CUMBERLAND COUNTY
WILKES ROAD LANDFILL & RECYCLING FACILITY
MAINTENANCE BUILDING CONSTRUCTION

SUPPLEMENTARY GEOTECHNICAL INFORMATION

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Note: The enclosed documentation is provided for informational purposes only as it may relate to the Contract Documents for Wilkes Road Landfill & Recycling Facility Maintenance Building Construction and is NOT PART OF THE CONTRACT DOCUMENTS.

The data provided may or may not represent actual site and subsurface conditions. Additionally, the lab testing information depict geotechnical conditions for the construction events indicated. Soil conditions may differ from conditions occurring during past construction events.

GeoTechnologies, Inc.
Geotechnical and Construction Materials Testing Services

April 14, 2022

Smith + Gardner
14 N Boylan Ave
Raleigh, NC 27603

Attn: Mr. Stacey Smith, PE

Re: Report of Subsurface Investigation
Cumberland County Storage Building
Fayetteville, North Carolina
GeoTechnologies Project No. 1-22-0315-EA

Dear Mr. Smith,

GeoTechnologies, Inc. has completed the authorized investigation to evaluate subsurface soil conditions for the above referenced project in Fayetteville, North Carolina. Subsurface conditions at the site were investigate by completing four soil test borings at the approximate locations shown on the attached Figure 1. The borings were advanced to up to 15 to 20 feet below the existing ground surface. The boring locations were established in the field by measuring off existing site features and should be considered approximate. The borings were completed using an all-terrain drill rig utilizing standard penetration testing (SPT) procedures with an auto hammer at selected intervals to evaluate the consistency and density of the subsurface soils. This report presents the findings of our investigation and our preliminary recommendations concerning site grading and foundation support.

SITE & PROJECT INFORMATION

The site is located at the existing mulch recycling facility at 771 Wilkes Road in Fayetteville. The new storage building will be located in an area just northeast of an existing storage building. The area is currently open and partly graveled. The new storage building will be a lightly loaded, 40 ft x 50 ft (approximate) building with a slab-on-grade. We assume that the foundation will likely be a turn-down thickened slab-on-grade. We expect minimal grading to achieve design subgrade elevations.

AREA GEOLOGY

The site is located in the Coastal Plain Physiographic and Geologic Province of North Carolina. The near surface soils in the area of the site generally consist of sands, clays, and silts which have eroded from the Piedmont Uplands and been deposited by streams. More specifically, the site is located within the Cape Fear Formation which is comprised of sandstones, sandy mudstones, and gray to bluish gray clays which were deposited during the Cretaceous Period approximately 63 to 138 million years ago. Frequent migration of the shoreline over the last two million years have redistributed the sedimentary soils originally deposited by streams and has resulted in the fairly Coastal Plain topography.

SUBSURFACE CONDITIONS

A generalized subsurface profile was prepared from the test boring data as Figure 2 to graphically illustrate subsurface conditions encountered during the investigation. More detailed descriptions of the conditions encountered at the boring locations are presented on the attached boring records.

Gravel or topsoil was encountered in the borings extending to depths of about 3 inches below the existing ground surface. Fill soils were encountered beneath the gravel or topsoil. These soils appeared to consist of very loose to medium dense sands with varying amounts of rock, concrete and brick fragments. In boring B-4, the fill from a depth of about 8 to 12 feet had significant amounts of organic material mixed with the sands. The fill extended to depths of 5.5 to 12 feet. Underlying the fill, slightly silty sands were encountered to the boring termination depths of 15 to 20 feet. The soils exhibited SPT resistances ranging from weight of hammer (WOH) to 15 blows per foot (bpf) in the fill and 2 to 10 bpf in the sand deposits.

Groundwater was encountered in the borings at depths of about 7 to 8 feet at boring completion. However, it should be noted that the near surface soils are fine grain materials which are conducive to the development of a temporarily higher perched groundwater condition. Regional groundwater levels can also fluctuate with seasonal and climatic changes and may be different at other times.

RECOMMENDATIONS

The following recommendations are made based upon a review of the attached test boring data, our understanding of the proposed construction, and past experience with similar projects and subsurface conditions. Once site development plans are developed, we would appreciate being provided with that information so that these recommendations can be confirmed, extended, or modified as necessary. Additionally, should subsurface conditions adverse to those indicated by this report be encountered during construction, those differences should be reported to us for review and comment.

