FROEHLING & ROBERTSON, INC.

Report of Preliminary Subsurface Exploration and Geotechnical Engineering Evaluation

Proposed Acquisition Site E-50
Morrisville, North Carolina
F&R Project No. 66T-0192

Prepared For:
The Wake County Board of Education
1429 Rock Quarry Road, Suite 116
Raleigh, NC 27610

Prepared By:
Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, North Carolina 27603

November 5, 2015

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November 5, 2015

The Wake County Board of Education
1429 Rock Quarry Road, Suite 116
Raleigh, North Carolina 27610

Attention: Ms. Betty L. Parker
Senior Director, Real Estate Services

Subject: Report of Preliminary Subsurface Exploration & Geotechnical Engineering Evaluation
Proposed Acquisition Site E-50
Morrisville, North Carolina
F&R Project No. 66T-0192

Ladies & Gentlemen:

Froehling & Robertson, Inc. (F&R) has completed a preliminary subsurface exploration and geotechnical engineering evaluation for the Proposed Acquisition Site E-50 in Morrisville, North Carolina. Our services were performed in general accordance with F&R Proposal No. 1666-00258 dated September 15, 2015 as authorized by a Wake County Board of Education Individual Project Proposal Agreement (IPPA) dated September 16, 2015 and Purchase Order #179372 dated September 21, 2015. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and general subsurface conditions, and presents preliminary geotechnical engineering recommendations for the proposed construction.

Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

NORTH CAROLINA PROFESSIONAL SEAL 017212 ENGINEER DANIEL K. SCHAEFER 11/6/15

Daniel K. Schaefer, P.E.
Raleigh Branch Manager

Ralph E. Sanders, P.E.
Chief Geotechnical Engineer

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APPENDICES

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of the preliminary subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions on a parcel of land that has a plan area of approximately 32 acres and to provide preliminary geotechnical engineering recommendations that can be used during the design and construction phases of the project.

F&R's scope of services included the following:

- Completion of 33 soil test borings (identified as B-1 to B-33) to depths ranging from 14 to 20 feet below the existing ground surface;
- Preparation of typed Boring Logs and development of Subsurface Profiles;
- Performing geotechnical laboratory testing on representative soil samples;
- Performing a preliminary geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction;
- Preparation of this preliminary geotechnical report by professional engineers.

2.0 PROJECT INFORMATION

2.1 Site Location and Description

The project site is located south of and abutting Little Drive at a point approximately ¼-mile west of its intersection with Davis Drive in Morrisville, Wake County, North Carolina (see Figure No. 1 in Appendix I). The project site consists of an undeveloped parcel with a plan area of approximately 32 acres. The project site consists of wooded land. An abandoned natural gas line easement traverses the northern portion of the project site in roughly a northwest to southeast orientation. It is not known if the abandoned gas line is still present. An active natural gas line is located near the north property line along Little Drive. In addition, a sanitary sewer line traverses the southwest corner of the site.

Several drainage features and small streams are located on the site. One stream traverses the southwest corner of the site along a similar alignment as the sanitary sewer line. This stream drains water that is discharging from a pond located on the abutting property to the south. This southeast corner of the site is somewhat low-lying and wet. Other significant drainage features are located in the following areas: 1) at the northwest corner of the site flowing to the northwest,

2) in the central portion of the site traversing in a north-south orientation and sloping down to the south, and 3) in the southern portion of the site traversing in an east-west orientation and sloping down to the west. The ground surface on the project site slopes down towards these drainage features at grades typically ranging from about 5 to 20 percent. The highest elevations of the site are located near the northeast, southeast and northwest corners (elevation 350 to 370). The lowest elevations are in the southwest quadrant of the site where ground surface elevations range from about 310 to 320.

2.2 Proposed Construction

It is F&R's understanding that the project site will become part of a future elementary school development. However, specific details regarding site layout, proposed site grading and type of structure are not available at this stage of the project. Although structural loads are not currently available, F&R assumes that any future school building will be light to moderately loaded, one to three-story structures with maximum wall and column loads on the order of 5 kips per linear foot (klf) and 200 kips, respectively. F&R assumes that maximum cut and fill depths on the order of 10 feet or less will be required establish finished grades.

Once the site layout has been established, building locations are are known, a grading plan has been prepared and structural loads have been determined, F&R requests that we be afforded an opportunity to review this information for further evaluation of geotechnical considerations.

3.0 EXPLORATION PROCEDURES

3.1 Subsurface Exploration

F&R advanced a total of 33 soil test borings (B-1 to B-33) as part of this exploration at the approximate locations shown on the Boring Location Plan presented as Figure No. 2 in Appendix I. The borings were advanced to depths ranging from 14 to 20 feet. The test boring locations were established in the field by F&R on an approximate 200 x 200 foot grid using a hand held GPS unit. Ground surface elevations at the boring locations were interpolated from Wake County GIS

topographic data. Given the method of determination, the boring locations and ground surface elevations should only be considered approximate.

The test borings were advanced by a track-mounted drill rig using 2-1/4" inside diameter (I.D.) hollow stem augers for borehole stabilization. Representative soil samples were obtained using a standard two-inch outside diameter (O.D.) split barrel sampler in general accordance with ASTM D 1586, Penetration Test and Split-Barrel Sampling of Soils (Standard Penetration Test). The number of blows required to drive the split barrel sampler three consecutive 6-inch increments with an automatic hammer is recorded and the blows of the last two 6-inch increments are added to obtain the Standard Penetration Test (SPT) N-values representing the penetration resistance of the soil. Standard Penetration Tests were performed almost continuously to a depth of 10 feet and at a nominal interval of approximately 5 feet thereafter.

A representative portion of the soil was obtained from each SPT sample, sealed in a glass jar, labeled and transported to our laboratory for final classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS), using visual-manual identification procedures (ASTM D2488). A Boring Log for each test boring is presented in Appendix II.

Groundwater level measurements were obtained from the boreholes immediately after drilling (IAD) and after a stabilization period of approximately 24 hours.

3.2 Laboratory Testing

F&R selected representative samples and subjected them to routine geotechnical index testing consisting of Natural Moisture Content, Sieve Analysis and/or Atterberg Limits determinations. The purpose of the index testing was to aid in our classification of the soil samples and development of engineering recommendations. The laboratory testing was performed in general accordance with applicable ASTM standards. The laboratory test results are presented in Appendix III of this report.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 Regional Geology

The project site is located in the Triassic Geologic Basin of North Carolina. This particular formation is a unique geologic unit, which developed 160 million years ago when differential movement occurred along the Jonesboro Fault in this area. The differential movement resulted in a long narrow northeast trending basin, which gradually filled with sediments eroded from upland areas of the surrounding topography. The sediments are thought to be several thousand feet deep and have resulted in sedimentary rock formations which are often encountered within 5 to 15 feet of the ground surface. Bedrock formations of the Triassic Basin consist of typically inter-bedded claystones, mudstones, siltstones, sandstones and conglomerates. Based on review of Geology and Mineral Resources of Wake County (Parker, 1979), sedimentary rock types mapped in the area of the project site include sandstone and mudstone. In addition, dikes and sills of igneous Diabase rock intruded these Triassic sedimentary rock types. Diabase rock is very hard and typically requires blasting for removal.

The soils that overlie the weathered rock and bedrock typically consist of silty clays and sandy clays within the upper portion of the soil profile, which are often highly plastic and become less plastic with depth. The surface clayey soils typically transition into fine sandy silts and silty sands to the top of partially weathered rock and rock. The boundary between soil and rock is not sharply defined. This transitional zone termed “Partially Weathered Rock” is typically found overlying the Triassic rock formations. Partially Weathered Rock (PWR) is defined, for engineering purposes, as material exhibiting Standard Penetration Resistances in excess of 100 blows per foot (bpf). Weathering is facilitated by fractures, joints and by the presence of less resistant rock types. Consequently, the profile of the partially weathered rock and hard rock is quite irregular and erratic, even over short horizontal distances. The subsurface conditions encountered at the site are generally typical of the conditions found in the Triassic Geologic Basin.

4.2 Subsurface Conditions

4.2.1 General

The subsurface conditions discussed in the following sections and those shown on the attached Boring Logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. The transitions between different soil strata are usually less distinct than those shown on the boring logs. Sometimes the relatively small sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific soil test borings are shown on the attached Boring Logs presented in Appendix II of this report.

Subsurface Profiles have been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site. The Subsurface Profiles are presented as Figures 3 through 7 in Appendix I.

