Report of Geotechnical Subsurface Investigation

Wedowee City Hall
North Main Street
Wedowee, Alabama
Our Job No. G21-6023

CARMICHAEL
Engineering, Inc.

P.O. Box 241702
Montgomery, AL 36124-1702

careng@carmichaelengineering.com

Phone: 334-213-5647
Fax: 334-213-7348

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Prepared For:

Mr. Glynn Clark
Glynn Clark Designs
P.O. Box 381561
Birmingham, AL 35238

Prepared By:

Carmichael Engineering, Inc.
P.O. Box 241702
Montgomery, Alabama 36124

334-213-5647
www.carmichaelengineering.com

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1.0 Introduction

Carmichael Engineering, Inc., is pleased to provide this report of our subsurface investigation for the planned Wedowee City Hall development. The scope of this investigation included 11 soil test bores in the planned building and pavement areas. The quantity and location of the test bores were taken in accordance with the authorized scope of work. The intent of this investigation was to evaluate the subsurface conditions with respect to the planned development.

This report has been prepared in accordance with generally accepted current standards of geotechnical engineering practices and no other warranties are expressed or implied. The recommendations of this report are based on our professional judgment considering the proposed construction as described by this report and the data available to us. The construction should include follow up geotechnical monitoring and construction materials testing by our firm. It is important that we confirm the expected subsurface conditions based on the soil boring data during the construction phase. This report is presented on the basis that all of our recommendations will be followed.

2.0 Summary

Generally, the subsurface investigation indicated conditions which should be compatible with the planned building and pavement development provided the site preparation and construction are completed in accordance with the recommendations which follow in this report. Please note that our recommendations are site specific and may not be suitable for other types of structures or other locations.

A total of 11 test bores were completed to evaluate the subsurface stratigraphy. Beneath 3 to 4" of organic topsoil or 1" of crushed stone, six of the test bores penetrated 1 to 8.5' of fill earth described as cohesive silty clay with brick fragments, sandy silty clay with brick and concrete fragments, clayey sand with gravel, silty clayey sand with gravel, and non-cohesive silty sand (sections with crushed stone or brick fragments). The test bores continued into possible fill and in-situ earth described as cohesive silty clay, sandy silty clay, sandy clay (sections with rock fragments), clayey sand (sections with gravel or rock fragments), and non-cohesive silt, sandy silt (sections with rock fragments), and silty sand (sections with crushed stone or rock fragments). The composition of the fill earth is similar in nature to the in-situ earth and we were not able to distinguish between fill and in-situ earth in some of the test bores. Beyond weak surficial soil conditions, the test bores indicated moderate to stronger soil strengths and consolidation characteristics which are expected to be compatible with the planned type of construction.

The test bores did not indicate any groundwater during or twenty-four hours following drilling. The test bores caved following drilling at depths of 7.3 to 22.7', twenty-four hours following drilling. The groundwater condition at this site is subject to seasonal variation and is expected to fluctuate. We do not anticipate that the groundwater condition will affect the construction or long term performance of this project. Shallow groundwater (if any) encountered during construction can be controlled using shallow drainage ditches, sump pits and pumps, and/or permanent underdrains.

The site is located in an area that typically is underlain by schist rock exhibiting varying degrees of weathering. The rock has been folded and distorted during the geologic past and has been subjected to irregular weathering. Due to the irregular weathering, hard sections of rock may be encountered at various elevations beneath the ground surface. Large rock boulders, rock layers, and cobbles are common in the residual soil mass overlying the parent rock. Generally, those materials exhibiting "N" values of 50 or less may be excavated with conventional earth excavating equipment. Excavations in weathered rock material exhibiting "N" values greater than 50, especially in confined excavations, may require pneumatic hammers, rippers, blasting or other rock removal techniques to advance excavations.

The project site had been previously developed. The building and related structures had been demolished and removed prior to this investigation. After removing the topsoil, crushed stone, or any required cut earth, the exposed subgrade should be processed (mixed and moisture conditioned) and compacted to 98% of the materials ASTM D-698 standard density. Areas

which fail to compact should be undercut to expose firm earth. The suitable clean non-organic non-saturated sections of the undercut material may stockpiled to be reused as “engineered fill.” The native clayey silt (MH) materials typically have high moisture contents and low soil unit weights and will not be suitable for reuse as “engineered fill”. The clayey silt (MH) material should be wasted in nonstructural areas or hauled off-site. Due to the high silt content of the native soils, we recommend that a minimum of 12” of the finished subgrade in the building and pavement areas consist of an approved “select fill” material from an off-site borrow source.

Following proper site preparation, conventional design and construction techniques can be used to develop a shallow spread foundation system for support of the building structure. The building foundations can bear transitional between the firm to stronger in-situ earth, properly compacted existing fill earth, and/or the new “engineered fill” earth with the foundations designed for net allowable soil bearing pressures of 2,500 pounds per square foot for isolated square foundations and 2,000 psf for continuous foundations.

The pavement sections may be developed using locally available materials and conventional construction techniques and are expected to be designed as a medium duty pavement section with a moderate volume of automobiles and occasional medium to heavy weight service trucks. The pavement sections may be constructed using a crushed aggregate base and high stability bituminous pavement section or a concrete pavement section placed directly over an improved layer of the subgrade earth.

3.0 Evaluation

3.1 Site Location

The site subject to this report is located on the northwest corner of North Main Street and Woodland Avenue NW in the Town of Wedowee, Randolph County, Alabama. Our field personnel utilized the provided site plan, instructions, and a survey grade GPS to locate the site and test bores. The enclosed boring plans further describes the test bore locations.

The ground elevations at each bore location were determined using a survey grade GPS. The approximate elevations are shown on the enclosed test boring records.

3.2 Site Conditions

The site consisted of an irregular shaped parcel of property. The site was described as clear and open with grass vegetation. The site contained an existing hospital structure but according to historical aerial imagery the previous building development was demolished and removed prior to March 2019.

The local terrain is described as moderately sloping. There was approximately 12’ of relief between the test bores. Surface drainage was described as good. Surface water is expected to flow over the site and discharge beyond the planned development areas. There was no significant ponded water present on the site.

Site access was described as good. There was no unusual difficulty mobilizing our ATV mounted drilling equipment over the site for the completion of the test bores.

3.3 Site Geology and Subsurface Stratigraphy
Geologically, the site is located in the Northern Piedmont Provence and is underlain by the Wedowee Group undifferentiated formation, formed in the Precambrian to Paleozoic Period. This formation typically yields schist rock, the upper sections of which have weathered into various combinations of clay, silt, and sand.

Initially, the test bores penetrated 3 to 4" of organic sandy, silty sandy, or clayey sandy topsoil. Test bore B-10 was located on a gravel drive and penetrated 1" of crushed stone. Beneath 3 to 4" of organic topsoil or 1" of crushed stone, six of the test bores penetrated 1 to 8.5' of fill earth described as cohesive silty clay with brick fragments, sandy silty clay with brick and concrete fragments, clayey sand with gravel, silty clayey sand with gravel, and non-cohesive silty sand (sections with crushed stone or brick fragments). The test bores continued into possible fill and in-situ earth described as cohesive silty clay, sandy silty clay, sandy clay (sections with rock fragments), clayey sand (sections with gravel or rock fragments), and non-cohesive silt, sandy silt (sections with rock fragments), and silty sand (sections with crushed stone or rock fragments). The composition of the fill earth is similar in nature to the in-situ earth and we were not able to distinguish between fill and in-situ earth in some of the test bores. The penetration resistance values, "N", ranged from 6 to 64 blows per foot indicating relative densities of loose to dense in the predominate sand earth and consistencies of firm to very hard in the predominate clay and silt earth. Moisture tests indicated water contents ranging from 4.6 to 30.4%. Laboratory analyses confirmed "ML" and "CL" Unified Soil Classifications of the predominate sandy silt and sandy clay earth with plasticity indices of non-plastic to 14. The test bores were terminated in the in-situ earth at depths of 10 to 25' below existing ground surface.

The test bores did not indicate any groundwater during drilling or twenty-four hours following drilling. The test bores caved at depths of 7.3 to 22.7' below ground surface, twenty-four hours following drilling.

The enclosed test boring records further describe the subsurface stratigraphy, Unified Soil Classifications, penetration resistance values, moisture contents, caved depths, and boring termination depths.

3.4 General Construction Information

The construction data described in this section was considered in the formulation of our recommendations; therefore, any significant changes, additions or modifications to the planned development may have a significant impact on our recommendations. We ask that we be advised of any significant errors, omissions, or revisions in the construction data to permit further comment as needed.

Specific building structural information was not provided to us. The building development will include conventional type building construction along with related grading, drainage, and pavement improvements. The proposed buildings are expected to include single to two story height, concrete floor slab on grade, CMU block wall, or wood or steel frame with brick veneer type construction. A portion of the primary building is expected to include a partial basement. Structural loads are expected to range from 2 to 3 kips per linear foot for continuous foundations and concentrated loads are expected to be less than 75 kips for isolated foundations. We do not expect that the planned construction will be particularly sensitive to usual settlements.

Specific pavement design criteria was not provided to us. The pavements are expected to be subjected to a medium duty traffic classification with a moderate volume of automobiles and occasional medium to heavy weight service trucks.

Based on the preliminary grading information provided, a finish floor elevation of 864.5 is set for the ground level floor of the main building and a finish floor elevation of 854 is set for the basement level. The finish floor elevation for the building on the west end of the site is 866. We anticipate earth cutting thicknesses of approximately 5’ and filling thickness of up to 8.5’. Fill earth required to establish subgrade elevation is expected to originate from on-site cuts or local off-site borrow sources.

One of the enclosed boring plans further describes the planned development.

4.0 Recommendations - Site Preparation

4.1 "Controlled Areas"
Define those areas throughout and 5' beyond the proposed building and pavement areas and throughout significant slopes as "controlled areas".

4.2 Stripping
Remove all topsoil, stumps, vegetation, abandoned utilities, old foundations, and otherwise unsuitable materials from the "controlled areas". All unsuitable materials should be wasted off-site or in non-structural areas.

4.3 Drainage
Maintain the "controlled areas" in a drained condition that will ensure the continual removal of surface water that may flow over the construction areas. Temporary site drainage can be enhanced by the installation of the final site drainage structures during the early phases of the site development.

4.4 Site Examination
Prior to the placement of fill earth and following removal of cut earth, the "controlled areas" should be examined by the Carmichael Engineering, Inc. This examination should use proof rolling with construction equipment, test pits, supplemental test bores, visual examinations, etc., as needed to determine the presence, location, and extent of any localized organic, weak, and/or otherwise unsuitable soil conditions which may exist at the site. Surficial weak soil conditions should be undercut to expose a firm level of soil followed by backfilling with "engineered fill".

4.5 Subgrade Improvements
Following removal of the topsoil and any cut earth, the exposed subgrade should be thoroughly compacted to at least 98% of the materials ASTM D-698 standard density. Areas which fail to compact should be undercut to expose firm earth followed by backfilling with "engineered fill". Please note that the predominate silt and clay soil present at this site may initially exhibit relatively strong soil strengths when exposed in cuts. However, exposure to weather and construction traffic can cause the material to weaken, especially when wet or saturated. Caution should be used in grading the site and in establishing positive surface drainage to minimize degradation of the subgrade. Disturbed areas should be corrected by processing and compacting the exposed subgrade.

4.6 Proof Rolling and Correction of Weak Soil Conditions
Following completion of the subgrade improvements and prior to the placement of fill earth and following removal of cut earth, the "controlled areas" should be proof rolled and examined by Carmichael Engineering, Inc. Areas which yield excessively, exhibit weak soil or otherwise unsuitable conditions should be corrected in accordance with our recommendations. Typically, areas which yield excessively under proof rolling should be undercut to expose a firm level of soil followed by backfilling with "engineered fill".

4.7 Fill Earth
Fill earth required to establish subgrade elevation in the "controlled areas" can consist of the clean, non-saturated, and non-organic sections of the native earth or existing fill earth. Fill materials should be restricted to those materials which exhibit maximum dry unit weights of 100 pcf or greater based on the materials ASTM D-698 standard density. Native materials with unit weights of less than 100 pcf may be used in deep fills (at least 2' or more below finish subgrade) in pavement areas or slopes beyond the building “controlled areas”.

4.8 "Select Fill"
All fill earth originating from an off-site borrow source should be designated as "select fill". The "select fill" should consist of a clean, non-saturated, and non-organic clayey sand or clayey silty sand that meets the following criteria.