Site Grading Considerations: Site grading should begin with clearing and stripping of all topsoil and vegetation within the limits of the proposed construction as well as removal of any construction equipment. Following stripping and clearing, all areas at grade or which are designated to receive fill should be proof rolled for stability with a partially loaded tandem axel dump truck in the presence of a geotechnical engineer to identify areas necessitating repairs. Repairs should be performed as recommended by the engineer.

Our borings indicate that the fill soils at this site are typically very loose to loose in the upper 3 to 5.5 feet. It may be possible to adequately densify the near surface sands with a large vibratory smooth drum roller. If this does not work, some limited undercutting and replacement or re-compaction of the existing sand fill may be required.

Borrow Materials/Placement: The on-site soils, excluding topsoil and fill soils with significant organic materials, should be suitable for reuse as structural fill. A standard compaction recommendation for soils placed in structural areas is to compact the material to at least 95% of the standard proctor maximum dry density, except at subgrade elevations where the compaction should be at least 98% of the standard proctor maximum dry density. In order to achieve proper density and stability, soil moisture contents should be maintained within 2% of the optimum moisture content, which may require some drying or the addition of moisture.

If off-site borrow is required, low plasticity clays, sands, or silts with Unified Soil Classification of CL, SM, SC, and ML may be used for structural fill. Non-structural areas should have some compaction effort when filling. We recommend that fill in non-structural areas be compacted to at least 85% of the standard proctor maximum dry density, if some post-construction settlement is acceptable.

Temporary Excavations: Temporary excavations should be designed in accordance with OSHA guidelines assuming that the on-site soils can be classified as Type "C" soils. Excavations exceeding 20 feet in depth must be designed by an engineer. Once open, all excavations should be observed on a daily basis by qualified personnel.

Foundation Design: Based upon the test borings, it is our opinion that a typical shallow foundation will not be suitable for the proposed construction due to the presence of very loose fill soils and fill soils with significant organics (B-4). A typical turn-down thickened edge slab foundation will likely result in excessive total and differential settlements which could damage the slab if bearing on the existing fill soils. Consideration can be given to complete removal of the fill (8 to 12 feet deep) and replacing with properly compacted sand fill. If this is done, shallow foundations can be used and designed for an allowable bearing pressure of 2,000 psf. However, it is likely that this option may not be cost effective. An alternative would be to support the foundation/slab on helical piers. Helical piers can be extended through the fill and bear in the natural sand deposits. We would anticipate that piers designed for a load of 10 kips would likely extend to a depth of maybe 20 feet. This option may be more cost-effective than a remove and replace option.

Slab-on-Grades: We recommend that slabs-on-grade for the structure are designed for an assumed subgrade modulus of 100 pci (for a 1 foot by 1 foot area). This assumes that subgrades will be compacted to a minimum of 98% of the standard proctor maximum dry density. We recommend that slabs be supported on a minimum of a 4 inch thick layer of compacted CABC. All slabs should be constructed per current ACI guidelines, including proper jointing to help control shrinkage cracking.

Seismic Design: This site is a seismic site class "E" under the building code based on the test boring data and past experience in the area of the site.

Dewatering Considerations: Groundwater was encountered at depths of 7 to 8 feet upon boring completion. However, groundwater depths can fluctuate. We anticipate any water encountered will be minor such that a sump pump can be used to effectively remove any water. Dewatering is ultimately the responsibility of the contractor.

Permanent Slopes: In this geology, dry and well compacted unreinforced fill slopes built at 2.5H:1V are stable without exception. Steeper fill slopes can be used with properly designed and installed geosynthetic reinforcement. Cut slopes should also be about 2.5H:1V or flatter. Any water encountered on the face of slopes should be brought to the attention of the geotechnical engineer so that necessary provisions can be made.

Pavement Design: Following proper completion of grading, the site should be suitable for support of conventional pavement structures. We recommend using a design CBR of 6% for the design of flexible pavements and a subgrade modulus of 100 pci for rigid pavements. Soils which do not provide the design CBR value may necessitate thickening of the stone base section. All pavement subgrades should be proofrolled in the presence of an engineer prior to the placement of CABC. Areas which are unstable in the opinion of the engineer should be repaired as directed. Stone grade should be proofrolled as well prior to paving.

The most important factors affecting pavement life in the area of the site are the condition of the subgrade immediately prior to base course stone placement and post-construction drainage. It is recommended that site grades be detailed to promote positive drainage away from pavement areas and that a drainage swale be installed on the uphill side of all pavement areas to intercept and divert perched water which may otherwise occur during the wetter winter months of the year. Since the near surface soils are fine grained, consideration should also be given to installing drains within planter islands and irrigated areas to intercept any perched water which occurs as a result of those open natural areas. Pavement sections (rigid and flexible) can be provided once traffic loading and volume details are known.