4.2.2 Surficial Materials

Surficial Organic Soils encountered in the test borings extended from the ground surface to depths ranging from approximately 0.1 to 0.6 feet. In many of the borings, roots extended to depths of 1 to 2 feet. The Surficial Organic Soils generally consisted of dark colored soil with roots, fibrous matter and/or other organic materials. Surficial Organic Soil is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed Surficial Organic Soil materials. Therefore, the term Surficial Organic Soil is not intended to indicate suitability for landscaping and/or other purposes. The Surficial Organic Soil depths provided in this report are based on driller observations and should be considered approximate. We note that the transition from Surficial Organic Soil to underlying materials may be gradual, and therefore the observation and measurement of Surficial Organic Soil depths is subjective. Actual Surficial Organic Soil depths should be expected to vary.

4.2.3 Residual Soils

Beneath the surficial organic soils, the residual soils predominantly consisted of firm to very hard sandy Silt (USCS – ML soil), loose to medium dense silty and/or clayey Sand (SM and SC), and firm to hard low plasticity sandy and/or silty Clay (CL).

In 19 of the 33 borings, a 1 to 3.5 feet thick layer of soft to stiff highly plastic Clay (CH) was encountered in the upper 3.5 feet of the soil profile. In borings B-7, B-12, B-22 and B-28, the highly plastic Clay layer extended to depths of 6.5 to 8.5 feet.

In 27 of the 33 borings, soft silts and clays or very loose sands with SPT N-values of less than 4 blows per foot (bpf) were encountered in the upper 1.5 to 2 feet of the soil profile. In borings B-1 and B-24, the soft/very loose soils extended to depths of 6 and 4 feet, respectively. It is noted that both borings B-1 and B-24 are located in drainage features. In contrast to the presence of soft/very loose near-surface soils, very hard soils with SPT N-values of greater than 50 bpf were encountered in about ½ of the borings within the soil profile overlying Partially Weathered Rock (PWR).

4.2.4 Partially Weathered Rock and Auger Refusal

Partially Weathered Rock (PWR) was encountered in 31 of the 33 test borings at depths ranging from 2.5 to 19 feet. The average depth to PWR in these borings was about 9 feet. PWR is defined for engineering purposes as residual material that exhibits an SPT N-value of more than 100 blows per foot (bpf). In 8 of the borings where PWR was encountered, 1 to 9.5 feet thick layers of typically very hard soil with SPT N-values of more than 50 bpf were encountered after penetrating the PWR surface within the overall PWR matrix. Most of the test borings were terminated in PWR.

Test boring B-1 was terminated upon encountering auger refusal at a depth of 14 feet. Auger refusal is a designation applied to any material that cannot be penetrated by the soil auger and typically includes boulders, hard rock lenses/ledges and bedrock. The nature of auger refusal was not explored in borings B-1. Auger refusal was not encountered in any of the remaining borings.

4.3 Soil Moisture and Groundwater Conditions

The recovered soil samples were generally classified as being in a moist condition (*i.e.*, generally within 3 to 5 percent of the optimum moisture content). In three of the borings (B-1, B-26 and B-30), wet soil conditions were noted in the upper 2 to 8 feet of the soil profile. It is noted that borings B-1, B-26 and B-30 are all located in lower-lying drainage features.

Groundwater level measurements were recorded in the test borings upon completion of drilling and after a stabilization period of at least 24 hours. Groundwater was only encountered in one boring (B-30) at completion of drilling. After a stabilization period of approximately 24 hours, groundwater was encountered in 7 borings (B-1, B-23, B-24, B-25, B-26, B-28 and B-30) at depths ranging from 5.5 to 13.5 feet. It is noted that the borings where stabilized groundwater readings were encountered are generally located in drainage features, and areas of the site that are more likely to be designed as fill areas than cut areas.

Based on the observed groundwater conditions, it is not anticipated that groundwater will be encountered during mass grading activities where maximum earth cuts depths are not generally expected to exceed 10 feet. However, due to the presence of relatively impervious clay soils and PWR on the project site, trapped or perched water conditions should be anticipated during periods of inclement weather and during seasonally wet periods. It should be noted that groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary or be different from those described in this report.

5.0 PRELIMINARY GEOTECHNICAL ENGINEERING RECOMMNEDATIONS

The preliminary conclusions and recommendations contained in this section of the report are based upon the results of the 33 widely spaced soil test borings performed and preliminary information provided to F&R regarding the proposed development. It is our opinion that the subsurface conditions encountered on the project site are suitable for the proposed development from a geotechnical engineering perspective, provided the recommendations presented in this report are followed throughout the design and construction phases of this project. Medium dense/stiff native soils and properly placed and compacted structural fill should be suitable for support of the school structures on conventional shallow spread foundations. The subsurface conditions revealed by the borings are typical of this area. However, the following conditions encountered in the test borings should be considered during the planning and design phases of the project to minimize impact during site development and building construction.

- As is common in this geologic region (Triassic Basin), highly plastic clayey soils (USCS - CH) were encountered in more than ½ of the borings. The thickness of the highly plastic soil layers ranged from 1 to 3.5 feet and these soils were typically encountered in the upper 3.5 feet of the soil profile. Deeper highly plastic clays were noted in just a few borings. Highly plastic clayey soils are generally considered poor material for use as structural fill and poor material for direct support of building foundations, slabs and roadways.
- Soft and/or very loose soils were encountered from the ground surface to a depth of approximately 1.5 to 2 feet in most of the borings. Deeper layers of soft or very loose soil were encountered in a couple borings that are located in lower-lying drainage features. Because of the presence of soft and loose soils, subgrade repairs are likely to be required if these soils are encountered at subgrade and finished grades. Subgrade repairs are also expected in the vicinity of drainage features.
- PWR was encountered in almost every boring. The depth to PWR varied across the project site from 2.5 to 19 feet (average depth of about 9 feet). F&R anticipates that PWR and hard excavation conditions will be required across portions of the site to establish proposed grades and install utilities, and will require ripping, hammering and/or blasting.

The overburden soils encountered in the soil test borings predominantly consisted of low plasticity silts and clays (USCS – CL and ML soils) and silty or clayey sand (SM and SC soils). These soil types are generally considered fair to good materials for use as structural fill material and should be suitable for subgrades beneath pavements, slabs and foundations.

Highly plastic silty clayey soils (CH) are generally considered poor material for use as structural fill and poor subgrade materials for foundations, slabs and pavements. These soils are highly moisture sensitive. As a result of being highly moisture sensitive, these soils are frequently difficult to properly place and compact, and become unstable during normal construction activities when wet. As such, if these soils are excavated from cut areas, it is generally recommended that they be used in non-load bearing areas or in the lower portion of deeper roadway fills. The highly plastic soils are also not desirable subgrade soils, and if present at finished subgrade (*e.g.,* roadway and building pad subgrades), undercutting and repair with lower plasticity materials may be required to create stable and suitable subgrades for pavement and building construction.

The soils encountered in the test borings have sufficient silt and clay content to render them moisture sensitive. These soil types can become unstable during normal construction traffic and activities when wet. Ideally, earthwork operations should be performed during the seasonally drier months (typically May to October) when the weather is generally more conducive to controlling and modifying the moisture content of the on-site soils. Earthwork construction during seasonally wet times of the year (typically November to April) may result in difficulties in properly placing and compacting the on-site soils, soft subgrade conditions, and possible undercutting in excess than would otherwise be expected.

As previously discussed, very loose and soft soils represented by SPT-N values of 4 bpf or less were encountered in most of the test borings from the existing ground surface to a depths of approximately 1.5 to 2 feet. Although some of these soft/loose soils will be removed during site stripping activities, soft unstable soils will likely be present following stripping and may require undercutting and/or other repair activities (e.g., drying and re-compaction) in order to establish

stable subgrades that are suitable to support the proposed buildings and pavements. Soft/loose soils are also anticipated in the vicinity of the drainage features and subgrade repair is also anticipated in these areas. If these conditions are encountered during construction, the methods of repair should be as directed by the project geotechnical engineer.

PWR was encountered at depths ranging from 2.5 to 19 feet in most of the borings. Since site grading and utility plans are not available, the magnitude of PWR excavation cannot be determined at this time. However, it appears likely that PWR will be encountered during mass grading and utility installation in some areas of the site since it was present at depths of less than 5 to 10 feet in some of the borings. Heavy excavating equipment with ripping tools (e.g., D-8 dozer with single shank ripper) is typically effective in removing the softer PWR (i.e., PWR with SPT blow counts of 50/4" to 50/6") during mass grading activities. Removal of harder PWR (i.e., PWR with SPT blow counts of 50/1" to 50/3" or less penetration) during mass grading in open areas may not be possible with ripping equipment and may require hammering, chipping or blasting. Based on the results of the test borings, some of the PWR had SPT blow counts of 50/4" or softer and should be able to be ripped in mass excavations. Removal of PWR from confined excavations (e.g., utility or foundation excavations) is typically more difficult than from large open mass excavations. Removal of softer PWR, (i.e., PWR with N-values of (50/4" to 50/6") from confined excavations may be possible using a large trackhoe (e.g., CAT 330 with new rock teeth); however, excavation will likely be slow and blasting is typically performed to pre-loosen the PWR. Removal of harder PWR and rock, (i.e., PWR with N-values of 50/0" to 50/3") in confined excavations will likely require blasting. The speed and ease of PWR and rock excavation will depend upon the equipment utilized, experience of the equipment operators and geologic structure of the PWR.

