-time basis by a qualified field technician working under the direction of a qualified construction testing firm.

*Drainage Control*

Proper drainage of the construction area is important to the integrity of the subgrade soils. If free water is permitted to stand on stable subgrade soils, these soils can absorb water, swell, and experience a reduction in their support capability. As a result, we recommend that the subgrade surface be graded to provide positive drainage away from the construction areas and towards suitable drainage handling areas, such as a perimeter ditch, French drain, or culvert.

The contractor should exercise care after structural fills have been placed and compacted. If water is permitted to stand on the surface, these soils may become saturated. Excess movement of construction traffic on saturated subgrades can cause rutting and damage the surface integrity of the structural fill. Once the integrity of the subgrade is destroyed, mobility of construction traffic may become difficult or impossible. Therefore, the fill surface should be sloped to achieve positive drainage and to minimize water from ponding on the surface.

*Cut and Fill Slopes*

We recommend that construction of any cut and fill slopes should be no steeper than 2H:1V (horizontal to vertical). If steeper slopes are required, detailed slope stability analyses should be performed. The tops and bases of all slopes should be located a minimum of 10 feet from structural limits and a minimum of 5 feet from pavement limits. To prevent shallow surface failures on the exposed slope faces, we also recommend that the soils exposed on all slope faces be compacted with track-mounted equipment prior to final seeding and mulching. Surface water runoff should be directed away from the slopes.

*Temporary Excavations*

Excavations required for construction of this project must be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations) or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas and protective systems by a "competent person" for evidence of situations that could result in cave-ins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, building supplies, etc., should be placed away from the edges of the excavation at a distance equaling or

exceeding the depth of the excavation. CG2 cautions that the actual excavation slopes will need to be evaluated frequently each day by the "competent person" and flatter slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation specific circumstances. The contractor is responsible for providing the "competent person" and all aspects of site excavation safety. CG2 can evaluate specific excavation slope situations if we are informed and requested by the owner, designer, or contractor's "competent person."

## FOUNDATION SUPPORT

*Shallow Foundations*

Based on the results of the Borings, the site appears adaptable for support of shallow foundations with a contact pressure of up to 2,500 pounds per square foot (psf) bearing on suitable residual soils exhibiting N-values of at least 8 bpf or newly placed structural fill. As discussed, existing fill soils were encountered in Borings B-1 and B-11. The existing fill soils appear adaptable for support of shallow foundations with a contact pressure of up to 2,500 (psf) provided the soils are free of deleterious materials, organics, voids, or soft lenses and prepared in accordance with the recommendations presented herein. We anticipate that localized undercut and replacement of the existing fill, soft/wet near surface soils, highly plastic/elastic, or organic laden near surface soils may be required to reach bearing surface for shallow foundations. Replacement of the undercut areas should consist of compacted structural fill, lean concrete, or #57 washed stone fully wrapped in nonwoven geotextile fabric.

Based on the general stratigraphy in the construction areas, experience with similar projects, and anticipated lightly loaded structures, it is our opinion that the total and differential settlement potentials for the proposed structures should be on the order of 1 inch and ½ inch, respectively. This conclusion is contingent upon compliance with the site preparation and fill placement recommendations outlined in this report.

Suitable bearing should be documented in the actual footing during construction. We recommend that the near-surface bearing soils be evaluated by an experienced testing firm using hand auger borings with DCP testing equipment or other suitable methods prior to foundation installation. We recommend that individual foundations be concreted as soon after the evaluation as possible to minimize potential disturbance of the bearing soils. During construction, soils that do not meet suitable bearing conditions for structure support should be undercut to suitable bearing soils. The actual means of undercut and/or stabilization should be determined at the time of construction.

Wall and column footings should extend a minimum depth of 12 inches below external grades for bearing considerations and frost protection. The column and wall footings should have a minimum width of 24 and 18 inches, respectively, regardless of loading to prevent a punching shear failure of the foundation bearing soils.

Loose or soft material, standing water, frozen soils, and debris should not be present in the footing at the time of concrete placement. If the foundation excavation subgrade soils must remain exposed overnight or during inclement weather, we recommend a protective barrier consisting of 2 to 3 inches of lean concrete or similar product be placed on the bearing soils.

## SITE RETAINING WALLS

We understand that one retaining wall will be required to provide proper grade separation along the northwest portion of the proposed tennis courts. Due to the preliminary nature of the project, the proposed wall type has not been provided to us. For the purpose of this report, we have assumed the wall will be constructed as a mechanically stabilized earth (MSE) retaining wall. The results of the Borings B-5 and B-6 borings performed near proposed wall location indicate a net allowable bearing pressure of up to 2,500 psf can be used for design of the wall bearing on residual soils. The foundation soils should be evaluated during construction by a qualified construction testing firm. Wall foundation soils should be undercut as necessary to provide uniform support of the wall bearing on suitable foundation soils. The undercut should extend at least 3 feet beyond the face and heel of the retaining wall.

### *Retaining Wall Parameters*

Retaining walls that are unrestrained and free to bend or rotate and thus mobilize soil strength may consider the active earth pressure coefficient ($K_a$). If below grade walls will be restrained such that the walls cannot bend or rotate, then the at-rest earth pressure coefficient ($K_0$) should be used for the design. We recommend the parameters presented in Table No. 2 be used for the development of lateral earth pressure on the chosen retaining wall design.