“Select Fill” Composition

Sieve Requirements	% Passing
3"	100
No. 4	75 - 100
No. 200	15 - 45
Liquid Limit	40 max
Plasticity Index	6 to 14
Maximum Dry Unit Weight Based on ASTM-D -698 Standard Density Test	$\geq$ 105 pcf

4.9 "Engineered Fill"
Unless otherwise specified, all fill earth and "select fill" earth placed in the "controlled areas" should be designated as "engineered fill". Place fill earth in thin lifts not to exceed 8" loose measure and thoroughly compact each lift of fill to at least 98% of the materials ASTM D-698 standard density in the “controlled areas”. At the time of densification, the moisture content of the "engineered fill" should be within 3% of the materials optimum water content. Following acceptance for moisture and density, any "engineered fill" areas which are disturbed should be retested prior to the placement of additional fill earth or structures.

4.10 Weather Considerations
The native soils contain appreciable amounts of clay and silt fines. These soils are subject to a significant loss of shear strength when wet or saturated and can pump and yield under heavy construction traffic, especially during periods of frequent or extended rain. The site can be best prepared during the normally drier summer and fall seasons when drying conditions are more favorable.

5.0 Recommendations - Shallow Spread Foundations And Ground Supported Floor Slabs

5.1 Maximum Net Allowable Soil Bearing Pressures
2,500 pounds per square foot for isolated square foundations.
2,000 pounds per square foot for continuous foundations.

Note: Building foundations should bear in the strong sections of in-situ earth, existing fill earth, and/or new “engineered fill” earth exhibiting "N" values of 9 or greater. Please note that in some sections of the site, the depth of the foundations may require increasing to reach suitable bearing material.

5.2 Minimum Foundation Dimensions
Depth - The bottom of perimeter wall and column foundations below outside finish grades should be at least 24"

- The bottom of interior foundations below the top of ground supported floor slabs should be at least 18”

Width - Isolated square foundations - 30"
- Continuous wall foundations - 18"
- Turned down slab edges - 12”

Note: All foundations should be sized for total load but should not be less than the minimums described preceding in this report. The use of the recommended minimum foundation depths considers that adequate surface drainage is provided at finish subgrade elevation.

5.3 Settlement
The planned building structure will be subjected to total long term settlements of less than 1" with differential settlements of less than 1/2". The building foundations should be designed to tolerate these estimated settlements.

5.4 Seismic Design Parameters
The design parameters for the IBC 2018 are as follows for the site subject to this report in Wedowee, Alabama.

$S_S = 0.180$ $S_{MS} = 0.288$ $S_{DS} = 0.192$
$S_1 = 0.083$ $S_{M1} = 0.199$ $S_{D1} = 0.132$
Site Class D

Seismic Design Category B for Use Group I, II or III and Seismic Design Category C for Use Group IV. The design parameters are as follows for the planned site.

5.5 Foundation Construction
Do not permit the foundation bearing soil to become saturated or dry excessively. Sections which become saturated or dry excessively should be undercut just prior to placement of the foundation concrete. All foundations should be constructed as expediently as possible following excavation of the foundation trench.

After excavation of the foundation trench, any disturbed soil exposed in foundation trenches should be thoroughly compacted to 98% standard density using a mechanical “jumping jack” type compactor. Areas which fail to compact should be undercut to a firm level off soil prior to placement of the foundation concrete.

Following construction of the foundations, the area adjacent to the foundation should be maintained in a drained condition. Water should not be permitted to pond adjacent to the building foundations during or following construction. Backfill adjacent to the building foundations as soon as possible to provide positive drainage. Backfill with clean soil typical of the material excavated from the foundation trenches. Masonry sand, broken brick and block or other construction debris should not be used to backfill against the foundations.

5.6 Acceptance of Foundation Bearing Levels
All foundation excavations should be examined by the project geotechnical consultant prior to the installation of the foundation reinforcement and concrete. All unacceptable conditions should be corrected in accordance with the geotechnical consultant's recommendations.

5.7 Floor Slab Bearing Conditions
The floor slabs should bear over the firm to stronger in-situ earth and/or “engineered fill” with a minimum 4” layer of crushed stone aggregate base (ALDOT 825) compacted to at least 98% modified density and a minimum 10 mil vapor barrier beneath the floor slab. For basement slabs, use 4” of free draining No.57 or No.67 graded stone capped with 3” of compacted crushed stone base material or No. 8910 stone and a minimum 10 mil vapor barrier between the subgrade layer and the floor slab. The No. 57 or 67 stone layers will serve as a working pad during construction and a permanent drainage blanket layer. The entire No. 57 or No. 67 stone drainage blanket should be enveloped with filter fabric such as Mirafi 140N or equal.

5.8 Acceptance Of Floor Slab Bearing Levels
All floor slab bearing levels should be examined by the projects geotechnical consultant prior to the placement of the vapor barrier. All unacceptable conditions should be corrected in accordance with the geotechnical consultant's recommendations.

5.9 Control/Expansion Joints
All masonry walls related to the construction should include control/expansion joints to reduce the effects of the usual differential settlement and concrete shrinkage that can occur. A liberal amount of control joints should be used in the construction. The design and location of control/expansion joints should be in accordance with the recommendations of the Portland Cement Association.

6.0 Recommendations – Basement Walls

6.1 Lateral Earth Pressures

The following Table 1 provides lateral earth pressures for foundation wall design for walls which are restrained against rotation.

Table 1

Material	Wet Unit Weight (pcf)	"At Rest" Earth Pressure Coefficient (Ko)	Lateral Earth Pressure (psf per foot of depth)*
Off-Site Free Draining Clean Coarse Sand	115	0.46	52.9
Graded No. 57 or No. 67 Stone	105	0.43	45.2
Native Earth / Select Fill	130	0.58	75.4

*Note: These pressures do not include lateral pressures introduced from adjacent foundations, floor slabs, equipment, or other extraneous sources. In order to utilize the lateral earth pressure for coarse sand or graded stone fill, the fill should be sloped from the wall foundation at 1(H):1(V) or flatter. Please note that the higher lateral pressures for the native soil should be used for design for walls with limited backfill zones. A coefficient of friction 0.4 may be used between the wall foundation and the native soil or "select fill" to resist sliding. A passive earth pressure of 320 psf per foot of depth may be used for the native soil or "select fill" to resist lateral forces. Apply an appropriate safety factor to the coefficient of friction and passive earth pressure to resist sliding. The project structural engineer should note the type of backfill material to be used on the structural drawings to satisfy the design criteria.

6.2 Wall Backfill

Develop as engineered fill, 95% of the ASTM D-698 standard density in structural areas and 90% standard density in non-structural areas. Place fill using hand directed compaction equipment. Do not use heavy construction equipment adjacent to below grade walls unless the walls are adequately braced to withstand the lateral pressures imposed by such loadings. The final 18" of fill along the below grade walls should consist of the less permeable native soil or select fill material to prevent large volumes of water from permeating the backfill zone.

6.3 Wall Drainage

Provide an underdrain system to prevent water from perching against the below grade walls during or following construction. Aggregate filled underdrainage may consist of perforated 4" diameter PVC underdrainage pipe meeting the minimum requirements of the Alabama Department of Transportation (ALDOT) Section 853.10. The drainage pipe should be surrounded by ALDOT Section 800 Size # 57 or # 67 aggregate. The aggregate should be enveloped by filter cloth such as Mirafi 140N (or equivalent) to prevent clogging of the underdrain. The bottom of the drain should be located 24" below the top of the below grade floor slab around the outside perimeter wall foundations. The drainage aggregate beneath the below grade floor slab should be relieved into the perimeter underdrain. The underdrain should be provided with a uniform slope of 1 to 2% or greater for its entire length. The drain should be provided a positive outlet.

7.0 Recommendations - Pavements

7.1 Reference
Alabama Department of Transportation (ALDOT), *Standard Specifications For Highway Construction* - 2018 Edition.

7.2 Subgrade Support Values
Based estimated California Bearing Ratios (CBR) for the native earth expected at subgrade elevation, a design CBR value of 5 is recommended.

7.3 Traffic Data
Specific design pavement traffic data was not available. The pavements are expected to be designed as a medium duty pavement section with a moderate volume of automobiles and occasional medium to heavy weight service trucks. Please contact our office if specific pavement design data is available so that we may modify our pavement recommendations (if required).

7.4 Subgrade Improvements
Thoroughly mix and compact the top 6" of subgrade to 100% standard density.

Slope subgrade to provide positive drainage to side drainage ditches, underdrains, and/or storm drains to prevent the entrapment of water in the subgrade layer.

7.5 Medium Duty Pavement Sections
Based on an estimated CBR value of 5.0 and a 20 year design life, the medium duty pavement sections may be developed using a crushed aggregate base and high stability bituminous pavement section or a concrete pavement section placed over the improved subgrade layer as follows:

7.5.1 Crushed Aggregate Base and High Stability Bituminous Pavement Section
1.5" - ALDOT Section 424-A 340 bituminous wearing surface.
1 - ALDOT Section 405 bituminous tack coat.
2.0" - ALDOT Section 424-B 636 bituminous binder.
1 - ALDOT Section 401-A bituminous prime coat.
6" - ALDOT Section 825 crushed aggregate base (100% modified density).
6" - ALDOT Section 230 improved roadbed (100% standard density).

Notes: All bituminous mixes should be designed on the fine side of the restrictive zone to reduce the permeability of the pavement section.

7.5.2 Concrete Pavement Section
5" - 4000 psi compressive strength (550 psi flexural strength) concrete, maximum 5" slump.
6" - Improved subgrade (100% standard density).

7.6 Trash Dumpster Loading Areas
A minimum 7” thick concrete pad should be developed over compacted subgrade in front and beneath trash dumpster areas to provide support for the sanitation vehicles during handling of the dumpsters.

7.7 Concrete Pavement Construction Joints
The design and location of construction joints should be in accordance with the recommendations of the Portland Cement Association. We recommend a maximum joint spacing of 12'. All joints should be filled with a suitable flexible joint compound to prevent water intrusion at the joints.

7.8 Material Thicknesses
All material thicknesses referred to in this section are completed thicknesses.

8.0 Recommendations – General

8.1 Utility Trenches
All utility trenches (new and existing) extending through the "controlled areas" should be back-filled with "engineered fill".

8.2 Grading and Drainage Improvements
Incorporate finish grades, side drainage ditches, underdrains, etc., to reduce the possibility of ponding surface water within 5' of foundations, pavements, and significant slopes.

8.3 Vertical Cuts
Vertical cuts greater than 4' or cuts required to remain open for extended periods of time should be sloped or braced as required for the protection of workmen entering deep excavations. Heavy construction traffic and stockpiling of excavated earth or other materials should not be permitted near the top of open unsupported excavations. Current OSHA regulations should be adhered to with respect to excavations for this project.

8.4 Cut and Fill Slopes
Permanent cut and fill slopes should perform satisfactorily as steep as 3(H):1(V) in the native earth or 2.5(H):1(V) in the "select fill". All slopes should be protected from erosion using suitable vegetation or pavements.

8.5 Quality Control
Carmichael Engineering, Inc., should provide the following services during construction:

8.5.1 Verify the results of stripping, proof-rolling, and correction of weak soil conditions, quality and density of "engineered fill", and conditions of the foundation, floor slab and pavement subgrade bearing levels.

8.5.2 Complete soil particle size, atterberg limits, and laboratory compaction tests on each different type of fill earth used in the "controlled areas".

8.5.3 Complete a minimum of 2 field density test per each 2,000 square feet per each 1' of vertical thickness of fill placed in the building "controlled areas" and 1 field density test per each 4,000 square feet per each 1' of vertical thickness of fill placed in the pavement "controlled areas". Also, a minimum of 1 field density test should be taken for each 50 linear feet per each 2' of vertical thickness of fill placed at utility trenches extending through "controlled areas".

8.5.4 Test all structural concrete in accordance with the guidelines established by the American Concrete Institute.

8.5.5 Quality assurance testing on the improved subgrade, base and pavement materials should be in accordance with the State of Alabama Department of Transportation.

9.0 General Comments

The scope of this study did not include sampling or testing for an environmental analysis or assessment for this site. If an environmental assessment of this site is desired, we should be contacted for further comment.

The comments of this report do not consider local flood conditions. The local flood condition/elevation (if any) should be determined and considered in the design of this project.

The frost penetration depth in the area of this project is generally taken to be less than 10". Provided our recommendations for the development of foundations and floor slabs are followed, we do not expect that the frost penetration will have any detrimental effects on the performance of these structures.

The comments of this report are based upon our interpretation of the construction information supplied by others, the data collected at the 11 soil test bores and our visual examination of the site. The evaluation of subsurface conditions based on the 11 soil test bores taken with this study requires a certain amount of interpolation. Improper site preparation, extremes in climatic conditions, significant changes in locations, grades, time, etc., can each affect groundwater, surface, and subsurface conditions. If conditions are encountered as the construction advances which vary significantly from those described by this report, we should be contacted for supplemental comment.