It appears that the soils encountered in the test borings are suitable to support the anticipated structure on conventional shallow spread foundations. Since site grading plans and finished floor elevations are not available at this time, it is assumed that foundations will bear in a combination of compacted structural fill material and stiff/medium dense to very hard/dense native soils. For foundations bearing in these soils, we anticipate that a net allowable bearing capacity on the order of 3,000 pounds per square foot should be available. However, further evaluation of foundation

bearing capacity and settlement should be performed after the site grades have been better determined and structural loading information is available.

We request that F&R be afforded the opportunity to review preliminary and final grading and utility plans for evaluation of geotechnical considerations. Once the building locations are known, a grading plan has been prepared, and structural loads have been determined, F&R recommends that a final geotechnical engineering evaluation be performed to provide final geotechnical design and construction recommendations for site development (earthwork), foundations, floor slabs, pavements, slopes and retaining structures. This evaluation may include recommendations for additional subsurface exploration (*e.g.*, test pits, soil test borings) within specific areas of the site. It would be prudent to have F&R involved during preliminary site development meetings with the design team to discuss the site geotechnical conditions and methods of minimizing geotechnical related issues during construction.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of The Wake County Board of Education and/or their agents for specific application to the referenced project. This report has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us; the data obtained from the subsurface exploration program, and generally accepted geotechnical engineering practice. The evaluations and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon on-site observations of the conditions.

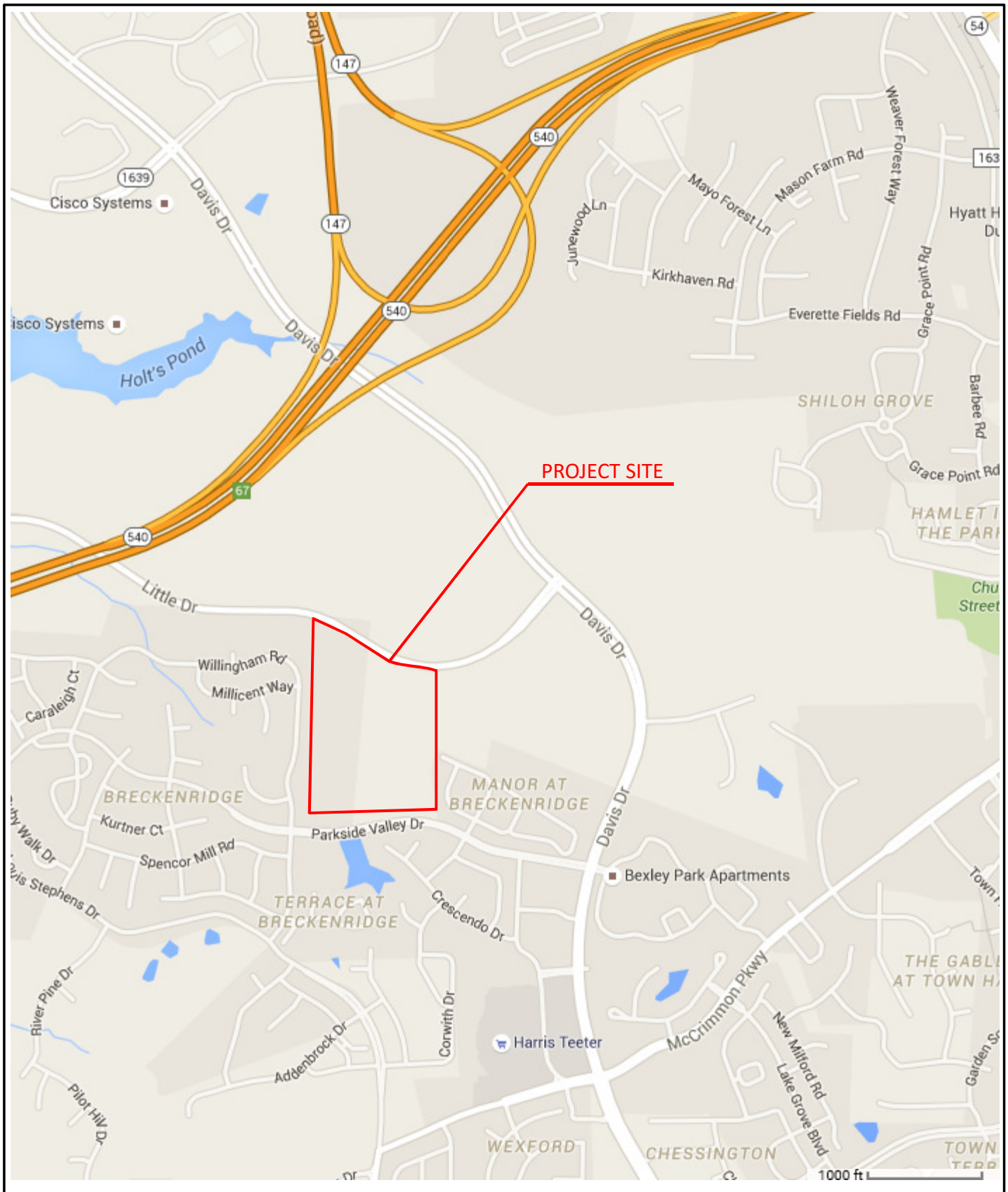
There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix IV. We ask that you please review this GBA information.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork, pavement, and foundation construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid. As previously indicated, a final geotechnical engineering evaluation should be performed as the site and structure design progresses.

APPENDIX I

FIGURES



SITE VICINITY MAP

North

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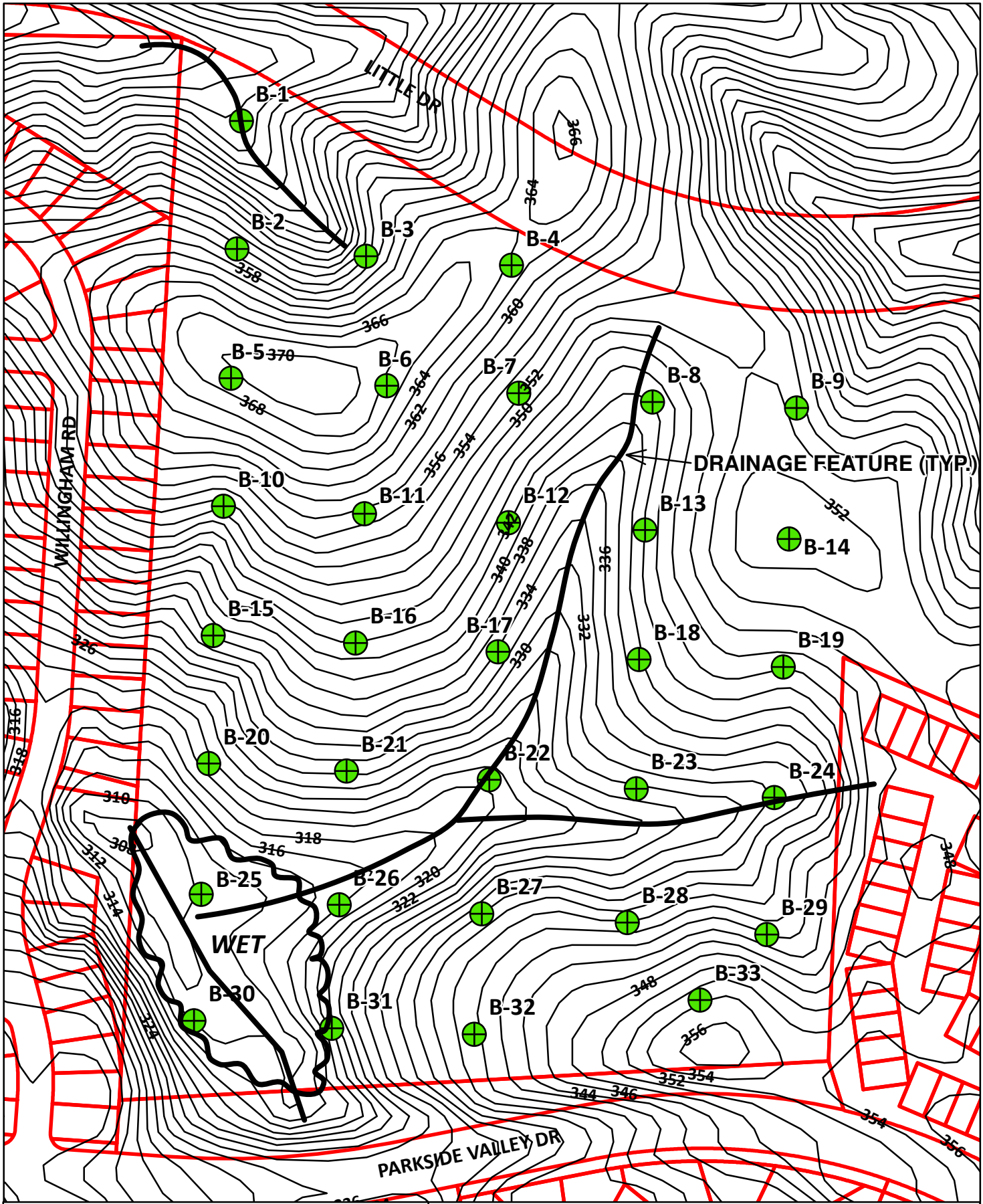
CLIENT: Wake County Board of Education	
PROJECT: E-50 Elementary School	
LOCATION: Morrisville, Wake County, North Carolina	
F&R PROJECT No.: 66T-0192	FIGURE No.: 1
DRAWN BY: D. Racey	
DATE: November 2015	SCALE: As shown