CLOSING

GeoTechnologies, Inc. appreciates the opportunity to be of service on the phase of the project. Please contact us if you have any questions concerning this letter or if we may be of addition service on this or other projects.

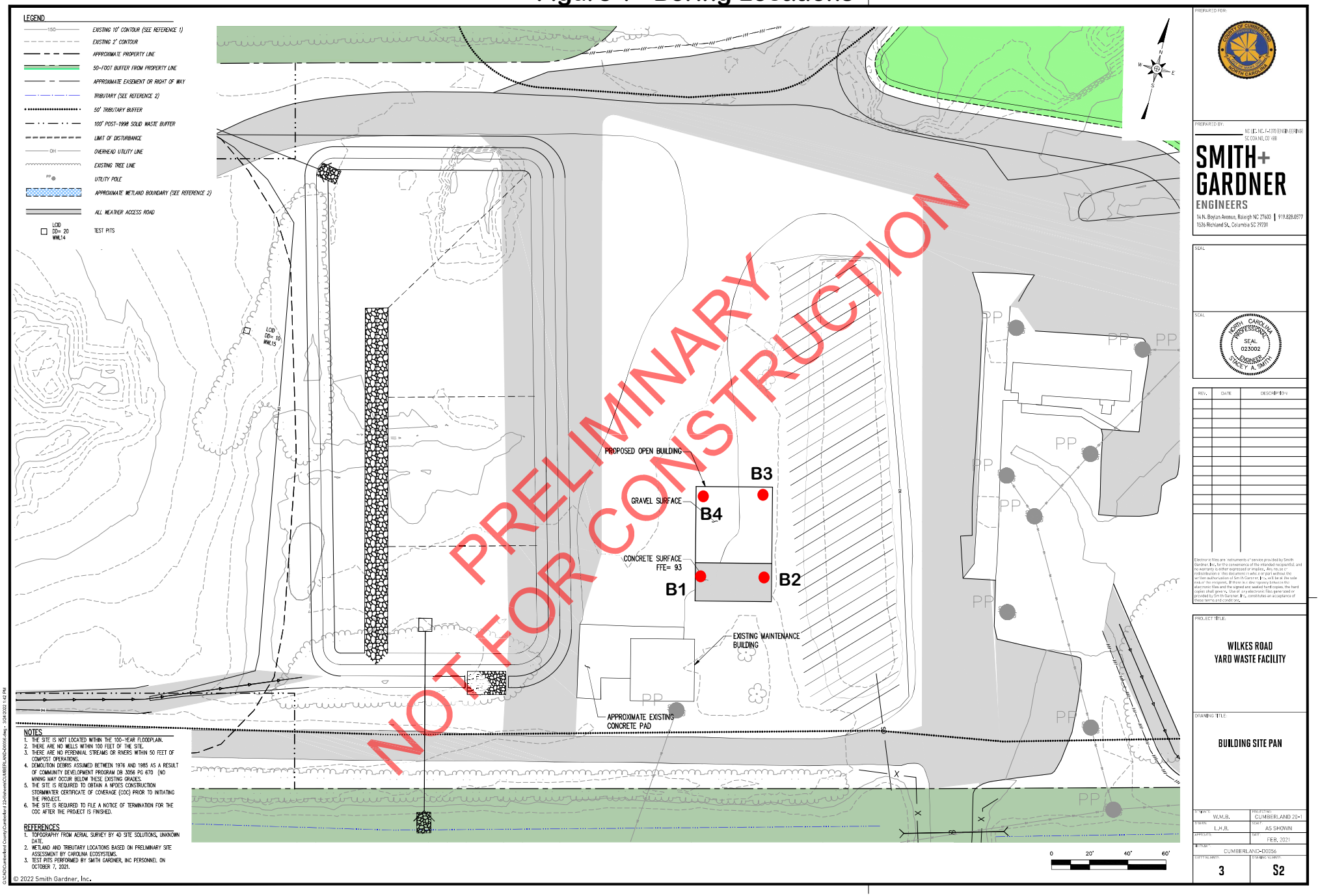
Sincerely,
GeoTechnologies, Inc.