The scope of this investigation is not intended to establish volumetric estimates of the various subsurface materials at the site. Volumetric estimates may require a larger number of test bores placed on a close grid to establish reliable cross sections. If volume estimates are required of us for the design/development of this project to advance, please contact us for further comment.

We are available to provide a review of the final plans and project specifications with respect to their compatibility with the contents of this report. Furthermore, our firm would appreciate the opportunity to continue to serve as the geotechnical consultant and to provide the construction materials testing and monitoring for this project.

10.0 Signatures

Thank you for selecting Carmichael Engineering, Inc., to provide the geotechnical services for this project. We are available to answer any questions concerning our findings and recommendations. If we can be of any further assistance, please contact our office.

Sincerely.

Robert E. Ellzey, E.I.
Project Engineer
E.I. No. 18818

ALABAMA LICENSED No. 29181 PROFESSIONAL ENGINEER BRANDON M. ROUNTREE

Brandon M. Rountree, P.E.
Licensed AL #29181

3/19/21

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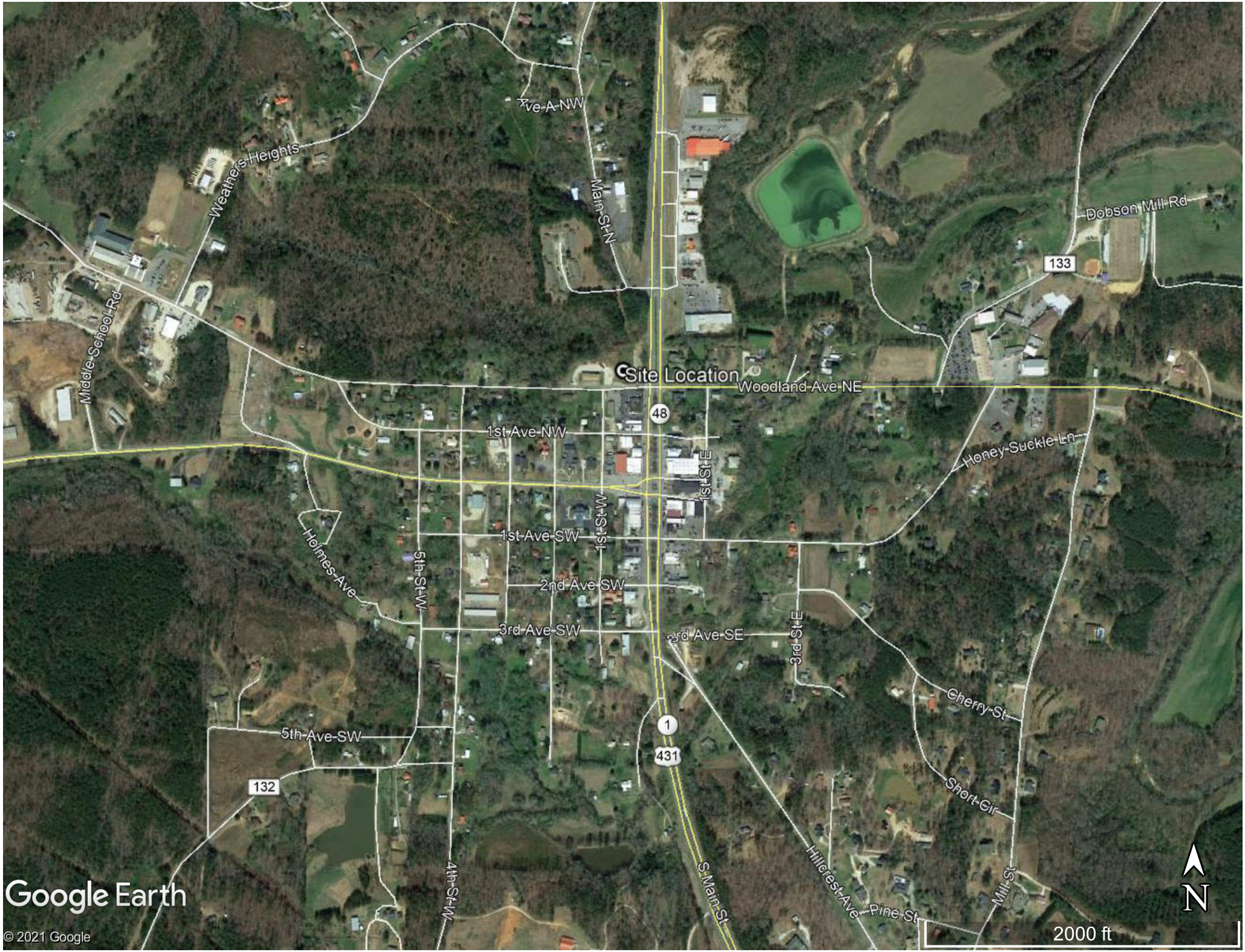
Site Location
Woodland Ave NE
1st Ave NW
1st Ave SW
2nd Ave SW
3rd Ave SW
3rd Ave SE
5th Ave SW
Main St N
1st St W
1st St E
3rd St E
5th St W
4th St W
S Main St
Weathers Heights
Middle School Rd
Ave A NW
Dobson Mill Rd
Honey Suckle Ln
Holmes Ave
Cherry St
Short Cir
Hillcrest Ave
Pine St
Mill St
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B-4
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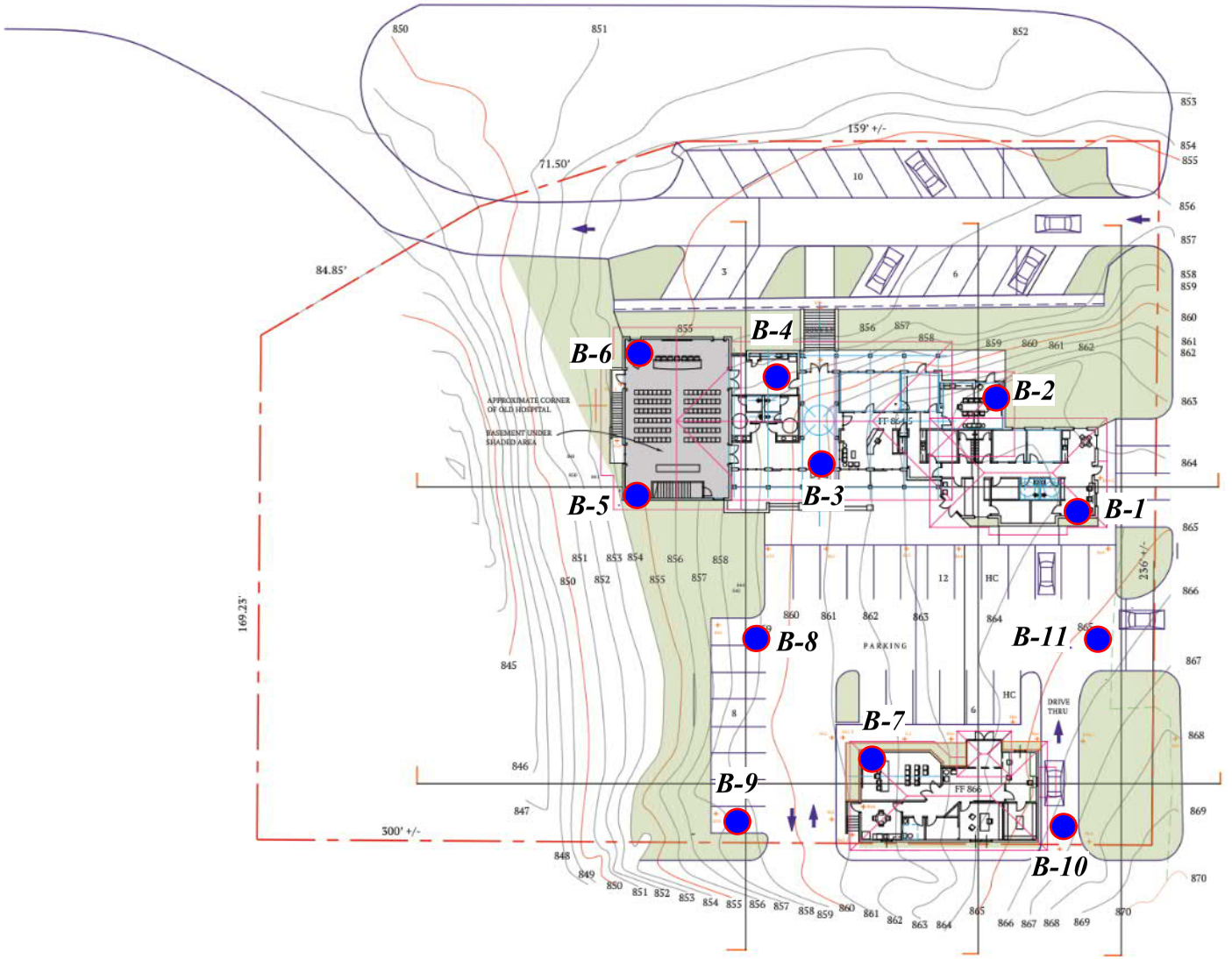
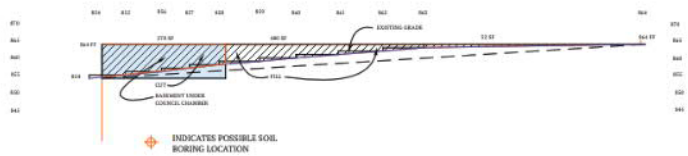




INDICATES POSSIBLE SOIL BORING LOCATION

N

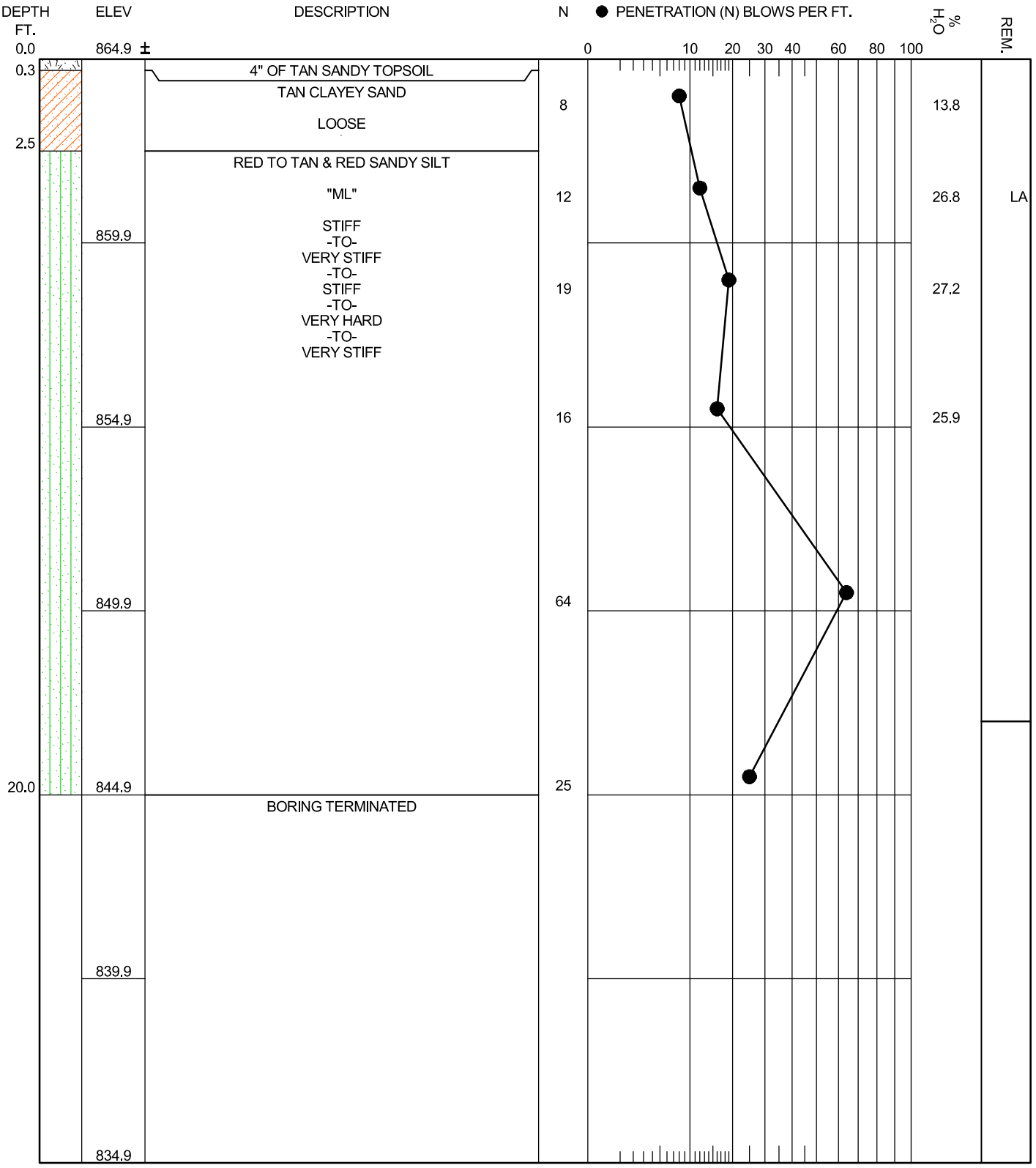
SITE PLAN

1" = 20' - 0"

0 10 20 40

COUNCIL CHAMBERS	2,500 SF
MAYOR/CITY OFFICES	2,500 SF
POLICE	1,800 SF
PRIMARY BUILDING	6,550 SF
UTILITIES	1,920 SF
TOTAL SF	8,470 SF

DATE PURPOSE



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 18.0' AFTER 24 HOURS

CARMICHAEL ENGINEERING, INC.