Boring Location Plan

0 50 100 200 300 400 Feet

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Client:	Wake County Board of Education
Project:	E-50 Elementary School
Location	Morrisville, Wake County, NC
F&R Project No.:	66T-0192
Data:	2014 Wake County Property Boundaries, 2007 Wake County Contours
Date:	November 2015
Scale:	1 inch = 200 feet

FIGURE No.: 2

Froehling & Robertson, Inc.

SUBSURFACE PROFILE

Plot Based on Elevation

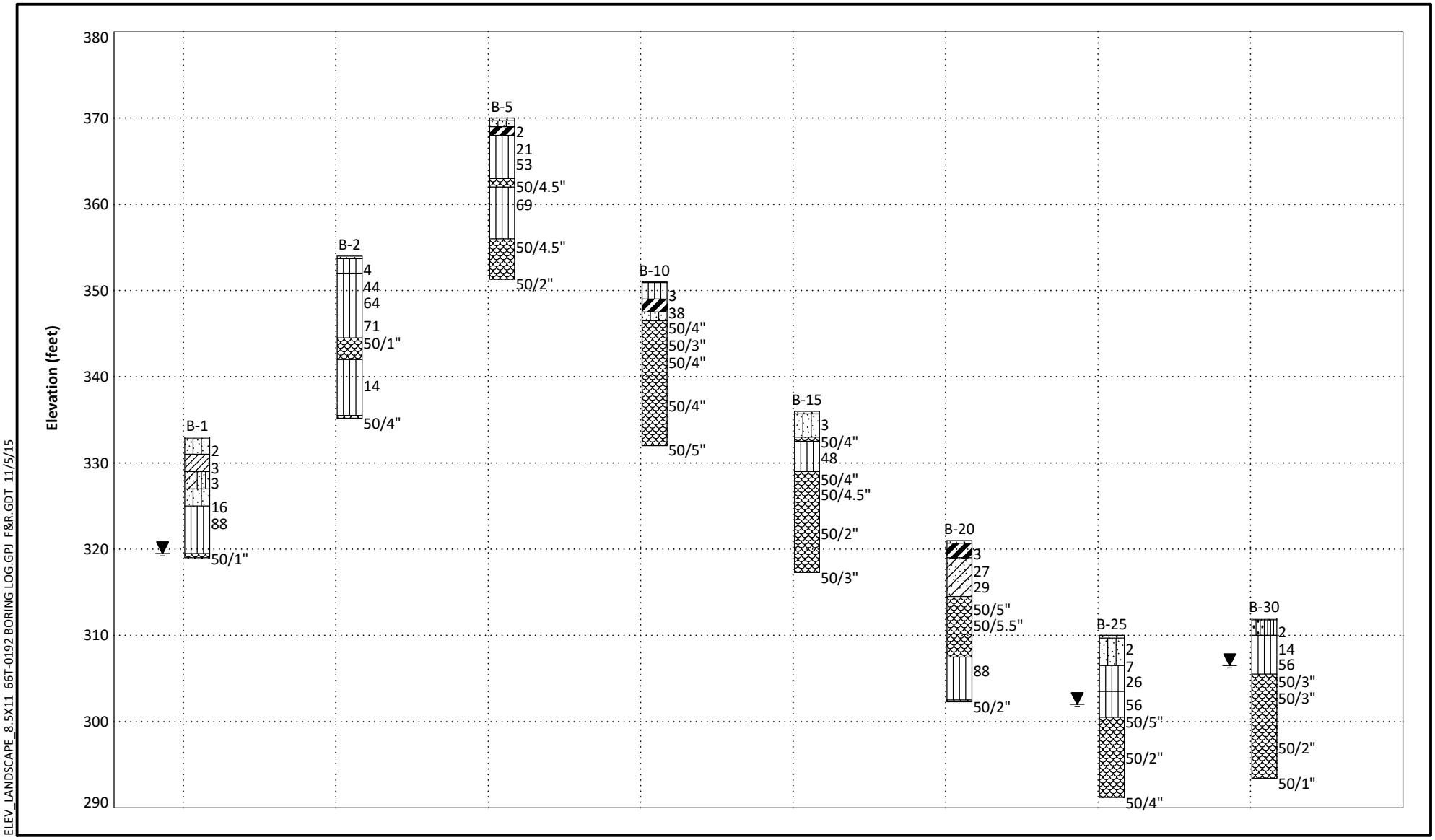
Profile Name: Figure No. 3

Project No: 66T-0192

Client: Wake Co. Board of Education

Project: E-50 Elementary School

City/State: Morrisville, NC



ELEV_LANDSCAPE_8.5X11 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

Froehling & Robertson, Inc.