Mark R. Potratz, PE
NC License No. 25955

Attachments

MRP/pr-dli

Figure 1 - Boring Locations



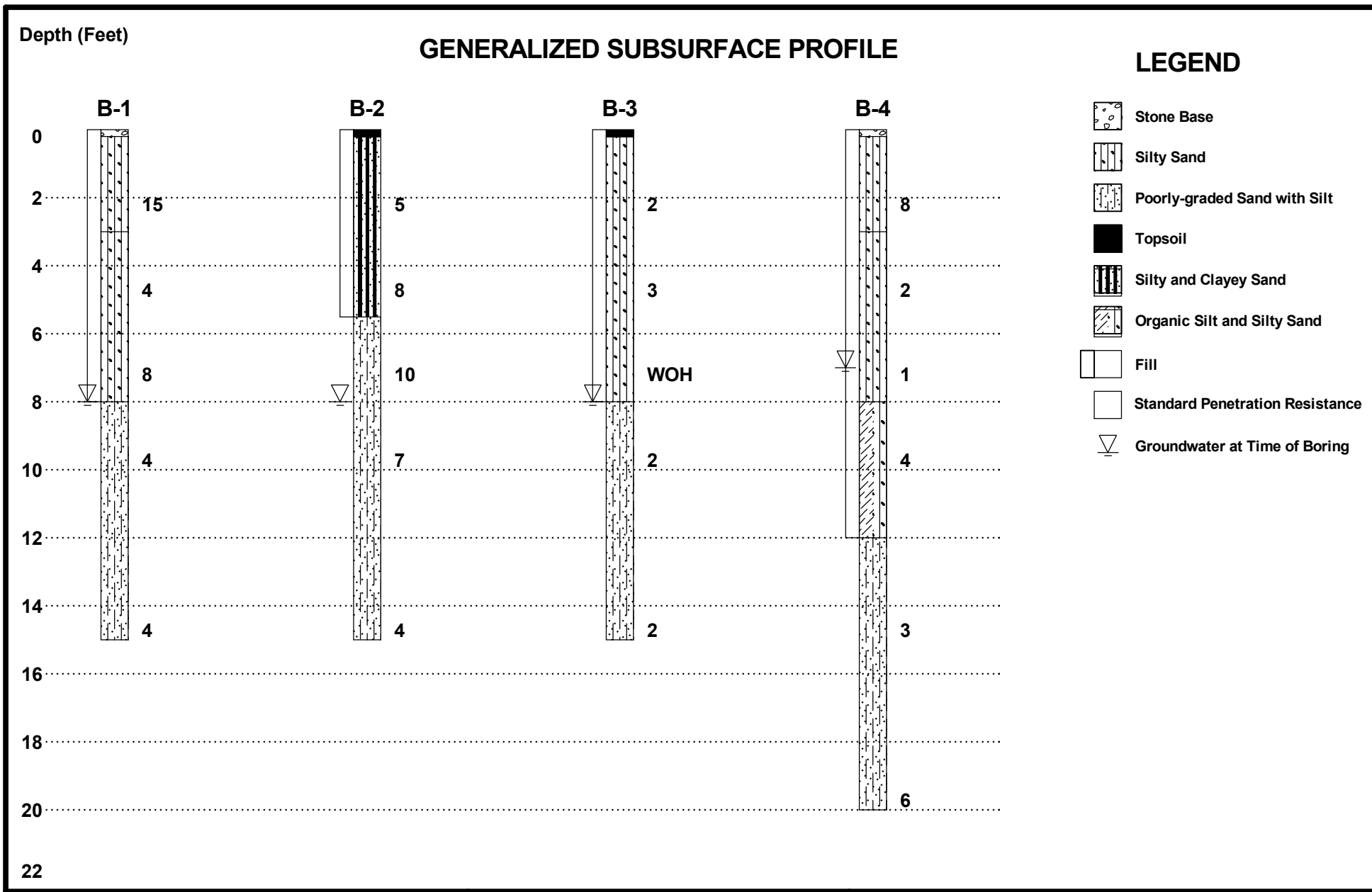
NOTES

1. THE SITE IS NOT LOCATED WITHIN THE 100-YEAR FLOODPLAIN.
2. THERE ARE NO WELLS WITHIN 100 FEET OF THE SITE.
3. THERE ARE NO PERENNIAL STREAMS OR RIVERS WITHIN 50 FEET OF COMPOST OPERATIONS.
4. DEMOLITION DEBRIS ASSUMED BETWEEN 1976 AND 1985 AS A RESULT OF COMMUNITY DEVELOPMENT PROGRAM DB 3056 PG 670 (NO MINING MAY OCCUR BELOW THESE EXISTING GRADES.
5. THE SITE IS REQUIRED TO OBTAIN A NPDES CONSTRUCTION STORMWATER CERTIFICATE OF COVERAGE (COC) PRIOR TO INITIATING THE PROJECT.
6. THE SITE IS REQUIRED TO FILE A NOTICE OF TERMINATION FOR THE COC AFTER THE PROJECT IS FINISHED.