**Table No. 2: Lateral Earth Pressure Parameters**

| Material | Friction Angle (Φ') degrees | Moist Unit Weight (γ) lb/ft$^3$ | $K_a$ | $K_0$ |
|---|---|---|---|---|
| Compacted Structural Fill | 28 | 120 | 0.36 | 0.57 |
| Graded Aggregate | 38 | 145 | 0.24 | 0.44 |
| AASHTO #57 Stone | 40 | 105 | 0.22 | 0.41 |

*Retaining Wall Drainage*

Walls should be designed with a drainage system that prevents the building of hydrostatic pressures behind the wall in the active pressure zone regardless of the wall type selected. The drainage system should allow groundwater entering from the retained soils to exit the wall without transporting the fine soil materials through the wall or saturating the reinforced backfill zone in MSE walls. If compacted structural fill is used to backfill the retaining wall, a vertical chimney drain could be incorporated between the wall and backfill for gravity walls or between the reinforced zone and retained soil for MSE walls. Weepholes and daylighting the corrugated drainage pipe system should be installed periodically across concrete and MSE walls, respectively. If AASHTO #57 stone is used, a filter geotextile should be installed to serve as a barrier to prevent the migration of fine materials into the stone.

Surface drainage on top of the wall should not be allowed to enter the subsurface drains. We recommend that surface water be collected behind the top of the wall and directed away from the wall into drop inlets or other methods to prevent flow of water over the face of the wall. Outlets should be placed in areas that will avoid erosion near the base of the wall and water should always drain away from the wall.

*Retaining Wall Construction*

Retaining wall backfill should consist of free draining material. We recommend excluding highly plastic soils, organic soils, or soils with high fines content (greater than 50%) from the reinforced zone. We recommend a minimum wall embedment of 2 feet for all retaining wall types with retained soil heights in excess of 4 feet. Additional wall embedment may be required at wall locations containing a slope in front of the wall or when the external stability of the wall warrants the additional embedment. Walls in excess of 4 feet should be designed and plans sealed by a geotechnical engineer.

We recommend that heavy construction equipment be kept a minimum of 5 feet horizontally from the face of any project walls. This may require the contractor to use lighter compaction equipment behind the wall face.

## PAVEMENTS AND TENNIS COURT AREAS

We recommend providing adequate drainage away from pavement and tennis court areas to reduce infiltration of surface water to the base course or subgrade materials. If the subgrade materials are allowed to become saturated during the life of the pavement section, then there will be a strength reduction of the materials that could result in a reduced life of the pavement section. All water should be routed away from the pavement and tennis court areas and adequate slopes provided to maintain drainage off site. The subgrade soils for pavement and tennis court areas should be evaluated by proof roll or other approved methods prior to placing structural fill and/or base course. Areas that pump, rut, wave, or are soft should be undercut to stable bearing elevation and replaced with suitable structural fill or additional stone base. Based on the conditions encountered within the soil test borings, a CBR value of 4% may be used for preliminary pavement design. A design CBR value should be confirmed prior to construction of pavement systems. Actual

pavement designs were beyond the accepted scope of work but can be provided as a supplemental scope of work, upon request.

## LIMITATIONS

The recommendations presented herein have been developed on the basis of the subsurface conditions encountered during the field investigation and our understanding of the proposed construction. Should changes in the project criteria occur or additional information becomes available, a review must be made by CG2 to determine if modifications to our recommendations will be required.

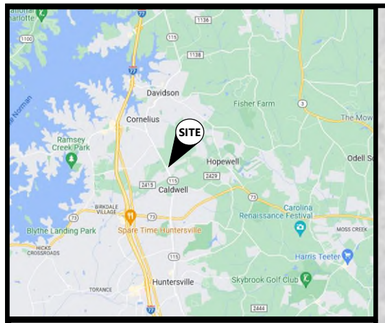
CG2 should be retained to review the design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications.

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

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

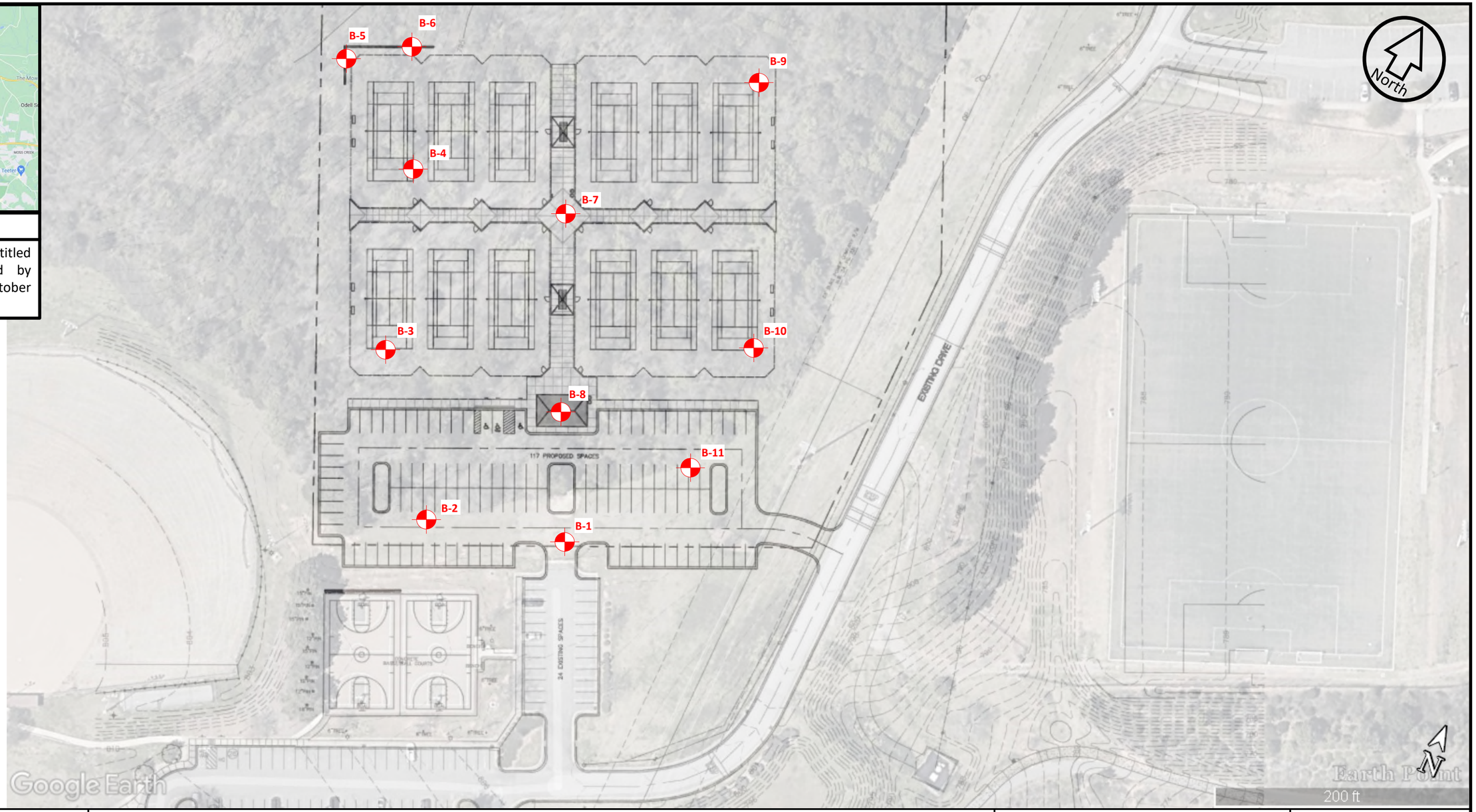
This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless CG2 reviews the changes and either verifies or modifies the conclusions of this report in writing.