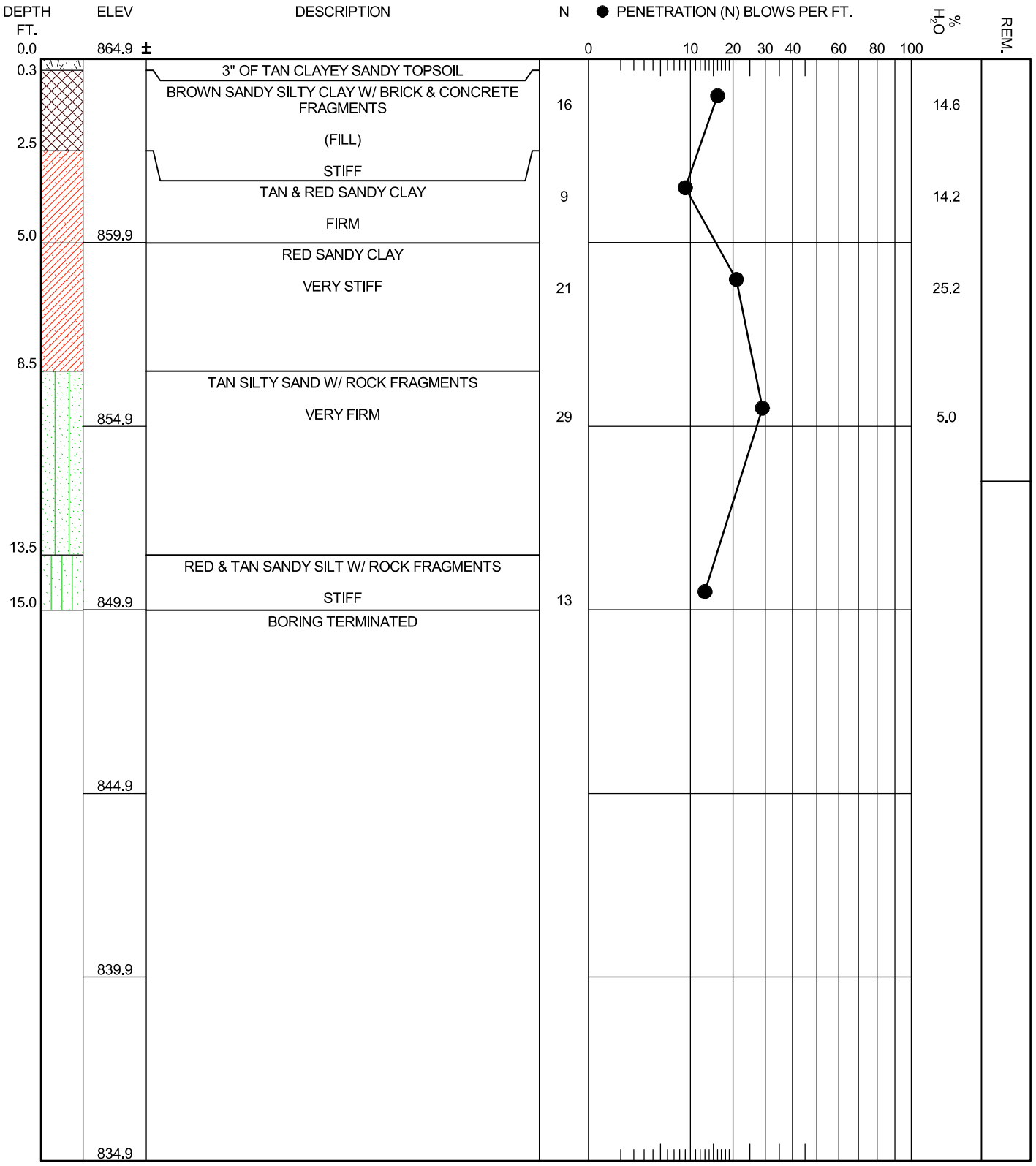
TEST BORING LOG

JOB NO. G21-6023

BORING NO. B -1

DATE DRILLED 3/9/21

TYPE BORING SB



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 11.5' AFTER 24 HOURS

TEST BORING LOG

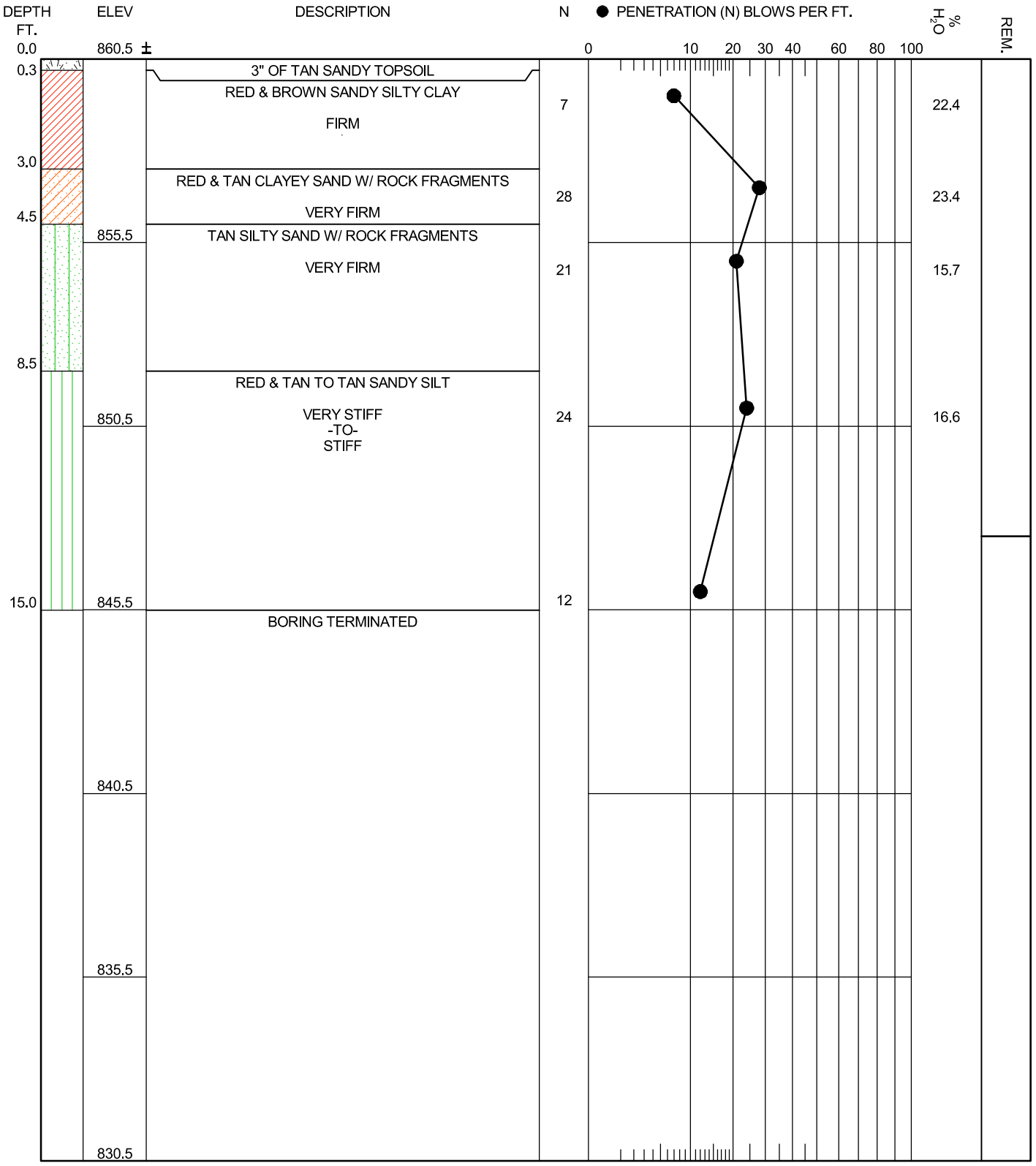
JOB NO. G21-6023

BORING NO. B -2

DATE DRILLED 3/9/21

TYPE BORING SB

CARMICHAEL ENGINEERING, INC.



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 13.0' AFTER 24 HOURS

TEST BORING LOG

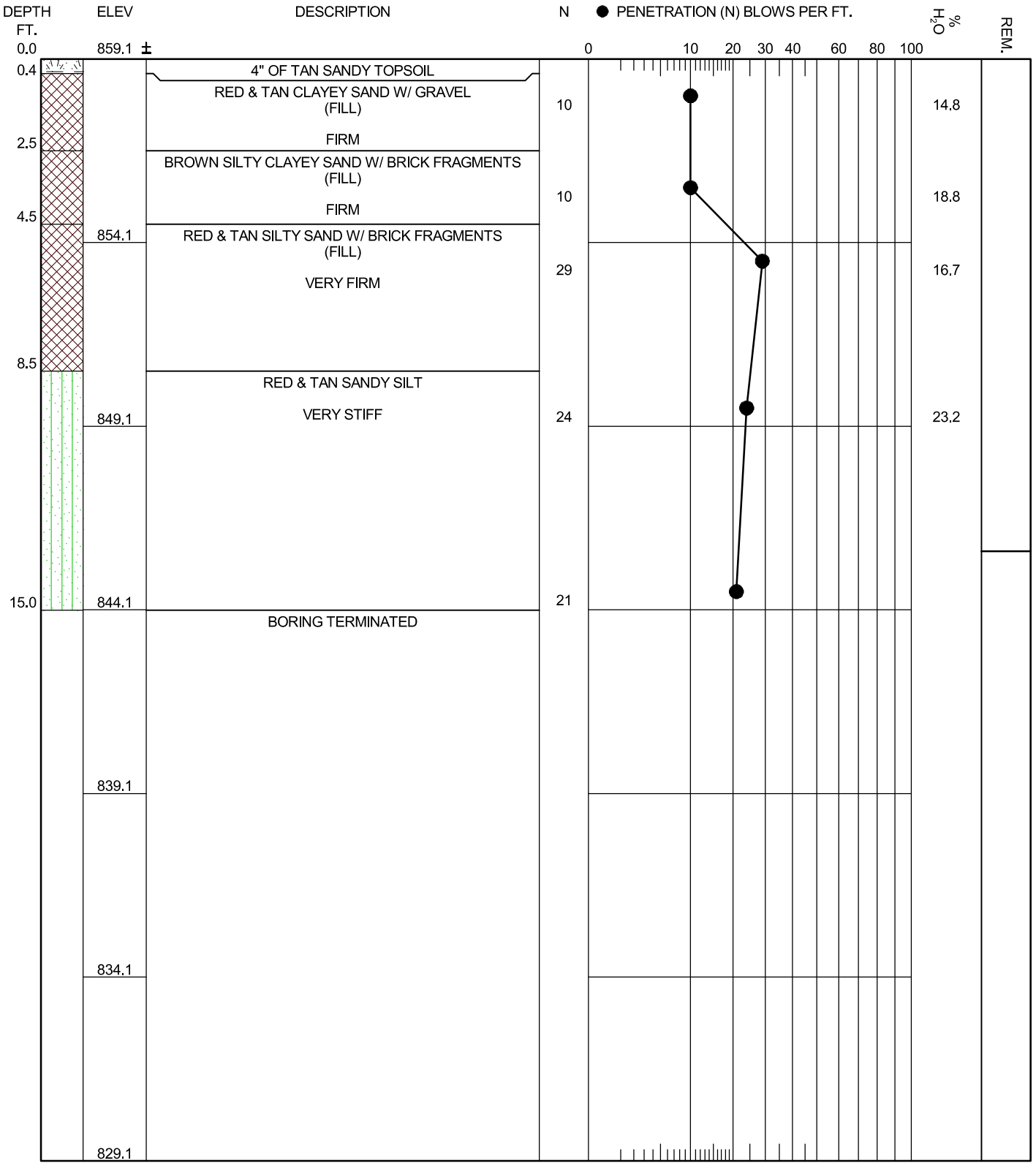
JOB NO. G21-6023

BORING NO. B -3

DATE DRILLED 3/9/21

TYPE BORING SB

CARMICHAEL ENGINEERING, INC.