REFERENCES

1. TOPOGRAPHY FROM AERIAL SURVEY BY 4D SITE SOLUTIONS, UNKNOWN DATE.
2. WETLAND AND TRIBUTARY LOCATIONS BASED ON PRELIMINARY SITE ASSESSMENT BY CAROLINA ECOSYSTEMS.
3. TEST PITS PERFORMED BY SMITH GARDNER, INC PERSONNEL ON OCTOBER 7, 2021.

C:\CAD\Cumberland County\Cumberland 22x34\sheets\CUMBERLAND-00056.dwg - 3/24/2022 1:46 PM



PROJECT:

Cumberland County Storage Building Fayetteville, NC

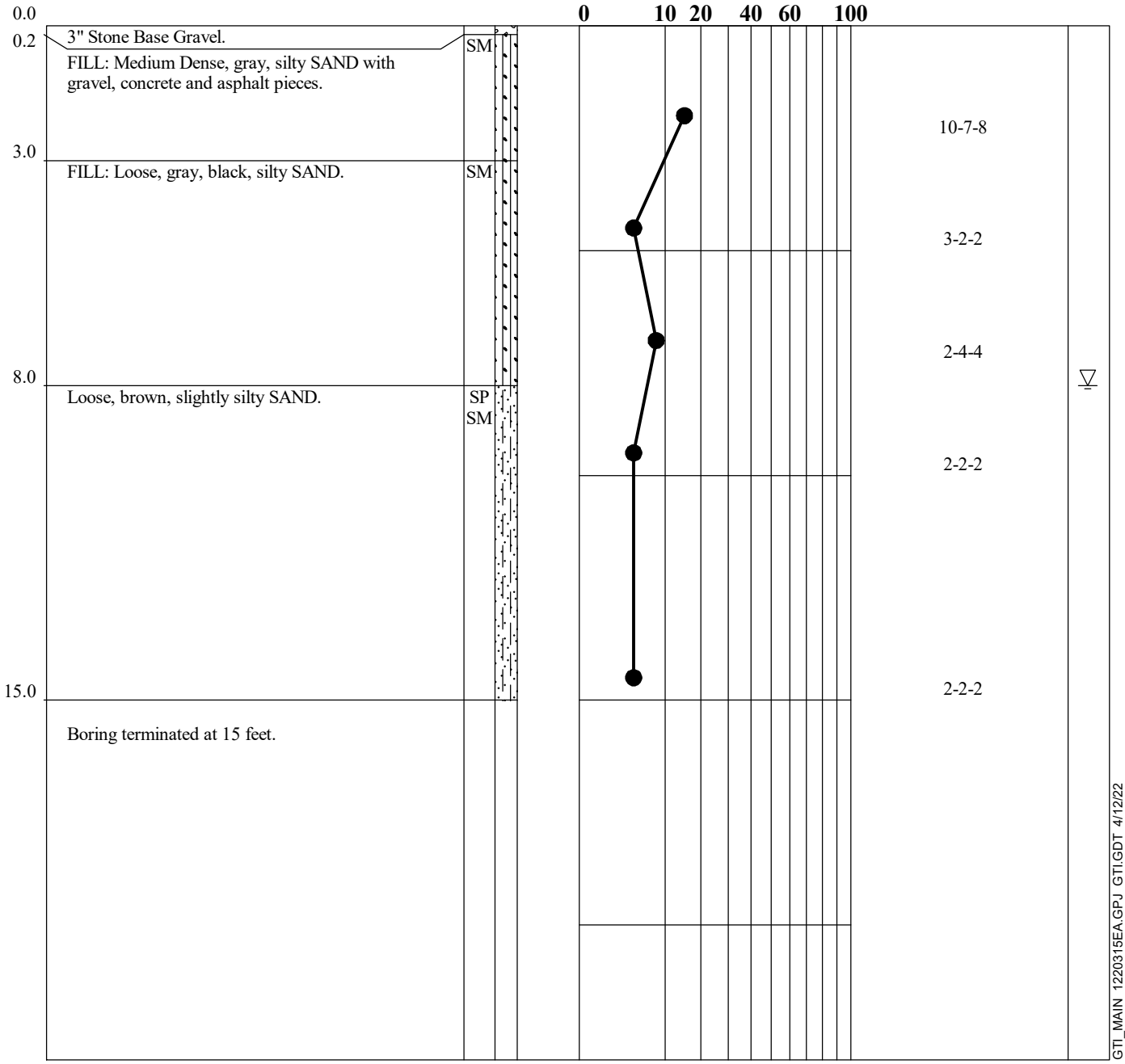
GeoTechnologies, Inc.