# ATTACHMENTS




Site Vicinity Map

Based on Sheet C-400 of plans titled "Bailey Road Park" Prepared by ColeJenest & Stone, PA dated October 13, 2022




**LEGEND**

APPROXIMATE TEST LOCATION

**TEST LOCATION PLAN WITH SITE VICINITY MAP**

**Bailey Road Park Tennis Courts**

**CG2 Project No. 240023184**

| | |
|---|---|
| SCALE: | NTS |
| DRAWN BY: | CTW |
| CHECKED BY: | REK |
| DATE: | May 5, 2023 |

FIGURE NO.

1

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# KEYS TO SYMBOLS

***LITHOLOGIC SYMBOLS (Unified Soil Classification System)***


ASPHALT: Asphalt


BLDRCBBL: Boulders and cobbles


CH: USCS High Plasticity Clay


CL: USCS Low Plasticity Clay


CL-CH: USCS Low to High Plasticity Clay


CLG: USCS Low Plasticity Gravelly Clay


CL-ML: USCS Low Plasticity Silty Clay


CLS: USCS Low Plasticity Sandy Clay


FILL: Fill


GC: USCS Clayey Gravel


GM: USCS Silty Gravel


GP: USCS Poorly-graded Gravel


GP-GC: USCS Poorly-graded Gravel with Clay


GP-GM: USCS Poorly-graded Gravel with Silt


GPS: USCS Poorly-graded Sandy Gravel


GW: USCS Well-graded Gravel


GW-GC: USCS Well-graded Gravel with Clay


GW-GM: USCS Well-graded Gravel with Silt


GWS: USCS Well-graded Sandy Gravel


MH: USCS Elastic Silt


ML: USCS Silt


MLG: USCS Gravelly Silt


MLS: USCS Sandy Silt


PARTIALLY WEATHERED ROCK


SC: USCS Clayey Sand


SC-SM: USCS Clayey Sand


SM: USCS Silty Sand


SP: USCS Poorly-graded Sand


SPG: USCS Poorly-graded Gravelly Sand


SP-SC: USCS Poorly-graded Sand with Clay


SP-SM: USCS Poorly-graded Sand with Silt


SW: USCS Well-graded Sand


SWG: USCS Well-graded Gravelly Sand


SW-SC: USCS Well-graded Sand with Clay


LIMESTONE: Limestone


OLSH: USCS Low Plasticity Organic Silt or Clay with Shells

***ABBREVIATIONS***

LL - Liquid Limit
PI - Plastic Index
W - Moisture Content (%)
DD - Dry Density (PCF)
NP - Non-Plastic
UC - Unconfined Compression
-200 - Percent Passing No.200 Sieve

▽ - Water Level at Time Drilling, or as Shown
▼ - Water Level at End of Drilling, or as Shown
▼ - Water Level After 24 Hours, or as Shown

***Correlation of Penetration Resistance with Relative Density and Consistency***

| SAND & GRAVEL | | SILT & CLAY | |
|---|---|---|---|
| No. of Blows | Consistency | No. of Blows | Consistency |
| 0 - 4 | Very Loose | 0 - 2 | Very Soft |
| 5 - 10 | Loose | 3 - 4 | Soft |
| 11 - 30 | Medium Dense | 5 - 8 | Medium Stiff |
| 30 - 50 | Dense | 9 - 15 | Stiff |
| over 50 | Very Dense | 16 - 30 | Very Stiff |
| | | over 30 | Hard |

***SAMPLER SYMBOLS***


Auger Cuttings


Split Spoon


Rock Core


Shelby Tube


Standard Penetration Test

***Boundary Classifications: Soils possessing characteristics of two groups are designated by combinations of group symbols***

| SILT or CLAY | SAND | | | GRAVEL | | Cobbles | Boulders |
|---|---|---|---|---|---|---|---|
| | Fine | Medium | Coarse | Fine | Coarse | | |