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 13.4' AFTER 24 HOURS

CARMICHAEL ENGINEERING, INC.

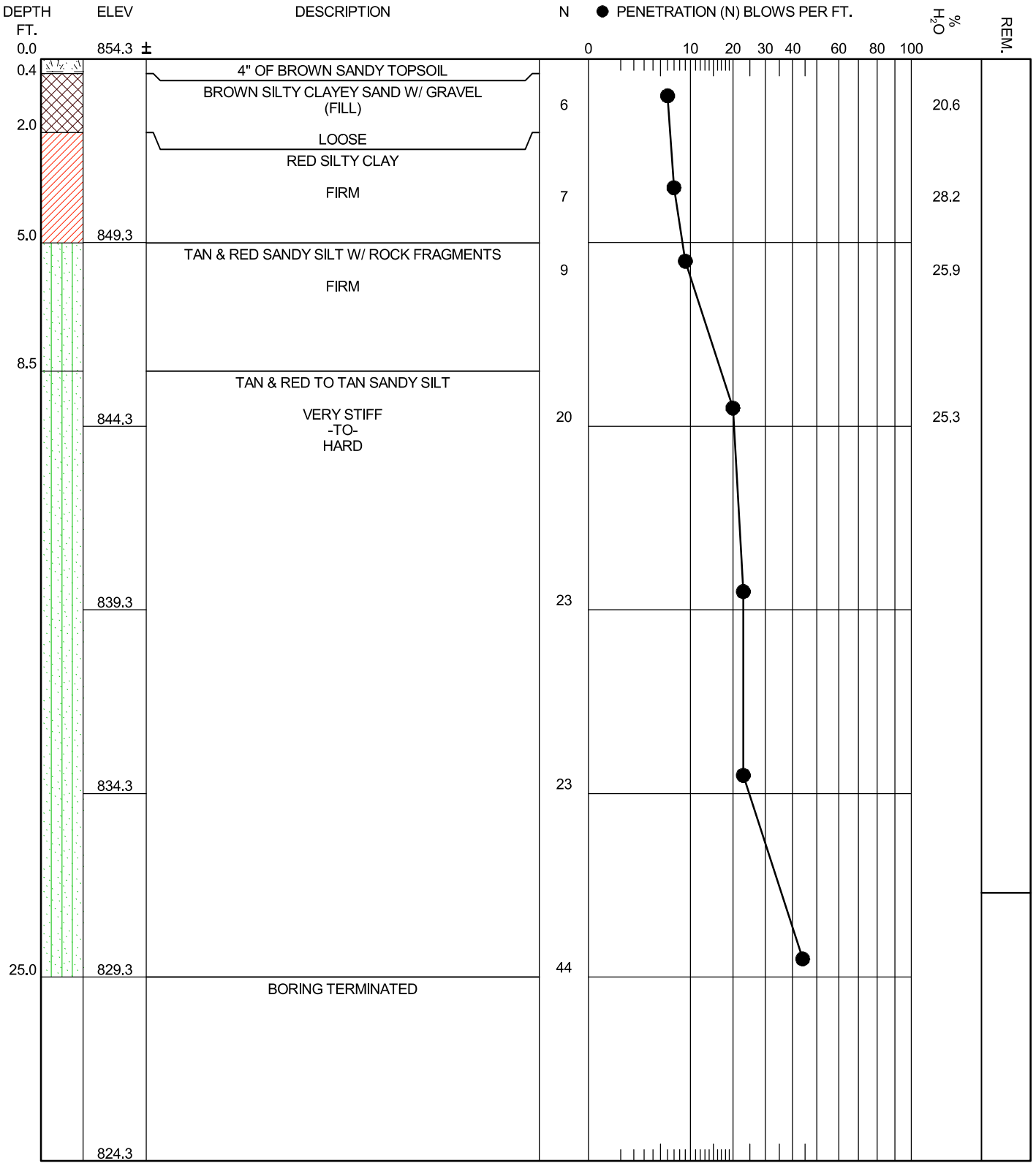
TEST BORING LOG

JOB NO. G21-6023

BORING NO. B -4

DATE DRILLED 3/9/21

TYPE BORING SB



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

☒ Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 22.7' AFTER 24 HOURS

CARMICHAEL ENGINEERING, INC.

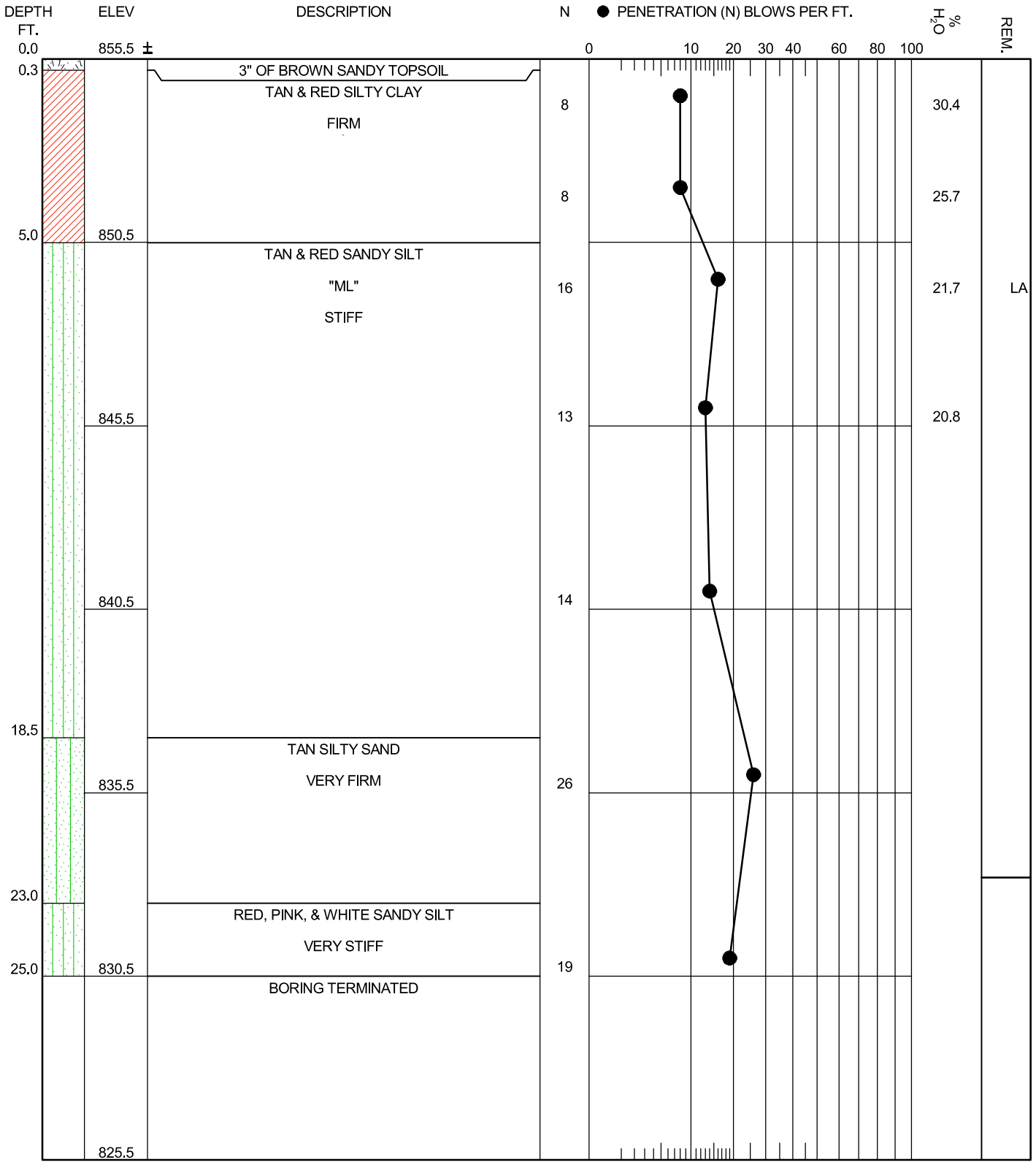
TEST BORING LOG

JOB NO. G21-6023

BORING NO. B -5

DATE DRILLED 3/9/21

TYPE BORING SB



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 22.3' AFTER 24 HOURS

TEST BORING LOG

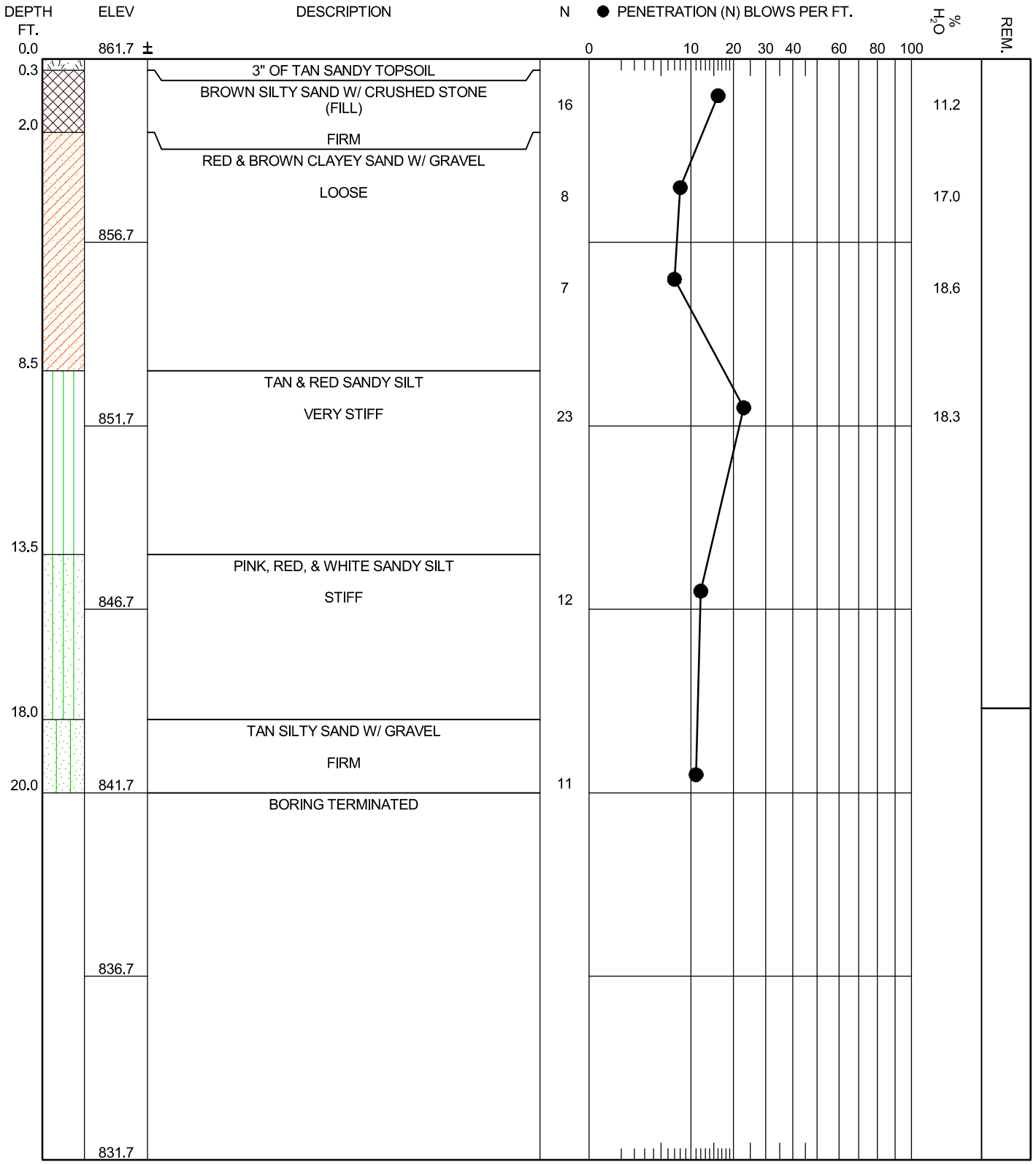
JOB NO. G21-6023

BORING NO. B -6

DATE DRILLED 3/9/21

TYPE BORING SB

CARMICHAEL ENGINEERING, INC.



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 17.7' AFTER 24 HOURS

CARMICHAEL ENGINEERING, INC.