SCALE: As Shown

JOB No:1220315EA

FIGURE No: 2

TEST BORING RECORD



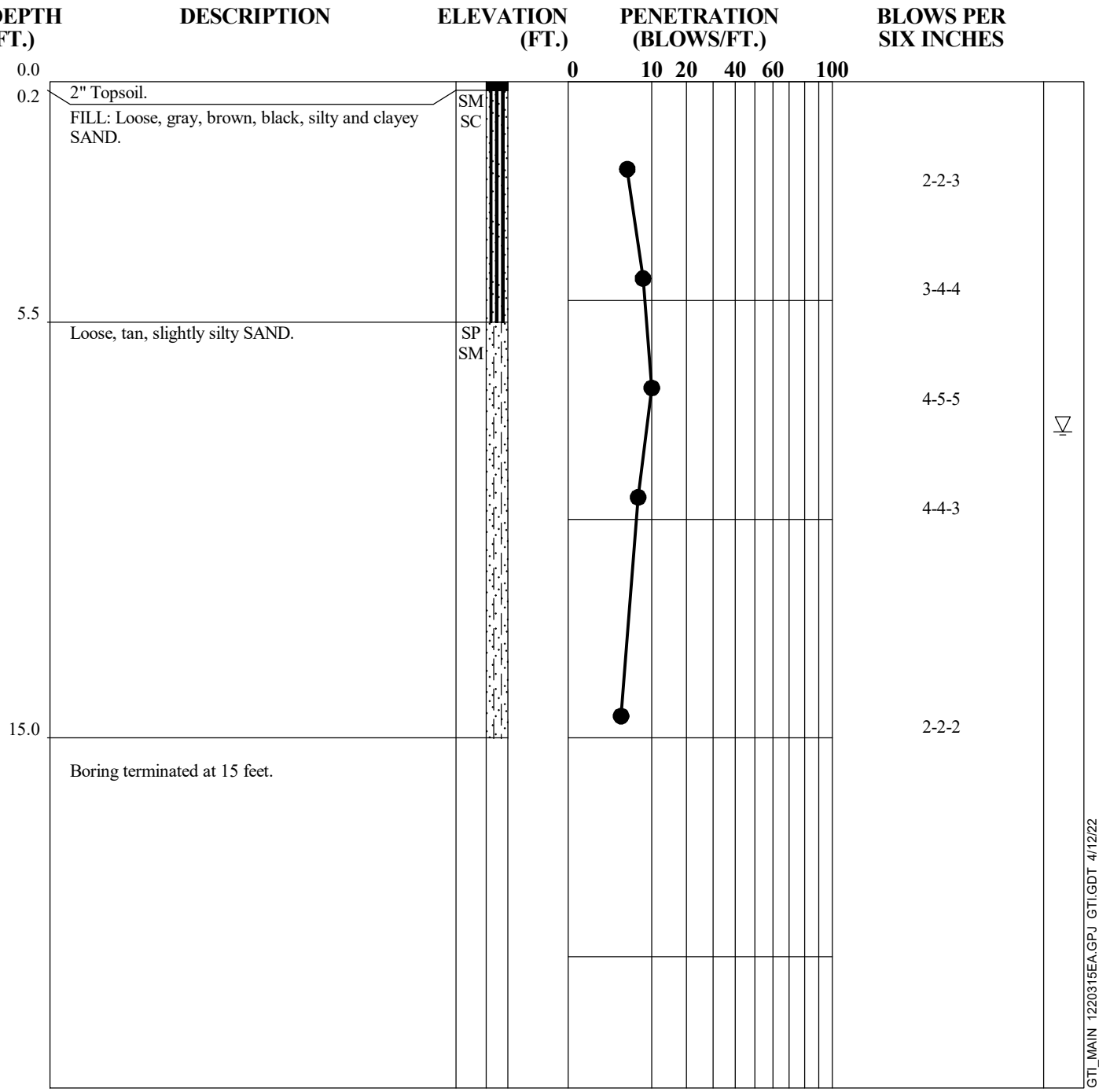
Sampled with autohammer. Groundwater encountered at 8 feet at time of boring completion.