No.200 No.40 No.10 No.4 ¾" 3" 12"

**U.S. Standard Sieve Size**

*Reference: "Classifications of Soils for Engineering Purposes (United Soil Classification System) ASTM D 2487, and/or "Description and Identification of Soils" (Visual-Manual Procedure), ASTM D 2488.*

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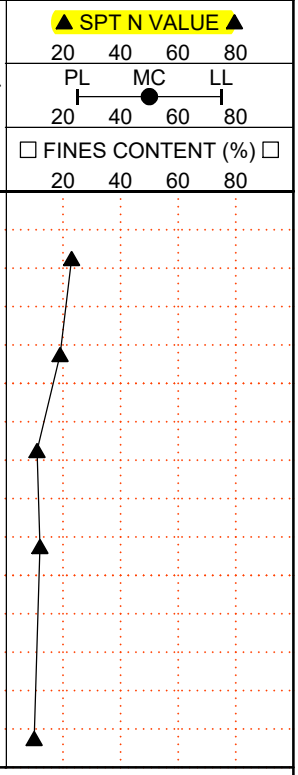
# BORING NUMBER B-1



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- END OF DAY - DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629172 ft **EASTING** 1450984 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | |
| | | **FILL:** Very Stiff, Orange-Tan, Elastic SILT with Sand (MH) | SS 1 | 18 | 8-10-13 (23) | M |
| | | **RESIDUAL:** Very Stiff, Orange-Tan, Elastic SILT with Sand (MH) | SS 2 | 18 | 6-8-11 (19) | M |
| 5 | | Stiff, Orange-Tan, Fine Sandy SILT (ML), trace mica | SS 3 | 18 | 3-4-7 (11) | M |
| | | | SS 4 | 18 | 5-5-7 (12) | M |
| 10 | | End of Day Cave-in: 13.0 | | | | |
| 15 | | | SS 5 | 18 | 3-4-6 (10) | M |

Boring terminated at a depth of 15.0 feet.



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# BORING NUMBER B-2



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- END OF DAY - DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629147 ft **EASTING** 1450876 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description | ▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80 |
|---|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | | |
| | | **RESIDUAL:** Stiff to Very Stiff, Orange-Tan, Elastic SILT with Sand (MH), trace mica | SS 1 | 18 | 5-7-9 (16) | M | |
| | | | SS 2 | 18 | 4-4-5 (9) | M | |
| 5 | | Stiff, Orange-Tan, Fine Sandy SILT (ML), trace mica | SS 3 | 18 | 4-5-8 (13) | M | |
| | | | SS 4 | 18 | 5-6-8 (14) | M | |
| 10 | | End of Day Cave-in: 12.6 | | | | | |
| | | | SS 5 | 18 | 4-6-5 (11) | M | |
| 15 | | Boring terminated at a depth of 15.0 feet. | | | | | |

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# BORING NUMBER B-3



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629257 ft **EASTING** 1450798 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | |
| | | **RESIDUAL:** Very Stiff, Red, Fine to Medium Sandy CLAY (CL) | SS 1 | 18 | 4-5-13 (18) | M |
| | | Very Dense, Red-Brown, Silty Fine to Coarse SAND (SM) | SS 2 | 8 | 16-28-23 (51) | D |
| 5 | | | | | | |
| | | Stiff to Very Stiff, Tan, Fine Sandy SILT (ML) | SS 3 | 12 | 6-7-8 (15) | D |
| | | | SS 4 | 14 | 7-12-14 (26) | D |
| 10 | | | | | | |
| | | Stiff, Purple-Red, SILT (ML), trace mica | SS 5 | 18 | 3-4-6 (10) | M |
| 15 | | | | | | |
| | | 24 Hour Cave-in: 16.3 | | | | |
| | | | SS 6 | 18 | 4-5-6 (11) | M |
| 20 | | | | | | |

Boring terminated at a depth of 20.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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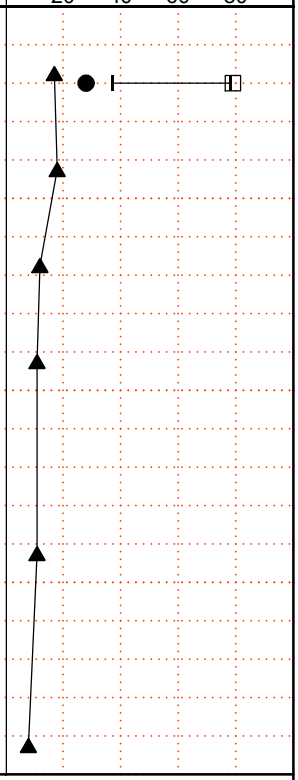
# BORING NUMBER B-4



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629397 ft **EASTING** 1450761 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | |
| | | **RESIDUAL:** Very Stiff, Red, Elastic SILT with Sand (MH), trace mica<br>LL: 78<br>PI : 41<br>% Passing No. 200: 78.8<br>Moisture Content: 28.2% | SS 1 | 18 | 5-6-11 (17) | M |
| 5 | | | SS 2 | 18 | 5-8-10 (18) | M |
| | | Medium Stiff to Stiff, Orange-Tan, Fine Sandy SILT (ML) | SS 3 | 18 | 4-5-7 (12) | M |
| 10 | | | SS 4 | 18 | 5-5-6 (11) | M |
| 15 | | | SS 5 | 18 | 4-4-7 (11) | M |
| | | 24 Hour Cave-in: 17.4 | | | | |
| 20 | | | SS 6 | 18 | 4-3-5 (8) | M |

Boring terminated at a depth of 20.0 feet.