SUBSURFACE PROFILE

Plot Based on Elevation

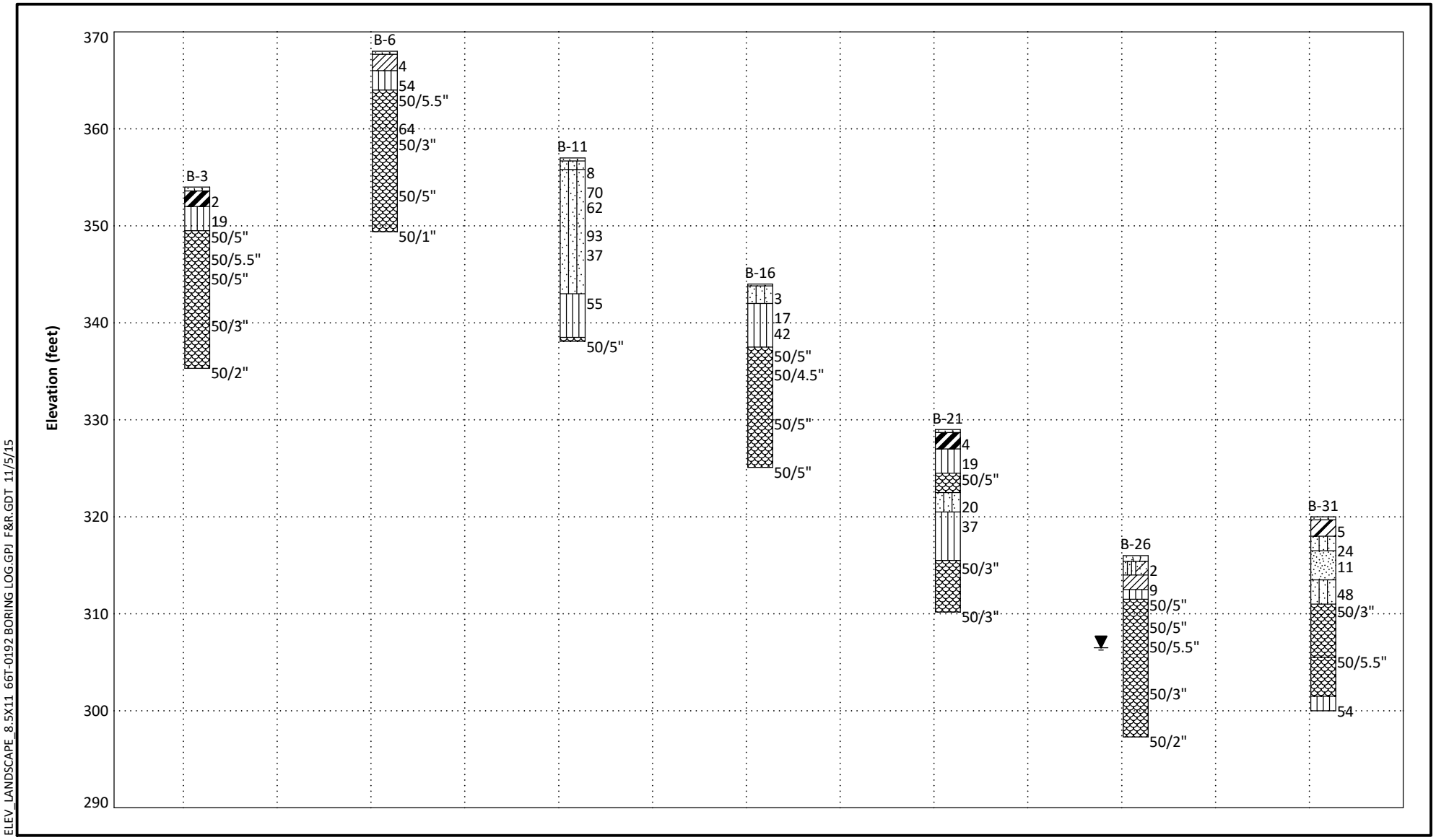
Profile Name: Figure No. 4

Project No: 66T-0192

Client: Wake Co. Board of Education

Project: E-50 Elementary School

City/State: Morrisville, NC



ELEV_LANDSCAPE_8.5X11 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

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SUBSURFACE PROFILE

Plot Based on Elevation

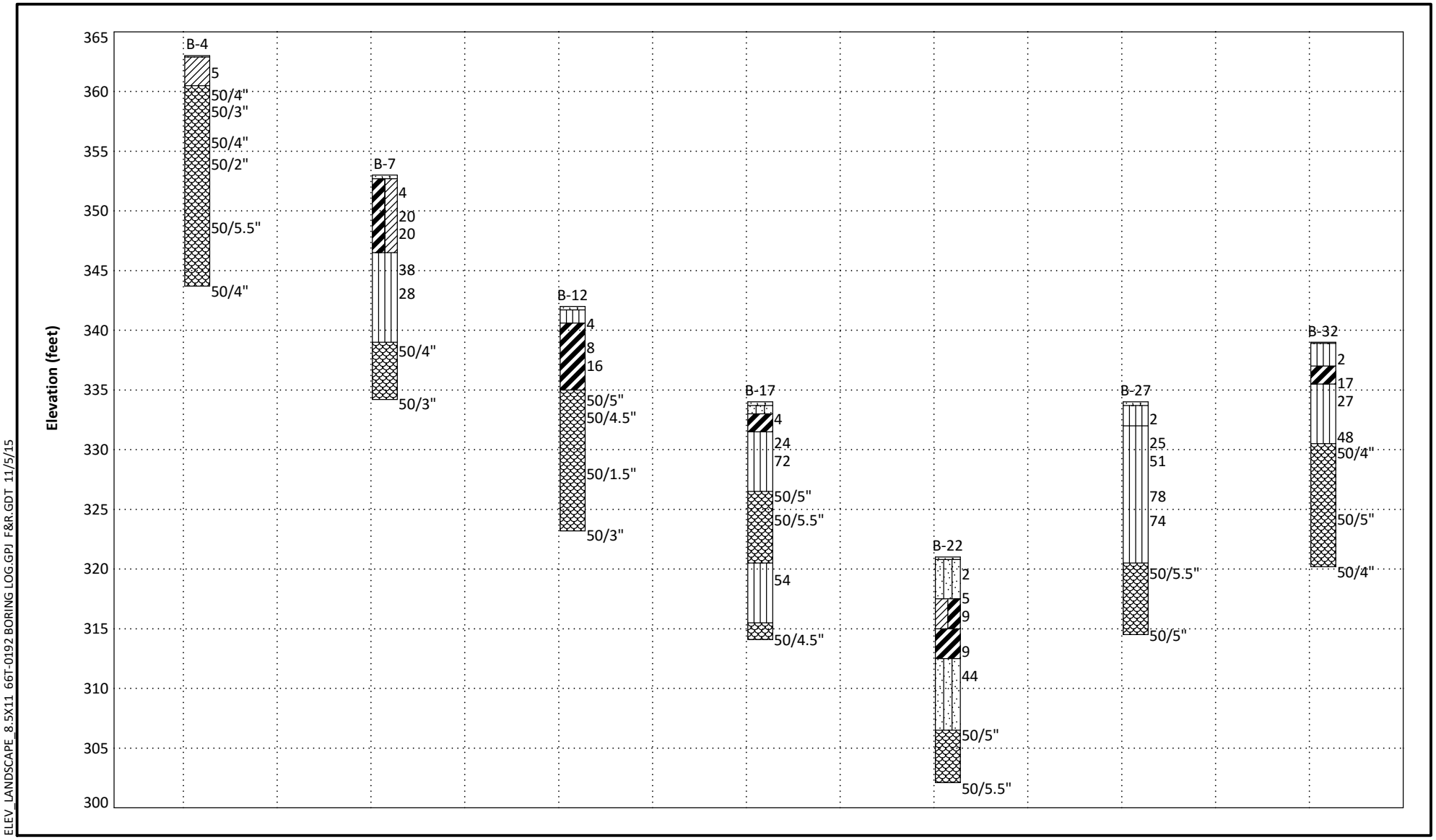
Profile Name: Figure No. 5

Project No: 66T-0192

Client: Wake Co. Board of Education

Project: E-50 Elementary School

City/State: Morrisville, NC



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SUBSURFACE PROFILE

Plot Based on Elevation

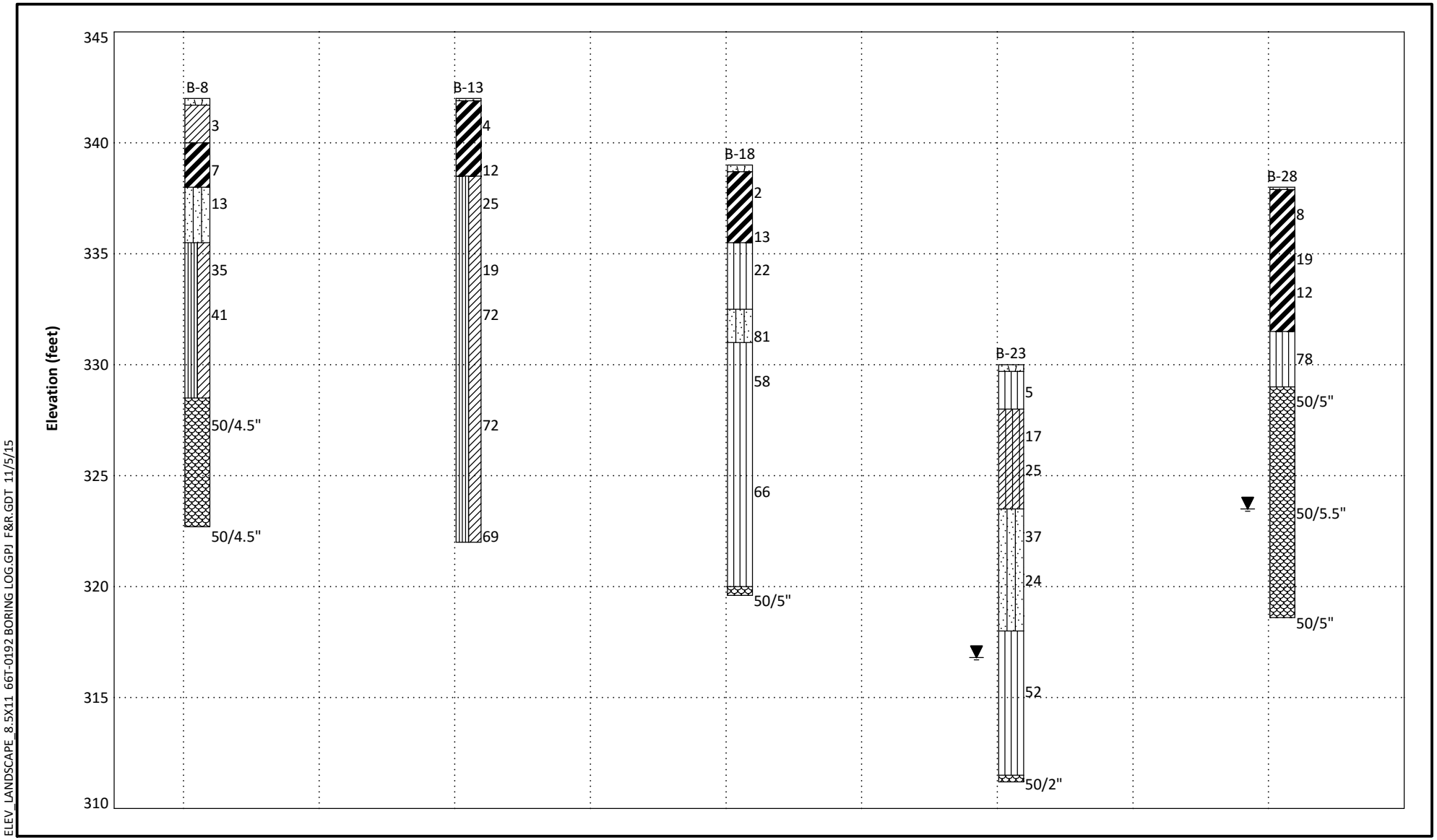
Profile Name: Figure No. 6

Project No: 66T-0192

Client: Wake Co. Board of Education

Project: E-50 Elementary School

City/State: Morrisville, NC



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Froehling & Robertson, Inc.