JOB NUMBER 1220315EA
BORING NUMBER B-1
DATE 4-11-22

PAGE 1 OF 1

GeoTechnologies, Inc.
3200 Wellington Court, Ste 108
Raleigh, NC 27615

TEST BORING RECORD



Sampled with autohammer. Groundwater encountered at 8 feet at time of boring completion.

JOB NUMBER 1220315EA
BORING NUMBER B-2
DATE 4-11-22

PAGE 1 OF 1

GeoTechnologies, Inc.
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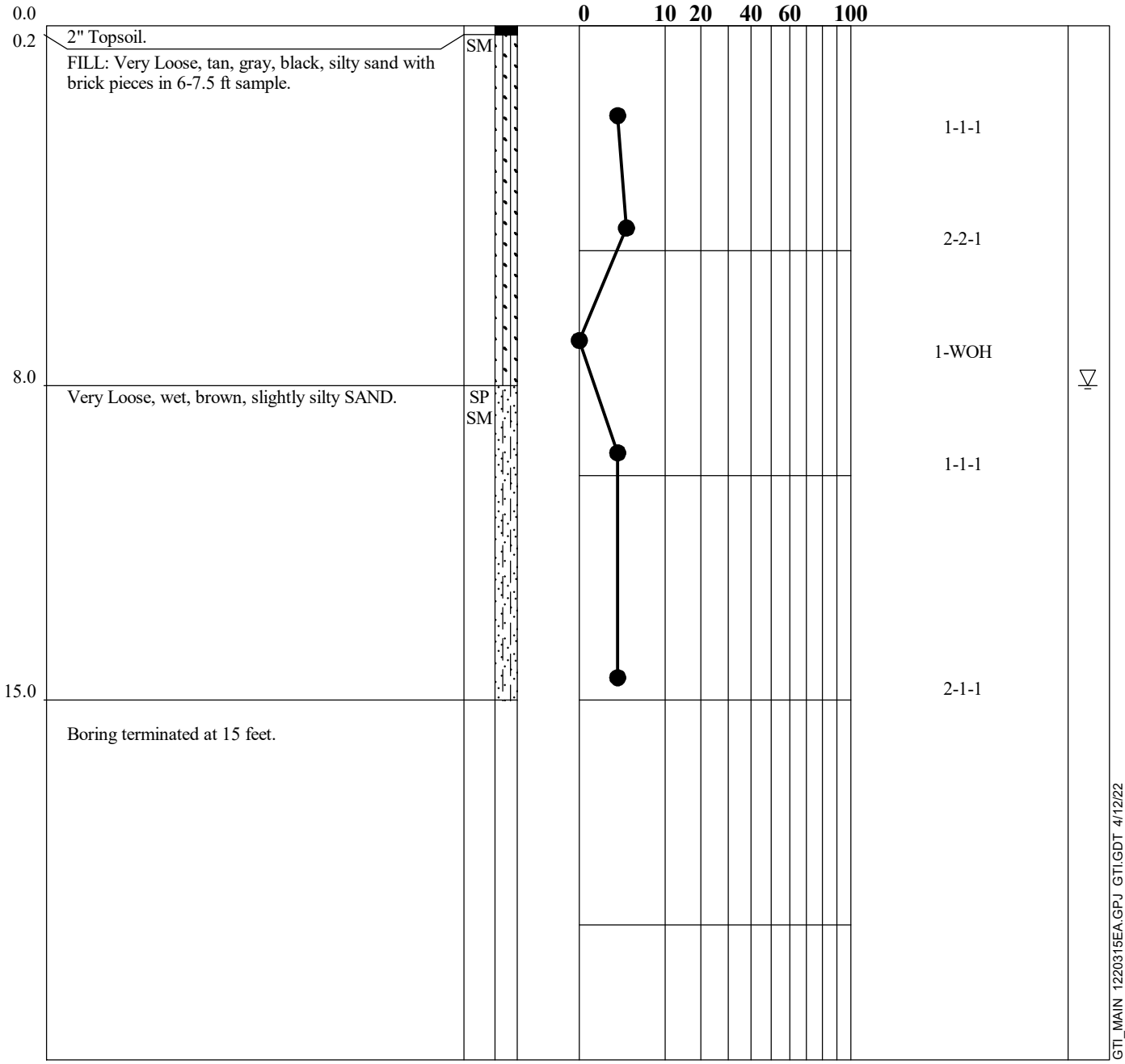
Raleigh, NC 27615

TEST BORING RECORD



Sampled with autohammer. Groundwater encountered at 8 feet at time of boring completion.