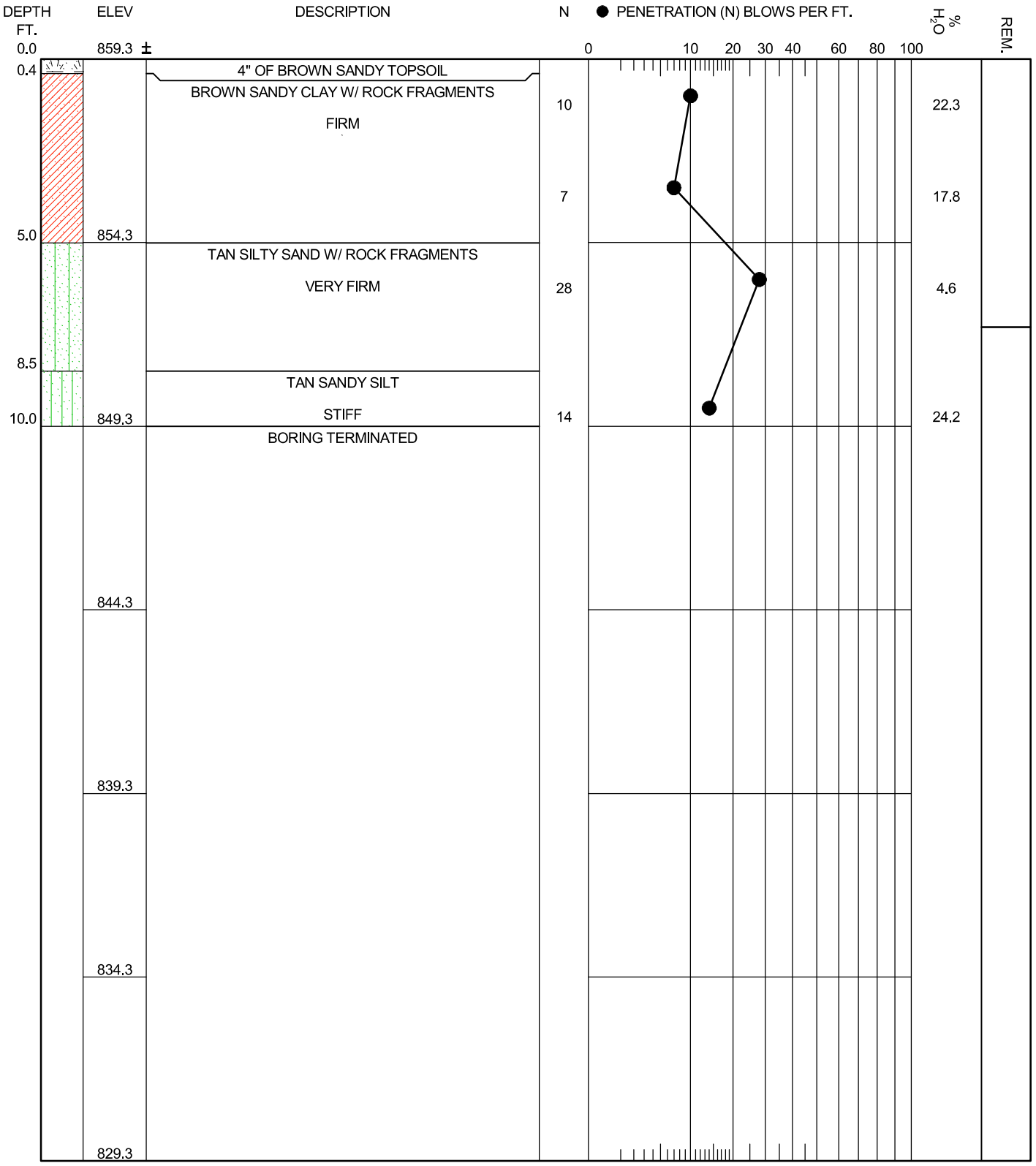
TEST BORING LOG

JOB NO. G21-6023

BORING NO. B -7

DATE DRILLED 3/9/21

TYPE BORING SB



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

☒ Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 7.3' AFTER 24 HOURS

CARMICHAEL ENGINEERING, INC.

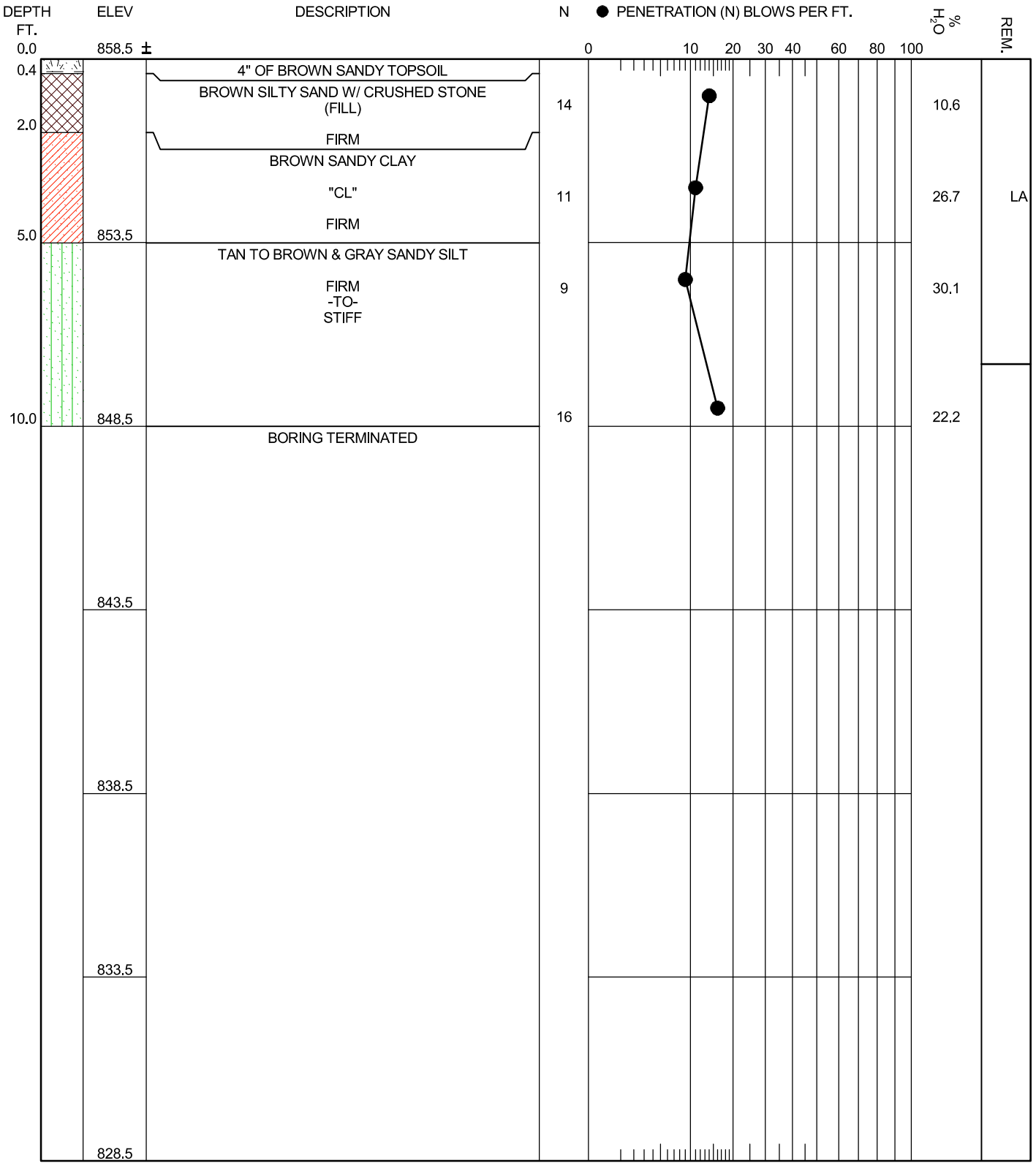
TEST BORING LOG

JOB NO. G21-6023

BORING NO. B -8

DATE DRILLED 3/9/21

TYPE BORING SB



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 8.3' AFTER 24 HOURS

CARMICHAEL ENGINEERING, INC.