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# BORING NUMBER B-5



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- END OF DAY - DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629449 ft **EASTING** 1450696 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | |
| | | **RESIDUAL:** Medium Stiff, Red, Fine to Medium Sandy CLAY (CL) | SS 1 | 18 | 2-3-5 (8) | M |
| | | **RESIDUAL:** Stiff, Orange-Tan, Elastic SILT with Sand (MH), trace mica | SS 2 | 18 | 4-4-6 (10) | M |
| 5 | | | SS 3 | 18 | 3-4-6 (10) | M |
| | | Stiff, Orange-Tan, Fine Sandy SILT (ML), trace mica | SS 4 | 18 | 4-5-7 (12) | D |
| 10 | | | | | | |
| | | End of Day Cave-in: 12.8 | SS 5 | 18 | 4-4-5 (9) | D |
| 15 | | Boring terminated at a depth of 15.0 feet. | | | | |

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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# BORING NUMBER B-6



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- END OF DAY - DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629485 ft **EASTING** 1450738 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description | ▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80 |
|---|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | | |
| | | **RESIDUAL:** Stiff, Orange-Tan, Elastic SILT with Sand (MH), trace mica | SS 1 | 18 | 2-5-8 (13) | M | |
| | | | SS 2 | 18 | 4-5-7 (12) | M | |
| 5 | | Stiff, Orange-Tan, Fine Sandy SILT (ML), trace mica | SS 3 | 18 | 3-4-6 (10) | M | |
| | | | SS 4 | 18 | 3-4-5 (9) | M | |
| 10 | | End of Day Cave-in: 12.4 | | | | | |
| 15 | | | SS 5 | 18 | 3-4-5 (9) | M | |

Boring terminated at a depth of 15.0 feet.

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Charlotte, North Carolina 28227

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# BORING NUMBER B-7



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629405 ft **EASTING** 1450893 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | |
| | | **RESIDUAL:** Loose, Red, Clayey Fine to Medium SAND (SC) | SS 1 | 18 | 2-3-5 (8) | M |
| | | Loose to Medium Dense, Orange-Tan to Gray-Tan, Silty Fine to Medium SAND (SM) | SS 2 | 6 | 5-6-8 (14) | M |
| 5 | | | SS 3 | 6 | 6-5-5 (10) | D |
| | | | SS 4 | 6 | 7-11-9 (20) | D |
| 10 | | | | | | |
| | | Stiff, Orange-Tan, Fine Sandy SILT (ML), trace mica | SS 5 | 4 | 6-6-8 (14) | M |
| 15 | | | | | | |
| | | 24 Hour Cave-in: 17.5 | | | | |
| 20 | | | SS 6 | 18 | 6-6-9 (15) | M |

Boring terminated at a depth of 20.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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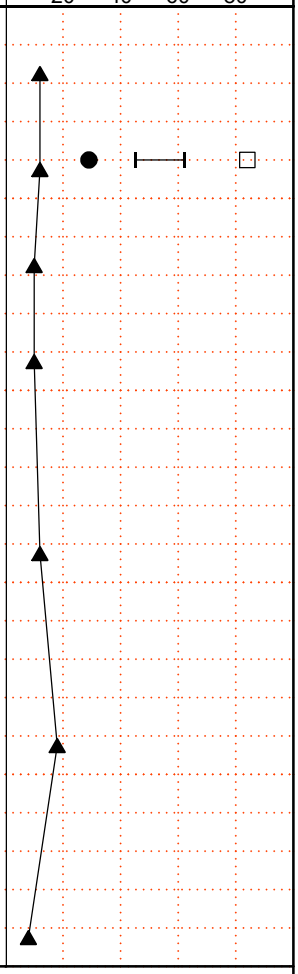
# BORING NUMBER B-8



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- END OF DAY - DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629264 ft **EASTING** 1450943 ft

| DEPTH (ft) | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|
| 0 | **TOPSOIL:** Approximately 6 inches | | | | |
| | **RESIDUAL:** Stiff, Red, Elastic SILT with Sand (MH), trace mica | SS 1 | 18 | 2-6-6 (12) | M |
| | Stiff, Purple-Red, Elastic SILT with Sand (MH) | SS 2 | 18 | 3-5-7 (12) | M |
| 5 | LL: 62<br>PI : 17<br>% Passing No. 200: 84.2<br>Moisture Content: 28.2% | SS 3 | 18 | 3-4-6 (10) | M |
| | Stiff, Purple-Red, Fine Sandy SILT (ML) | SS 4 | 18 | 3-5-5 (10) | M |
| 10 | | | | | |
| | Medium Stiff to Very Stiff, Orange-Tan, Fine Sandy SILT (ML), trace mica | SS 5 | 18 | 3-5-7 (12) | M |
| 15 | | | | | |
| | | SS 6 | 18 | 5-9-9 (18) | M |
| 20 | End of Day Cave-in: 22.7 | | | | |
| | | SS 7 | 18 | 3-4-4 (8) | M |
| 25 | Boring terminated at a depth of 25.0 feet. | | | | |



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# BORING NUMBER B-9



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629563 ft **EASTING** 1450987 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | |
| | | **RESIDUAL:** Stiff, Red, Elastic SILT with Sand (MH), trace mica | SS 1 | 18 | 2-6-6 (12) | M |
| | | | SS 2 | 18 | 4-6-8 (14) | M |
| 5 | | Medium Stiff to Stiff, Purple-Red, SILT (ML), trace mica | SS 3 | 18 | 4-5-5 (10) | M |
| | | | SS 4 | 18 | 3-4-5 (9) | M |
| 10 | | | | | | |
| | | | SS 5 | 18 | 3-3-5 (8) | M |
| 15 | | 24 Hour Cave-in: 15.6 | | | | |
| | | | SS 6 | 18 | 3-3-5 (8) | M |
| 20 | | Boring terminated at a depth of 20.0 feet. | | | | |