JOB NUMBER 1220315EA
BORING NUMBER B-3
DATE 4-11-22

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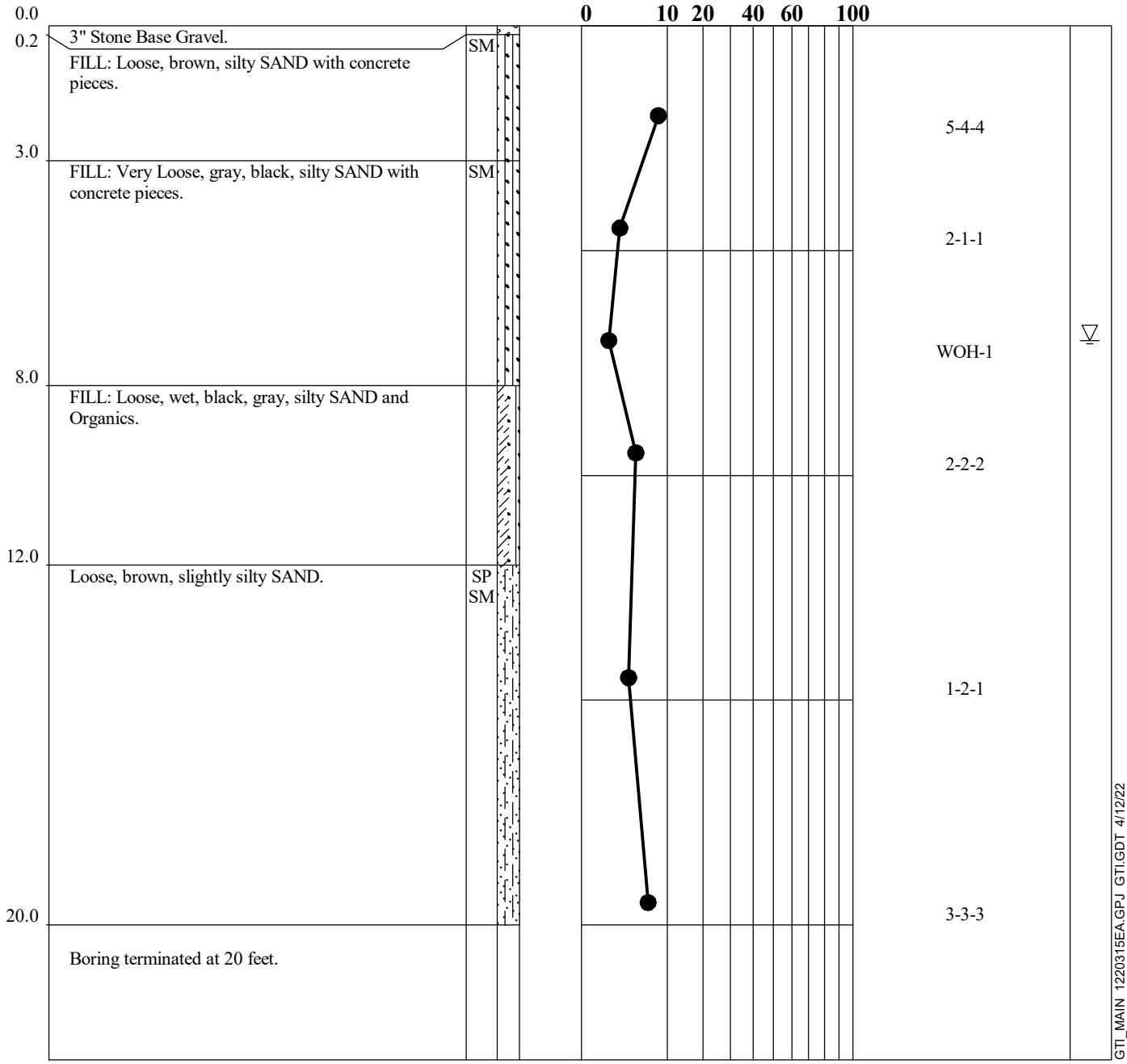
GeoTechnologies, Inc.
3200 Wellington Court, Ste 108
Raleigh, NC 27615

TEST BORING RECORD



Sampled with autohammer. Groundwater encountered at 7 feet at time of boring completion.

JOB NUMBER 1220315EA
BORING NUMBER B-4
DATE 4-11-22

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