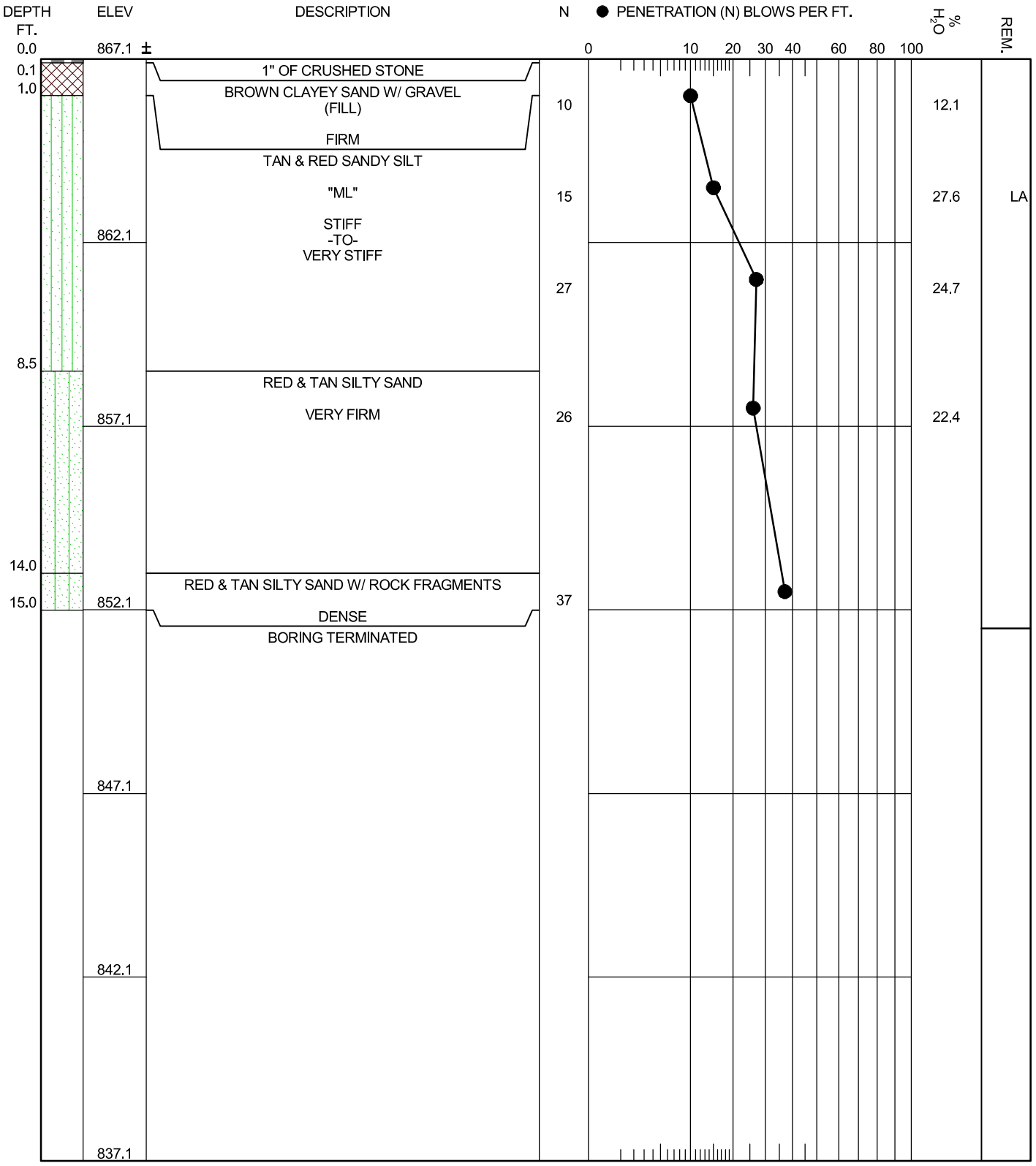
TEST BORING LOG

JOB NO. G21-6023

BORING NO. B -9

DATE DRILLED 3/9/21

TYPE BORING SB



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

☒ Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 15.5' AFTER 24 HOURS

TEST BORING LOG

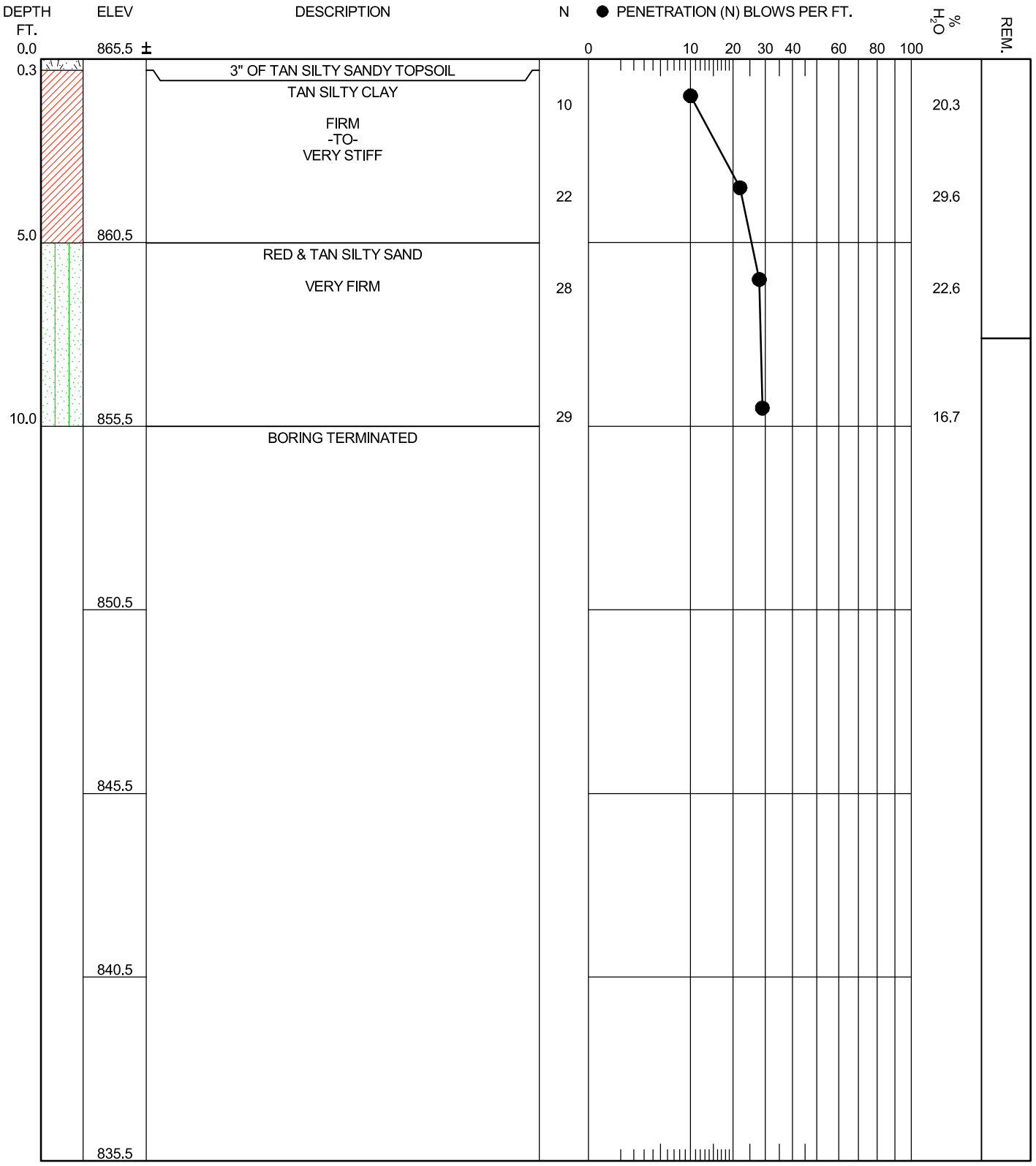
JOB NO. G21-6023

BORING NO. B-10

DATE DRILLED 3/9/21

TYPE BORING SB

CARMICHAEL ENGINEERING, INC.



Boring and Sampling Meets ASTM D-1586

Penetration (N) is the Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in I.D. Sampler 1 Ft.

Undisturbed Sample

LA Lab Analysis

Water Level

Water Level

Boring Caved 7.6' AFTER 24 HOURS

CARMICHAEL ENGINEERING, INC.

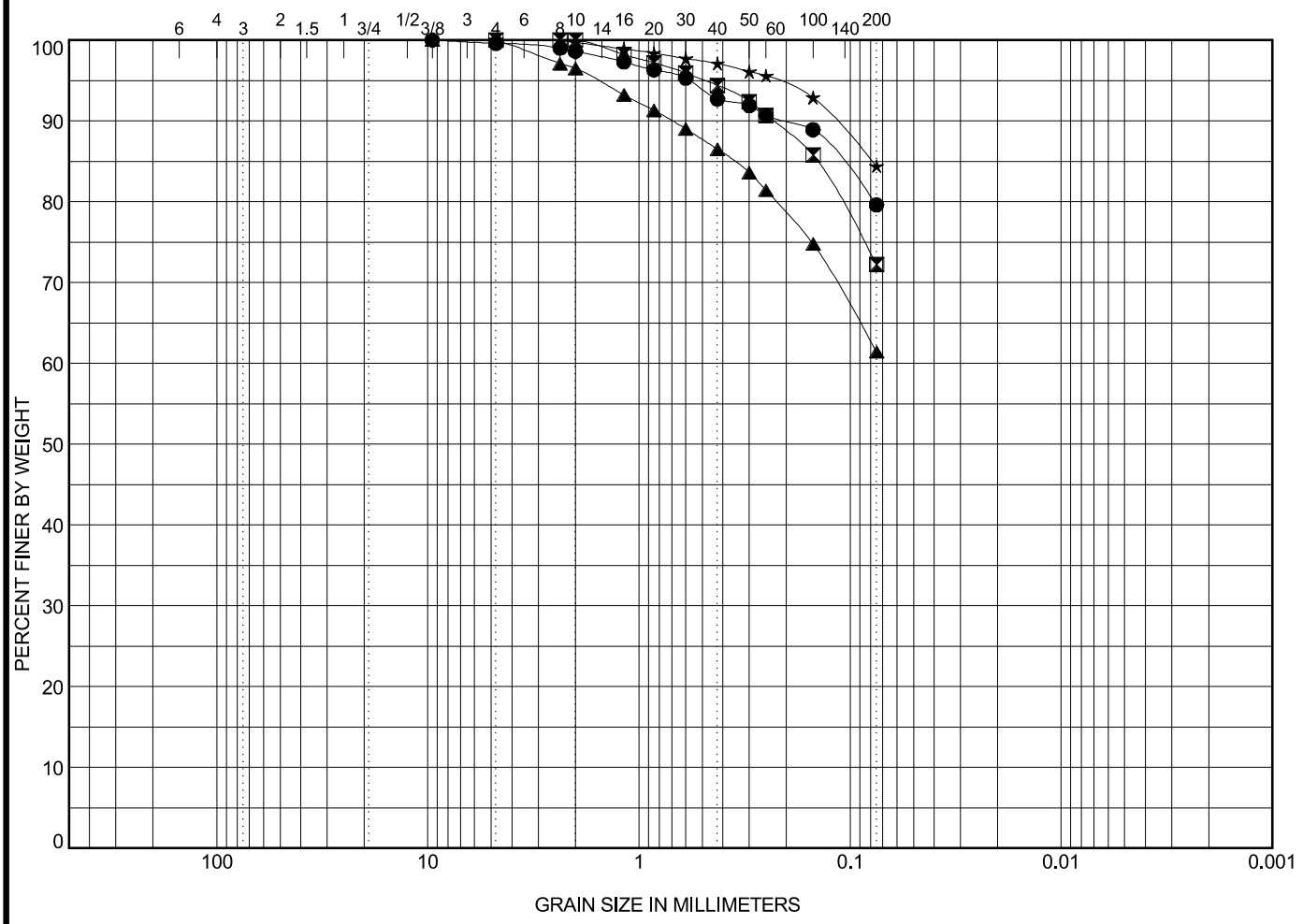
TEST BORING LOG

JOB NO. G21-6023

BORING NO. B-11

DATE DRILLED 3/9/21

TYPE BORING SB



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	1212	B-1 2.5-4'	SILT with SAND ML	43	29	14		
⊠	1213	B-6 5-6.5'	SILT with SAND ML	NP	NP	NP		
▲	1214	B-9 2.5-4'	SANDY LEAN CLAY CL	26	17	9		
★	1215	B-10 2.5-4'	SILT with SAND ML	43	30	13		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1212	B-1 2.5-4'	9.525				0.4	20.0	79.6	
⊠	1213	B-6 5-6.5'	4.75				0.0	27.8	72.2	
▲	1214	B-9 2.5-4'	9.525				0.1	38.5	61.4	
★	1215	B-10 2.5-4'	4.75				0.0	15.6	84.4	

Client: Glynn Clark Designs
P.O. Box 381561
Birmingham, AL 35238

Test Methods: ASTM D422, ASTM D4318
Sample Received Date: 3/9/2021
Test Date(s): Grain Size - 3/15/2021, Atterberg Limits - 3/15/2021

CARMICHAEL ENGINEERING, INC.

GRAIN SIZE DISTRIBUTION

Project: Wedowee City Hall

Location: Wedowee, AL

Job No.: G21-6023 Report Date: 3/16/2021

Reviewed By: Brandon M. Rountree, P.E.

US GRAIN SIZE2 G21-6023.GPJ CARMICHL.GDT 3/20/21

INVESTIGATIVE FIELD PROCEDURES

Penetration Testing & Split Barrel Sampling: A standard 2.0" O.D. (1.4" I.D.) split barrel sampler is first seated 6" to penetrate any loose cuttings and then driven an additional 12" with blows of a 140-pound hammer falling 30". The number of blows required to drive the sampler the final foot is recorded and designated the “penetration resistance” (N). (ASTM D- 1586)

Soil Boring (SB): The test bore is advanced by a drilling rig utilizing 5-5/8" O.D. (2-1/4" I.D.) hollow stem augers. Soil samples are obtained with a standard split-tube sampler by driving the sampler thru the hollow auger. Collected soil specimens are sealed in air tight containers and delivered to the laboratory to confirm the drillers classifications. (ASTM D- 1452 & 1586)

Auger Boring (AB): Steel flight augers are utilized to advance the test bore. The soils are visually classified and sampled from the cuttings which are bought to the surface. (ASTM D-1452)

Undisturbed Sampling (UD): Relatively undisturbed soil samples are obtained by forcing a section of 3" O.D. 16-gauge steel tubing into the soil at the desired sample location. The tube is then sealed from moisture loss and delivered to the laboratory for possible laboratory testing.

Rotary-Wash Boring (RB): The drilling operation is performed by first setting a length of casing and then advancing the test bore by “jetting” a bentonite solution thru drill rods and bit.

Core Drilling (CD): The test bore is advanced thru rock by coring which utilizes a diamond bit and a double tube, swivel type core barrel. (ASTM D-2113)

Monitoring Wells (MW): Temporary or permanent wells may be installed to provide the accurate water table determination and periodic monitoring. The well is constructed with 1.5" to 4" diameter PVC pipe meeting current standards for monitoring well construction.

NOTES AND REFERENCES

Soil descriptions are based on the predominate constituent of the material and are further described by appropriate modifiers in reverse order of their importance. For example, a predominate sand soil containing clay would be described as “clayey sand”. Additional modifiers may be used, beginning with the least important constituent such as “silty clayey sand”, etc.

Water levels shown on the test boring logs reflect those levels measured at the specified time and date indicated on the logs. These water levels are subject to seasonal fluctuation and can be effected by local surface drainage and/or rainfall during the monitoring period.

The following table describes soil relative densities and consistencies based on penetration resistance values (N) determined by the Standard Penetration Test. The “N” values are estimated for hand tool bores using a portable dynamic cone penetrometer.