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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# BORING NUMBER B-10



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629369 ft **EASTING** 1451063 ft

| DEPTH (ft) | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description |
|---|---|---|---|---|---|
| 0 | **TOPSOIL:** Approximately 6 inches | | | | |
| | **RESIDUAL:** Stiff, Red, Elastic SILT with Sand (MH), trace mica | SS 1 | 18 | 2-4-6 (10) | M |
| 5 | | SS 2 | 18 | 4-4-7 (11) | M |
| | Medium Stiff to Stiff, Orange-Tan, Elastic SILT with Sand (MH), trace mica | SS 3 | 18 | 2-3-5 (8) | M |
| | LL: 55<br>PI : 10<br>% Passing No. 200: 81.5<br>Moisture Content: 29.7% | SS 4 | 18 | 3-4-4 (8) | M |
| 10 | | | | | |
| 15 | | SS 5 | 18 | 3-5-6 (11) | M |
| | 24 Hour Cave-in: 15.5 | | | | |
| 20 | | SS 6 | 18 | 4-4-6 (10) | M |

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Boring terminated at a depth of 20.0 feet.

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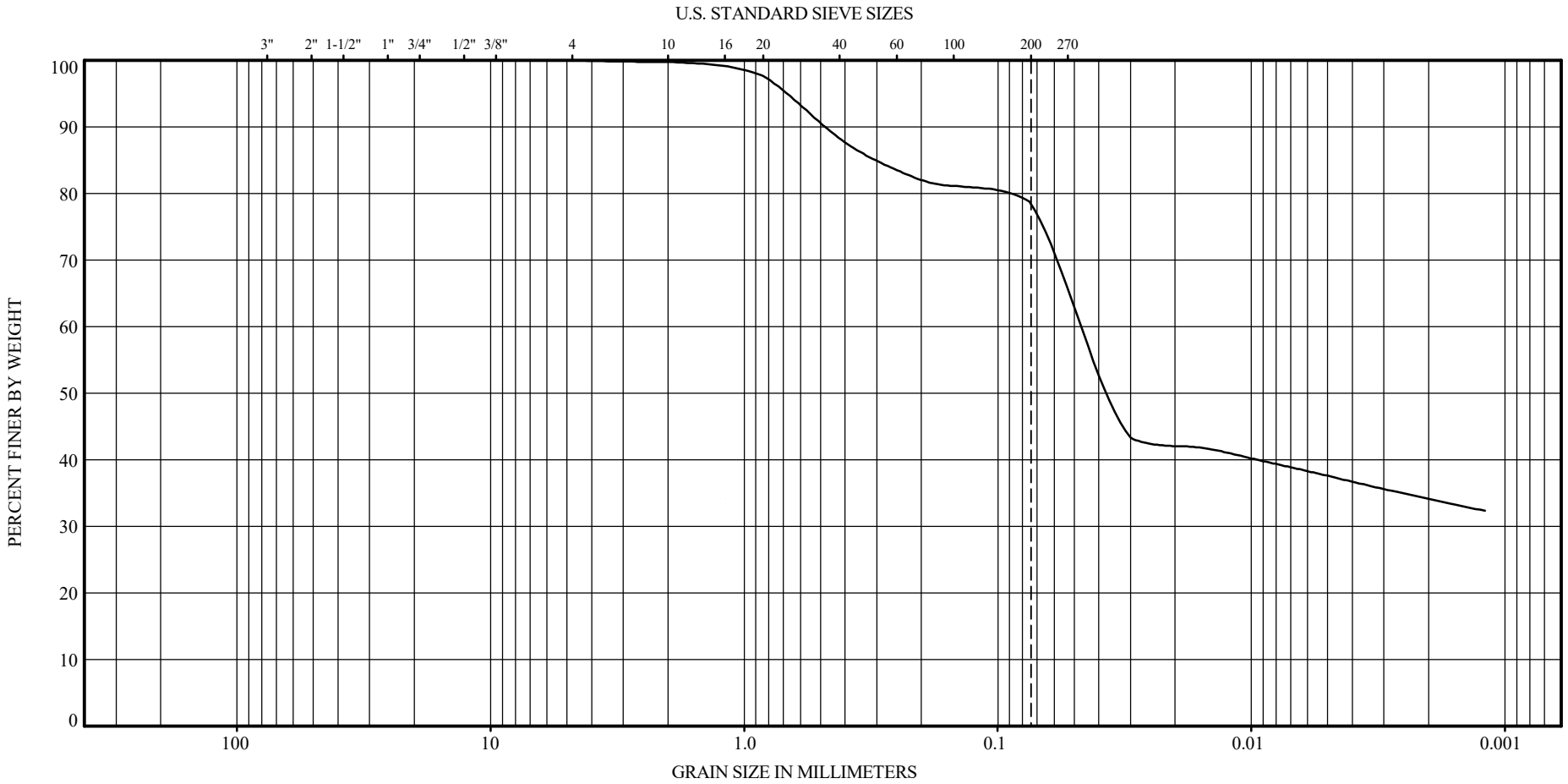
# BORING NUMBER B-11