SUBSURFACE PROFILE

Plot Based on Elevation

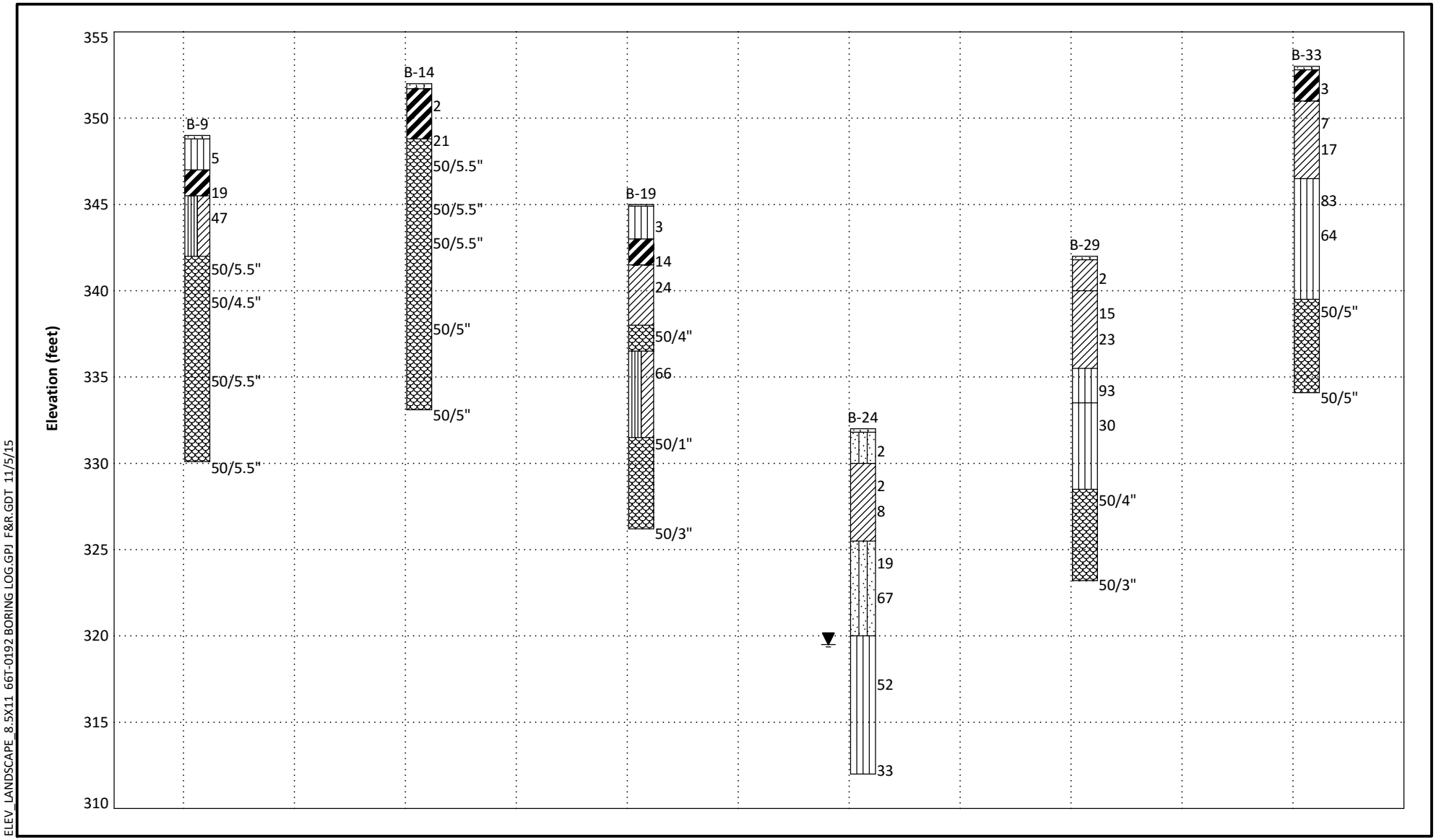
Profile Name: Figure No. 7

Project No: 66T-0192

Client: Wake Co. Board of Education

Project: E-50 Elementary School

City/State: Morrisville, NC



ELEV_LANDSCAPE_8.5X11 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

APPENDIX II

BORING LOGS

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	**Coarse** - 3/4 to 3 inches diameter **Fine** - 4.76 mm to 3/4 inch diameter
Sand:	**Coarse** - 2.0 mm to 4.76 mm diameter **Medium** - 0.42 mm to 2.0 mm diameter **Fine** - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

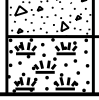
The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers
≤ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

SINCE F&R 1881

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

Froehling & Robertson, Inc.

BORING LOG

Boring: B-1 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 333.0
Total Depth: 14.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/14/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
332.8	0.2	SURFICIAL ORGANIC SOILS	1-1-1	0.0		GROUNDWATER DATA:
		NATIVE SOILS: Very Loose, Red-Brown, Wet, Silty Fine SAND (SM) with Trace Roots			2	0 HR: Dry inside PVC
				1.5		24 Hrs: 13.5' inside PVC
331.0	2.0	Soft, Yellow-Brown, Moist, Silty CLAY (CL)	1-1-2	2.0		
					3	
			1-1-2	3.5		
329.0	4.0	Very Loose, Yellow-Brown, Wet, Clayey Silty Fine SAND (SC-SM) with Trace Roots			3	
				5.0		
327.0	6.0	Medium Dense, Brown, Saturated, Silty Fine SAND (SM) with Trace Roots	3-6-10	6.5		
					16	
325.0	8.0	Very Hard, Red-Maroon, Moist, Fine Sandy Clayey SILT (ML)		8.0		
			12-38-50	8.5		
					88	
				10.0		
319.5	13.5			13.5		
319.0	14.0	PARTIALLY WEATHERED ROCK: Sampled as Very Dense, Red-Maroon, Moist, Clayey Silt (ML)	50/1"		100+	
		Boring Terminated by Auger Refusal at 14 feet.				

Froehling & Robertson, Inc.

BORING LOG

Boring: B-2 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 354.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/16/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
353.7	0.3	SURFICIAL ORGANIC SOILS	2-2-2	0.0		GROUNDWATER DATA:
		NATIVE SOILS: Soft to Firm, Orange-Brown, Moist, Fine Sandy Clayey SILT (ML) with Trace Organics			4	0 Hr: Dry inside HSA
				1.5		24 Hrs: Dry, Hole Caved at 14.0'
352.0	2.0	Hard to Very Hard, Red-Maroon, Moist, Fine Sandy SILT (ML)	7-17-27	2.0		
					44	
			16-31-33	3.5		
					64	
				5.0		
			20-23-48	6.5		
					71	
				8.0		
			30-40-50/1"	8.5		
					100+	
344.5	9.5	PARTIALLY WEATHERED ROCK: Sampled as Red-Maroon, Moist, Fine Sandy Silt (ML)		9.6		
342.0	12.0	Stiff, Red-Maroon, Moist, Fine Sandy SILT (ML)				
			7-6-8	13.5		
					14	
				15.0		
335.5	18.5		50/4"	18.5		
335.2	18.8	PARTIALLY WEATHERED ROCK: Sampled as Red-Maroon, Moist, Fine Sandy Silt (ML)			100+	
		Boring Terminated at 18.8 feet.				

BORING_LOG 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

Froehling & Robertson, Inc.