	N	Relative Density
	0 – 3	Very Loose
	4 – 9	Loose
Sand	10 – 19	Firm
	20 - 29	Very Firm
	30 - 49	Dense
	50+	Very Dense

	N	Consistency
	0 - 2	Very Soft
	3 - 5	Soft
	6 - 11	Firm
Clay and Silt	12 - 17	Stiff
	18 - 29	Very Stiff
	30 - 49	Hard
	50+	Very Hard

Laboratory Test References

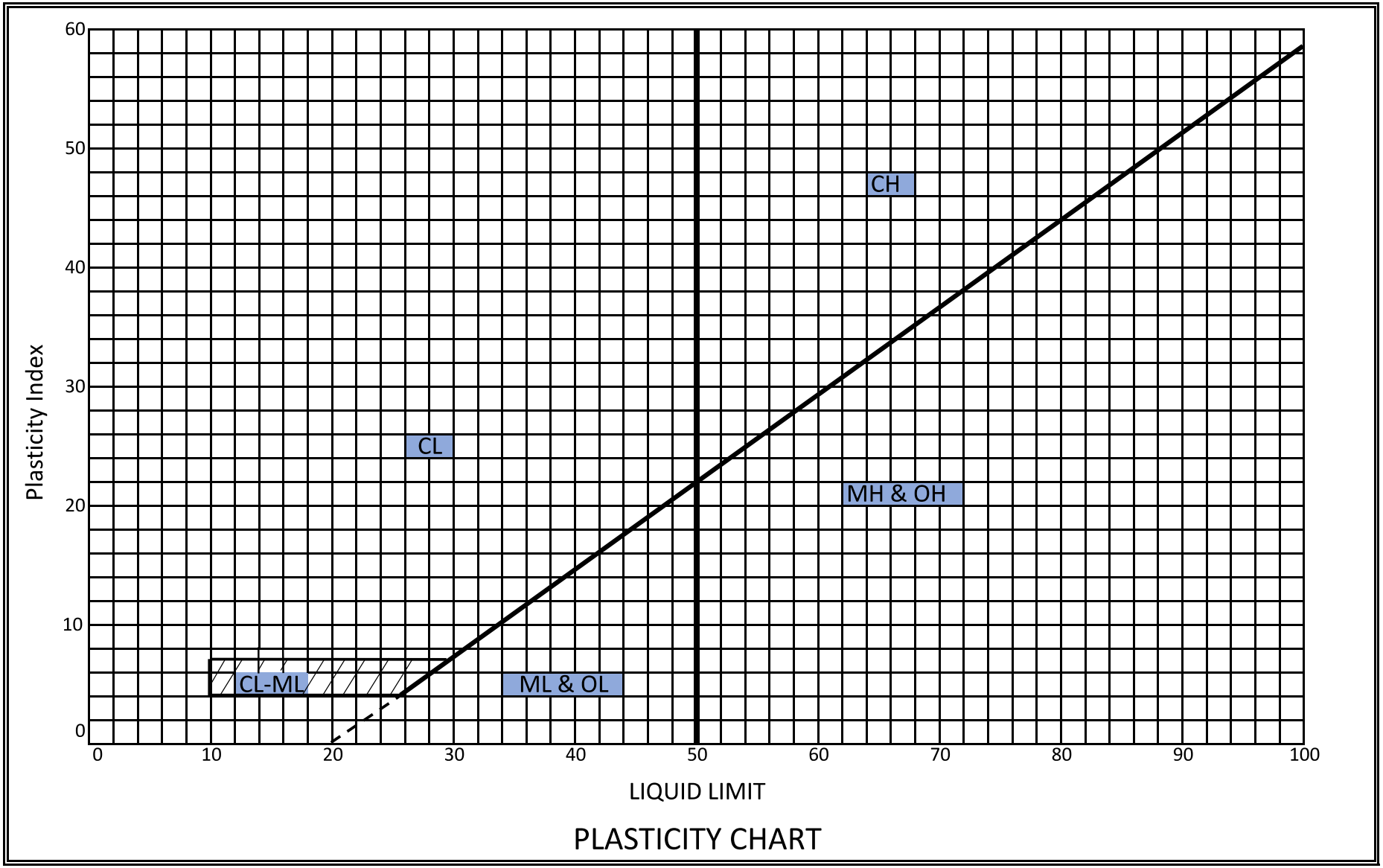
Test	**Reference**
Moisture Content	ASTM D-854
Particle Size Analysis	ASTM D-421,422,1140
Atterberg Limit	ASTM D-423, 424
Specific Gravity	ASTM D-2216
Compaction Test	ASTM D-698, 1557
California Bearing Ratio Test	AASHTO T-193
Triaxial Shear Test	ASTM D-2850
Unconfined Compression Test	ASTM D-2166
Consolidation Test	ASTM D-2435
Soil Permeability Test	ASTM D-2434

The Unified Soil Classification System

Major divisions			Group symbol		Typical names	Classification criteria for coarse-grained soils	
Coarse-grained soils (more than half of material is larger than No. 200)	Gravels (more than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	$C_U \geq 4$ $1 \leq C_C \leq 3$	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW ($C_U < 4$ or $1 > C_C > 3$)	
		Gravels with fines (appreciable amount of fines)	GM	d/u	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below A line or $I_P < 4$	Above A line with $4 < I_P < 7$ are borderline cases requiring use of dual symbols
			GC		Clayey gravels, gravel-sand-clay mixtures	Atterberg limits below A line with $I_P > 7$	
	Sands (more than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	CU ≥ 6 $1 \leq C_C \leq 3$	
			SP		Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW ($C_U < 6$ or $1 > C_C > 3$)	
		Sands with fines (appreciable amount of fines)	SM	d/u	Silty sands, sand-silt mixtures	Atterberg limits below A line or $I_P < 4$	Limits plotting in hatched zone with $4 \leq I_P \leq 7$ are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above A line with $I_P > 7$	
Fine-grained soils (more than half of material is smaller than No. 200)	Silts and clays (liquid limit < 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	1. Determine percentages of sand and gravel from grain-size curve. 2. Depending on percentages of fines (fraction smalled than 200 sieve size), coarse-grained soils are classified as follows: Less than 5%-GW, GP, SW, SP More than 12%-GM, GC, SM, SC 5 to 12%-Borderline cases requiring dual symbols.	
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL		Organic silts and organic silty clays of low plasticity		
	Silts and clays (liquid limit > 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH		Inorganic clays or high plasticity, fat clays		
			OH		Organic clays of medium to high plasticity, organic silts		
	Highly organic soils		Pt		Peat and other highly organic soils		

$$C_U = D_{60}/D_{10}$$

$$C_C = D^2_{30}/D_{10}D_{60}$$



PLASTICITY CHART

EXHIBIT C

CARMICHAEL ENGINEERING, INC.

GENERAL CONDITIONS OF AGREEMENT WITH THE CLIENT

1. PAYMENT TERMS. CARMICHAEL ENGINEERING, INC., (hereinafter called "CEI") will submit invoices to client monthly and a final bill upon completion of services. Invoice will show charges for different personnel, unit prices and/or expense classifications unless a lump sum payment is agreed to as part of this agreement. Payment is due upon presentation of invoice and is past due ten (10) days from the invoice date. Client agrees to pay a finance charge of one and one-half percent (1 1/2%) per month (minimum of $15.00 per month) on the principal amount of any past due account. In the event CEI deems it necessary to refer the account to an attorney for collection, client agrees to pay all costs of collection, including a reasonable attorney's fee.

2. INSURANCE. CEI maintains Worker's Compensation and Employer's Liability Insurance in conformance with applicable state law. In addition, we maintain Comprehensive General Liability Insurance and Automobile Liability Insurance with bodily injury limits and property damage limits of, to wit $1,000,000 combined single limit. A certificate of insurance can be supplied evidencing such coverage which contains a clause providing that fifteen (15) days written notice be given prior to cancellation. Cost of the above is included in our quoted fees. If additional coverage, such as additional insured endorsements, waiver of subrogation or increased limits of liability are required, CEI will endeavor to obtain the requested insurance and charge separately for costs associated with additional coverage or increased limits.

3. STANDARD OF CARE. The only warranty or guarantee made by CEI in connection with the services performed hereunder is that we will use that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, expressed or implied, is made or intended by our proposal for geotechnical/environmental services or by our furnishing oral or written reports.

4. LIMITATION OF LIABILITY. Client agrees to limit CEI's liability to client, and to all construction contractors and subcontractors on the project, arising from CEI's professional acts, errors or omissions or other professional negligence, so that the total aggregate liability of CEI to all those named shall not exceed $1,000,000.

5. RIGHT OF ENTRY. Unless otherwise agreed in writing, client will provide for the right of entry for CEI, its agents and employees and all equipment necessary for the completion of the work. While CEI will take reasonable precautions to minimize any damage to the site, it is understood by the client that in the normal course of work some damage may occur and that the cost of correction or repairing such damage is not included in the quoted fee and CEI is not responsible unless specifically stated. If client desires CEI to repair or correct the damage, the cost of such repairs or corrections will be paid by client as an additional fee.

6. EXISTING MAN MADE OBJECTS. It is the duty of the client to disclose the presence and accurate location of all hidden or obscure man made objects, including utility lines, relative to field test or boring locations. CEI field personnel are trained to recognize clearly identifiable stakes or markings in the field and, without special written instructions to initiate field testing, drilling and/or sampling within a reasonable distance of each designated location. If CEI is notified in writing of the presence or potential presence of underground or above ground obstructions, such as utilities, CEI will give special instructions to its field personnel. Client agrees to indemnify and save harmless CEI from all claims, suits, losses, personal injuries, deaths and property liability resulting from unusual subsurface structures, owned by client or third parties, occurring in the performance of the proposed services, the presence and exact locations of which were not revealed to CEI in writing, and to reimburse CEI for expenses in connection with any such claims or suits, including reasonable attorney's fees.

7. SAMPLING OR TESTING LOCATION. The fees included in the Agreement do not include costs associated with surveying of the site or the accurate horizontal and vertical locations of tests. Field test or boring locations described in CEI's report or shown on sketches are based on specific information furnished by the client or clients agent or estimates made by CEI technicians. Such dimensions, depths or elevations should be considered as approximations unless otherwise stated in the report or contracted for at the inception of the Agreement.

8. SAMPLE DISPOSAL AGREEMENT. CEI will retain soil and rock samples which are not used for testing for forty-five (45) days after submission of our report. After forty-five (45) days the retained samples will be discarded unless the client has made written request for storage or transfer of the samples. Client shall be responsible for the expense of such storage or transfer.

9. SAFETY. When CEI provides periodic observations or monitoring services at the job site during construction, Client agrees that, in accordance with generally accepted construction practices, the contractor (i.e. not CEI) will be solely and completely responsible for working conditions on the job site, including safety of all persons and property during the performance of the work, and compliance with OSHA regulations, and that these requirements will apply continuously and not be limited to normal working hours. Any monitoring of the contractor's procedures conducted by CEI is not intended to include review of the adequacy of the contractor's safety measures in, on, adjacent to, or near the construction site.

10. ENGINEERING, EQUIPMENT AND TECHNICAL SERVICES. Fees for such services are based on all time spent on the project by engineering or technical personnel at the hourly or unit rates of the Fee Schedules. The quoted fee may not cover the cost of conferences, site visits, review of foundation plans and specifications, or other services subsequent to submission of our report. Such additional services will be invoiced at the applicable rates. All engineering and technical work is generally done by CEI's regular employees; however, special services by other firms or consultants may be needed on occasion and will be invoiced at the applicable rates but no "outside" services will be contracted for without clients prior permission.

11. ASSIGNMENT. Neither client or CEI may delegate, assign, sublet or transfer its duties or interest in this agreement without the prior written consent of the other party.

12. OWNERSHIP OF DOCUMENTS. All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates and other documents prepared by CEI, as instruments or service, shall remain the property of CEI. Client agrees that under no circumstances shall any documents or reports produced by CEI pursuant to this Agreement be used at any location or for any project not expressly provided for in this agreement without the written permission of CEI. Client agrees that all reports and other work furnished to client or its agents, which are not paid for, will be returned upon demand and will not be used by client for any purpose whatsoever. CEI will retain all pertinent written records relating to the services performed for a period of five (5) years following submission of the report, during which period the records will be made available to client at all reasonable times. During this five (5) year period, CEI will provide client with copies of documents created in the performance of the work, at the expense of client.

13. TERMINATION. This agreement may be terminated by either party upon fourteen (14) days written notice in the event of material failure by the other party to perform in accordance with the terms hereof. Such termination shall not be effective if the material failure has been remedied before the expiration of the period specified in the written notice. In the event of termination, CEI shall be paid for all services performed and expenses incurred up to the termination notice data plus reasonable termination expenses. The expenses of termination or suspension shall include all direct costs or CEI in completing such analysis, records and reports.

14. GOVERNING LAW. This agreement shall be governed and construed in accordance with the laws of the State of Alabama, United States of America.

15. SEPARABILITY. The provisions of this agreement are separate and divisible, and, if any court of competent jurisdiction shall determine that any provision hereof is void and/or unenforceable, the remaining provisions shall be construed and shall be valid as if the void and/or unenforceable provisions or were not included in this Agreement.

16. WAIVER. Except as otherwise especially provided in this Agreement, no failure on the part of either party to exercise, and no delay in exercising, any rights, privilege or power under this Agreement shall operate as a waiver or relinquishment thereof, nor shall any single partial exercise by either party or any right, privilege or power under this Agreement preclude any other or further exercise thereof, or the exercise of any right, privilege or power. Waiver by any party of any breach of any provisions of the Agreement shall not constitute or be construed as a continuing waiver, or a waiver of any other breach of any provision of this Agreement.

17. BINDING. This agreement shall be binding upon all of the parties and their respective estates, heirs, administrators, executors, successors and assigns.

18. STIPULATION. Each of the parties to this Agreement as set forth herein and in the Work Order furnished by CEI stipulates that they have read, understand and agree to be bound by all of the terms set forth pursuant to the documents which are the basis of this agreement.

(Revised 1/1/09)