**CLIENT** Town of Cornelius
**PROJECT NAME** Bailey Road Park Tennis Courts
**PROJECT NUMBER** 240023184
**PROJECT LOCATION** Cornelius, NC
**DATE STARTED** 4/5/23 **COMPLETED** 4/5/23
**GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
**DRILLING CONTRACTOR** CG2 Exploration, LLC. - CME550X
**GROUND WATER LEVELS:**
**DRILLING METHOD** H.S. Augers
**0-HR WATER LEVEL** --- DRY
**LOGGED BY** T. Wenner **CHECKED BY** R. Kral, P.E.
**STABILIZED WATER LEVEL** --- END OF DAY - DRY
**NOTES** Hammer Efficiency 74% (4/8/2022)
**NORTHING** 629265 ft **EASTING** 1451057 ft

| DEPTH (ft) | GRAPHIC LOG | MATERIAL DESCRIPTION | SAMPLE TYPE NUMBER | RECOVERY (in.) | BLOW COUNTS (N VALUE) | Moisture Description | ▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80 |
|---|---|---|---|---|---|---|---|
| 0 | | **TOPSOIL:** Approximately 6 inches | | | | | |
| | | **FILL:** Very Stiff, Orange-Tan, Elastic SILT with Sand (MH) | SS 1 | 18 | 5-8-13 (21) | M | |
| | | | SS 2 | 18 | 5-9-12 (21) | M | |
| 5 | | **RESIDUAL:** Stiff, Orange-Tan, Elastic SILT with Sand (MH) | SS 3 | 18 | 3-5-6 (11) | M | |
| | | Stiff, Purple-Red, SILT (ML), trace mica | SS 4 | 18 | 3-4-5 (9) | M | |
| 10 | | | | | | | |
| | | End of Day Cave-in: 13.0 | SS 5 | 18 | 5-5-6 (11) | M | |
| 15 | | | | | | | |

Boring terminated at a depth of 15.0 feet.




| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| BORING: | DEPTH: | NAT WC | LL | PL | PI | DESCRIPTION OR CLASSIFICATION |
|---|---|---|---|---|---|---|
| B-4 S1 | 1.0' - 2.5' | 28.2 | 78 | 37 | 41 | Elastic Silt With Sand |

# GRAIN SIZE DISTRIBUTION

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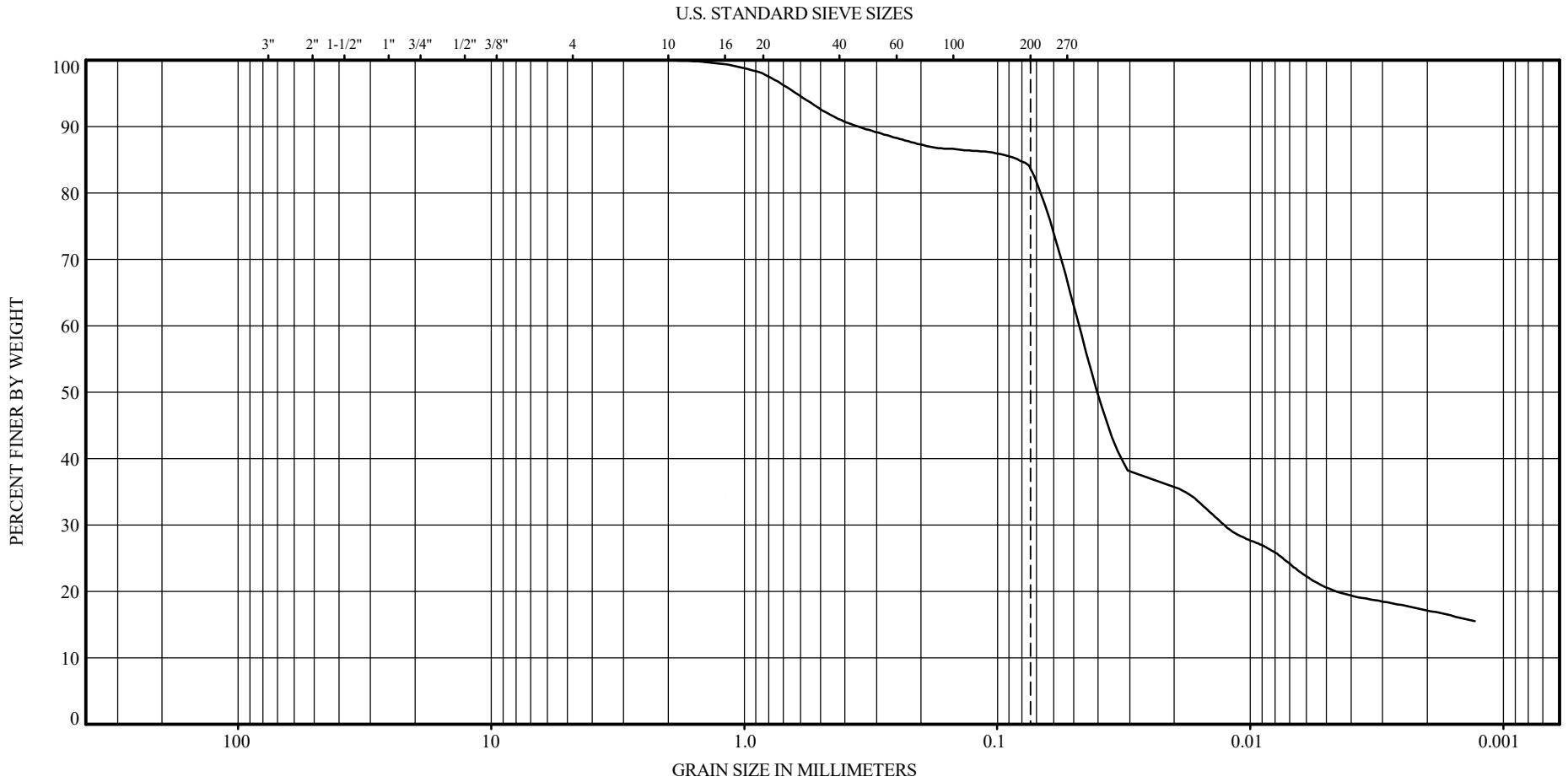


| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| BORING: | DEPTH: | NAT WC | LL | PL | PI | DESCRIPTION OR CLASSIFICATION |
|---|---|---|---|---|---|---|
| B-8 S2 | 3.5' - 5.0' | 29.4 | 62 | 45 | 17 | Elastic Silt With Sand |