BORING LOG

Boring: B-3 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 354.0
Total Depth: 18.7'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/13/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
353.6	0.4	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 13.0'
		NATIVE SOILS: Red-Brown, Very Soft, Moist, Fine Sandy Silty CLAY (CH) with Trace Roots		1.5		
352.0	2.0	Very Stiff, Red-Maroon, Moist, Very Fine Sandy SILT (ML) with Trace Mica	3-7-12	2.0	19	
			17-37-50/5"	3.5	100+	
349.5	4.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Very Dense, Moist, Silty Fine Sand (SM)		4.9		
			50/5.5"	6.5 7.0	100+	
			50/5"	8.5 8.9	100+	
			50/3"	13.5	100+	
335.3	18.7	Boring Terminated at 18.7 feet.	50/2"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-4 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 363.0
Total Depth: 19.3'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/13/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
362.9	0.1	SURFICIAL ORGANIC SOILS	2-2-3	0.0	5	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.0'
		NATIVE SOILS: Brown, Firm, Moist, Fine Sandy CLAY (CL)		1.5		
			40-50/4"	2.0		
360.5	2.5	PARTIALLY WEATHERED ROCK: Sampled as Very Dense, Red-Brown, Dry, Silty Fine Sand (SM)		2.8	100+	
			45-50/3"	3.5		
				4.3	100+	
			50/4"	6.5	100+	
			50/2"	8.5	100+	
			50/5.5"	13.5		
				14.0	100+	
			30-50/4"	18.5		
343.7	19.3	Boring Terminated at 19.3 feet.		19.3	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-5 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 370.0
Total Depth: 18.7'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/16/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
369.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.5'
369.0	1.0	NATIVE SOILS: Very Loose, Yellow-Brown, Moist, Very Silty Fine to Medium SAND (SM) with Trace Roots		1.5		
368.0	2.0	Very Soft, Yellow-Brown, Moist, Very Silty CLAY (CH) with Trace Roots	6-9-12	2.0	21	
		Very Stiff to Very Hard, Red-Maroon, Moist, Very Fine Sandy SILT (ML)	10-23-30	3.5	53	
				5.0		
			25-50/4.5"	6.5		
363.0	7.0	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Fine Sandy Silt (ML)		7.4	100+	
362.0	8.0	Very Hard, Red-Maroon, Moist, Fine Sandy SILT (ML)	15-25-44	8.5	69	
				10.0		
			27-50/4.5"	13.5		
356.0	14.0	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Fine Sandy Silt (ML)		14.4	100+	
351.3	18.7	Boring Terminated at 18.7 feet.	50/2"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-6 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 368.0
Total Depth: 18.6'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/14/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
367.7	0.3	SURFICIAL ORGANIC SOILS	2-1-3	0.0	4	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry inside HSA
		NATIVE SOILS: Red-Brown, Soft, Moist, Fine Sandy Silty CLAY (CL)		1.5		
366.0	2.0	Red-Maroon, Very Hard, Moist, Fine Sandy SILT (ML)	10-22-32	2.0	54	
			26-50/5.5"	3.5	100+	
364.0	4.0	PARTIALLY WEATHERED ROCK: Sampled as Red-Maroon, Fine Sandy Silt (ML)		4.5		
			12-26-38	6.5	64	
				8.0		
			50/3"	8.5	100+	
			33-50/5"	13.5	100+	
				14.4		
349.4	18.6	Boring Terminated at 18.6 feet.	50/1"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-7 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 353.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/16/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
352.7	0.3	SURFICIAL ORGANIC SOILS	1-1-3	0.0	4	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry inside HSA
		NATIVE SOILS: Soft to Very Stiff, Yellow-Brown, Moist, Silty CLAY (CH-CL)		1.5		
			3-6-14	2.0	20	
			3-6-14	3.5	20	
				5.0		
346.5	6.5	Very Stiff to Hard, Maroon, Moist, Fine Sandy SILT (ML)	14-18-20	6.5	38	
				8.0		
			10-10-18	8.5	28	
				10.0		
			35-50/4"	13.5	100+	
339.0	14.0	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Moist, Fine Sandy Silt (ML)		14.3		
			50/3"	18.5		
334.2	18.8	Boring Terminated at 18.8 feet.			100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-8 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 342.0
Total Depth: 19.3'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/20/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
341.7	0.3	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.0'
		NATIVE SOILS: Soft, Yellow-Brown, Moist, Slightly Fine Sandy Silty CLAY (CL) with Trace Organics		1.5		
340.0	2.0	Firm, Orange-Brown, Moist, Silty CLAY (CH)	2-3-4	2.0	7	
			4-6-7	3.5		
338.0	4.0	Medium Dense, Tan, Moist, Silty Fine to Medium SAND (SM) with Wood/Root Piece			13	
				5.0		
335.5	6.5	Hard, Tan, Moist, Fine Sandy Clayey SILT (ML-CL)	12-15-20	6.5	35	
				8.0		
			15-20-21	8.5	41	
				10.0		
328.5	13.5	PARTIALLY WEATHERED ROCK: Sampled as Tan, Fine Sandy Silt (ML)	35-50/4.5"	13.5	100+	
				14.9		
			40-50/4.5"	18.5	100+	
322.7	19.3	Boring Terminated at 19.3 feet.		19.9		

Froehling & Robertson, Inc.

BORING LOG

Boring: B-9 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 349.0
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/20/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
348.8	0.2	SURFICIAL ORGANIC SOILS	2-3-2	0.0	5	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.0'
		NATIVE SOILS: Firm, Brown, Moist, Fine Sandy SILT (ML) with Trace Roots		1.5		
347.0	2.0	Very Stiff, Brown, Moist, Silty CLAY (CH)	5-7-12	2.0	19	
345.5	3.5	Hard, Maroon-Gray, Moist, Slightly Fine Sandy Clayey SILT (ML-CL)	12-17-30	3.5	47	
				5.0		
			27-50/5.5"	6.5		
342.0	7.0	PARTIALLY WEATHERED ROCK: Sampled as Gray, Maroon, Fine Sandy Clayey SILT (ML-CL)		7.5	100+	
			38-50/4.5"	8.5		
				9.4	100+	
			50/5.5"	13.5		
				14.0	100+	
			50/5.5"	18.5		
330.1	18.9	Boring Terminated at 18.9 feet.		19.0	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-10 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 351.0
Total Depth: 19.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/23/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
350.9	0.1	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry
		NATIVE SOILS: Soft, Brown, Moist, Fine Medium Sandy SILT (ML) with Trace Roots		1.5		
349.0	2.0	Hard, Orange-Brown, Moist, Slightly Fine to Medium Sandy Silty CLAY (CH)	7-11-27	2.0	38	
347.5	3.5	Very Dense, Brown, Moist, Silty Fine to Coarse SAND (SM)	27-31-50/4"	3.5	100+	
346.5	4.5	PARTIALLY WEATHERED ROCK: Sampled as Red, Brown, Silty Fine Sand (SM)		4.8		
			50/3"	6.5	100+	
			50/4"	8.5	100+	
			50/4"	13.5	100+	
			50/5"	18.5	100+	
332.0	19.0	Boring Terminated at 19 feet.		18.9		

BORING_LOG 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

Froehling & Robertson, Inc.

BORING LOG

Boring: B-11 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 357.0
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/16/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
356.7	0.3	SURFICIAL ORGANIC SOILS	2-3-5	0.0	8	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.0'
355.8	1.2	NATIVE SOILS: Loose, Gray-Brown, Moist, Very Silty Fine SAND (SM)		1.5		
		Very Dense to Dense, Tan-Gray, Moist, Silty Fine to Medium SAND (SM)	17-33-37	2.0	70	
			27-29-33	3.5	62	
				5.0		
			38-43-50	6.5	93	
				8.0		
			17-21-16	8.5	37	
				10.0		
			16-23-32	13.5	55	
343.0	14.0	Very Hard, Maroon, Moist, Fine Sandy SILT (ML)		15.0		
338.5	18.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Moist, Fine Sandy Silt (ML)	50/5"	18.5	100+	
338.1	18.9	Boring Terminated at 18.9 feet.		18.9		

Froehling & Robertson, Inc.

BORING LOG

Boring: B-12 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 342.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/16/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
341.7	0.3	SURFICIAL ORGANIC SOILS	1-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.0'
340.6	1.4	NATIVE SOILS: Soft to Firm, Gray-Brown, Moist, Fine Sandy SILT (ML) with Trace Organics		1.5		
		Stiff to Very Stiff, Yellow-Brown, Moist, Fine Sandy Silty CLAY (CH) with Trace Roots	2-3-5	2.0	8	
			3-6-10	3.5	16	
				5.0		
			26-50/5"	6.5	100+	
335.0	7.0	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Moist, Fine Sandy Silt (ML)		7.4		
			50/4.5"	8.5	100+	
			50/1.5"	13.5	100+	
323.2	18.8	Boring Terminated at 18.8 feet.	50/3"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-13 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 342.0
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/23/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
341.9	0.1	SURFICIAL ORGANIC SOILS	1-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: Dry, Hole Caved at 13.5'
		NATIVE SOILS: Soft to Stiff, Orange-Brown, Moist, Silty CLAY (CH)		1.5		
			3-5-7	2.0	12	
338.5	3.5	Very Stiff to Very Hard, Gray-Brown, Moist, Fine Sandy Clayey SILT (ML-CL)	6-11-14	3.5	25	
				5.0		
			6-9-10	6.5	19	
				8.0		
			14-26-46	8.5	72	
				10.0		
			24-29-43	13.5	72	
				15.0		
			20-28-41	18.5	69	
322.0	20.0	Boring Terminated at 20 feet.		20.0		

BORING_LOG 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

Froehling & Robertson, Inc.