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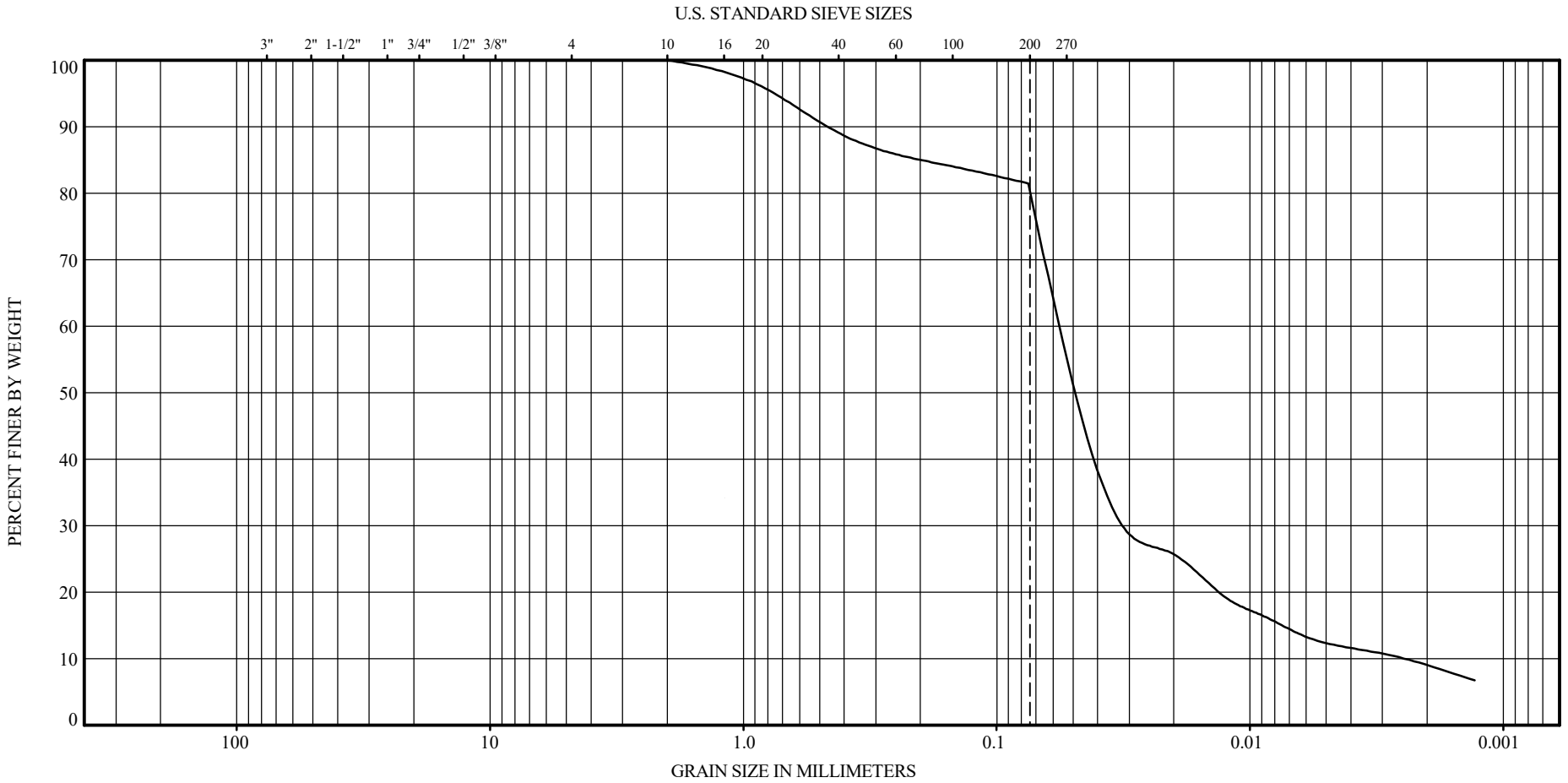


| BOULDERS | COBBLES | GRAVEL | | SAND | | | FINES | |
|---|---|---|---|---|---|---|---|---|
| | | COARSE | FINE | COARSE | MEDIUM | FINE | SILT SIZES | CLAY SIZES |

| BORING: | DEPTH: | NAT WC | LL | PL | PI | DESCRIPTION OR CLASSIFICATION |
|---|---|---|---|---|---|---|
| B-10 S3 | 6.0' - 7.5' | 29.7 | 55 | 45 | 10 | Elastic Silt With Sand |

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**Charlotte, North Carolina**

# Important Information about This

# Geotechnical-Engineering Report

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

**While you cannot eliminate all such risks, you can manage them. The following information is provided to help.**

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

## You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

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

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## This Report May Not Be Reliable

*Do not rely on this report* if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

## Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

## This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

## This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

## Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

## Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

## Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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e-mail: info@geoprofessional.org www.geoprofessional.org


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GEOTECHNICAL
GROUP