BORING LOG

Boring: B-14 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 352.0
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/20/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
351.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0		
		NATIVE SOILS: Very Soft to Very Stiff, Red-Brown, Moist, Silty CLAY (CH)			2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 15.0'
				1.5		
			7-9-12	2.0		
					21	
348.8	3.2	PARTIALLY WEATHERED ROCK: Sampled as Maroon-Gray, Fine Sandy Clayey Silt (ML-CL)		3.5		
			27-50/5.5"		100+	
				4.5		
				6.5		
			50/5.5"	7.0	100+	
				8.5		
			50/5.5"	9.0	100+	
				13.5		
			50/5"	13.9	100+	
				18.5		
333.1	18.9	Boring Terminated at 18.9 feet.	50/5"	18.9	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-15 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 336.0
Total Depth: 18.7'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/29/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
335.7	0.3	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.7'
		NATIVE SOIL: Very Loose to Dense, Gray-Brown, Moist, Silty Fine SAND (SM) with Trace Roots from 0.0'-1.5'		1.5		
			15-46-50/4"	2.0	100+	
333.0	3.0	PARTIALLY WEATHERED ROCK: Sampled as Tan-Gray, Silty Fine Sand (SM)		2.3		
332.5	3.5		16-22-26	3.5	48	
		Hard, Maroon, Moist, Clayey SILT (ML)		5.0		
			25-50/4"	6.5		
329.0	7.0	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Clayey Silt (ML)		7.3	100+	
			50/4.5"	8.5	100+	
			50/2"	13.5	100+	
317.3	18.7	Boring Terminated at 18.7 feet.	50/3"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-16 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 344.0
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/29/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
343.8	0.2	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 15.4'
		NATIVE SOILS: Very Loose, Tan-Brown, Moist, Silty Fine SAND (SM) with Trace Roots		1.5		
342.0	2.0	Very Stiff to Hard, Gray-Brown, Moist, Fine Sandy SILT (ML)	2-6-11	2.0	17	
			4-9-33	3.5	42	
				5.0		
337.5	6.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Maroon, Fine Sandy Silt (ML)	50/5"	6.5 6.9	100+	
			50/4.5"	8.5	100+	
			50/5"	13.5 13.9	100+	
325.1	18.9	Boring Terminated at 18.9 feet.	50/5"	18.5 18.9	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-17 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 334.0
Total Depth: 19.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/26/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
333.7	0.3	SURFICIAL ORGANIC SOILS	1-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 15.7'
333.0	1.0	NATIVE SOILS: Very Loose, Brown, Silty Fine SAND (SM)		1.5		
		Soft to Firm, Brown, Moist, Fine Sandy Silty CLAY (CH)	3-7-17	2.0	24	
331.5	2.5	Very Stiff to Very Hard, Maroon-Gray, Moist, Fine Sandy Clayey SILT (ML)	20-32-40	3.5	72	
				5.0		
			20-42-50/5"	6.5	100+	
326.5	7.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon-Gray, Fine Sandy Clayey Silt (ML)		7.9		
			32-50/5.5"	8.5	100+	
				9.5		
320.5	13.5	Very Hard, Maroon-Gray, Fine Sandy SILT (ML)	20-22-32	13.5	54	
				15.0		
315.5	18.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Tan, Fine Sandy Silt (ML)	10-22-50/4.5"	18.5	100+	
314.1	19.9	Boring Terminated at 19.9 feet.		19.9		

BORING_LOG 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

Froehling & Robertson, Inc.

BORING LOG

Boring: B-18 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 339.0
Total Depth: 19.4'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/29/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
338.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 15.8'
		NATIVE SOILS: Very Soft to Stiff, Tan-Orange, Moist, Slightly Sandy Silty CLAY (CH) with Roots		1.5		
			2-5-8	2.0	13	
335.5	3.5	Very Stiff, Red-Purple, Moist, Fine Sandy Clayey SILT (ML)	6-9-13	3.5	22	
				5.0		
332.5	6.5	Very Dense, Tan-Brown, Moist, Silty Fine SAND (SM)	28-42-39	6.5	81	
331.0	8.0	Very Hard, Brown-Maroon, Moist, Fine Sandy SILT (ML)		8.0		
			8-20-38	8.5	58	
				10.0		
			16-27-39	13.5	66	
				15.0		
			38-50/5"	18.5	100+	
320.0	19.0	PARTIALLY WEATHERED ROCK: Sampled as Brown, Fine Sandy Silt (ML)				
319.6	19.4	Boring Terminated at 19.4 feet.		19.4		

Froehling & Robertson, Inc.

BORING LOG

Boring: B-19 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 345.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/23/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
344.9	0.1	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry, Hole Caved at 13.0'
		NATIVE SOILS: Soft, Brown, Moist, Fine Sandy SILT (ML)		1.5		
343.0	2.0	Stiff, Brown, Moist, Silty CLAY (CH)	3-6-8	2.0	14	
341.5	3.5	Very Stiff, Maroon, Moist, Slightly Fine Sandy Silty CLAY (CL)	7-9-15	3.5	24	
				5.0		
			24-50/4"	6.5		
338.0	7.0	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Slightly Fine Sandy Clayey Silt (ML-CL)		7.3	100+	
336.5	8.5	Very Hard, Maroon, Moist, Slightly Fine Sandy Clayey SILT (ML-CL)	17-40-26	8.5	66	
				10.0		
331.5	13.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Maroon, Fine Sandy Silt (ML)	50/1"	13.5	100+	
326.2	18.8	Boring Terminated at 18.8 feet.	50/3"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-20 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 321.0
Total Depth: 18.6'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/29/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
320.7	0.3	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 15.8'
		NATIVE SOILS: Soft, Yellow-Brown, Moist, Fine Sandy Silty CLAY (CH) with Roots		1.5		
319.0	2.0	Medium Dense, Tan-Brown, Moist, Clayey Fine SAND (SC)	8-11-16	2.0	27	
			11-15-14	3.5	29	
				5.0		
314.5	6.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Brown, Silty Fine Sand (SM)	41-50/5"	6.5	100+	
				7.4		
			50/5.5"	8.5		
				9.0	100+	
307.5	13.5	Very Hard, Maroon, Moist, Fine Sandy Clayey SILT (ML)	25-38-50	13.5	88	
				15.0		
302.5	18.5		50/2"	18.5		
302.3	18.7	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Fine Sandy Clayey Silt (CL)			100+	
		Boring Terminated at 18.6 feet.				

Froehling & Robertson, Inc.

BORING LOG

Boring: B-21 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 329.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/15/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
328.7	0.3	SURFICIAL ORGANIC SOILS	1-2-2	0.0	4	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 13.5'
		NATIVE SOILS: Soft to Firm, Orange-Brown, Moist, Silty CLAY (CH) with Roots		1.5		
327.0	2.0	Very Stiff, Maroon, Moist, Fine Sandy SILT (ML)	4-8-11	2.0	19	
			12-13-50/5"	3.5	100+	
324.5	4.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Moist, Fine Sandy Silt (ML)		4.9		
322.5	6.5	Medium Dense, Gray-Brown, Moist, Silty Fine SAND (SM)	14-8-12	6.5	20	
				8.0		
320.5	8.5	Hard, Maroon, Moist, Fine Sandy SILT (ML)	6-11-26	8.5	37	
				10.0		
315.5	13.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Maroon, Moist, Fine Sandy Silt (ML)	50/3"	13.5	100+	
310.2	18.8	Boring Terminated at 18.8 feet.	50/3"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-22 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 321.0
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/26/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
320.8	0.2	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 15.2'
		NATIVE SOILS: Very Loose to Loose, Gray-Brown, Moist, Silty Fine SAND (SM) with Trace Roots		1.5		
			2-2-3	2.0	5	
317.5	3.5	Stiff, Gray-Brown, Moist, Fine Sandy Silty CLAY (CL-CH) with Trace Roots	2-4-5	3.5	9	
				5.0		
315.0	6.0	Stiff, Gray-Brown, Wet, Fine Sandy Silty CLAY (CH)	3-3-6	6.5	9	
				8.0		
312.5	8.5	Dense, Gray, Moist, Silty Fine to Medium SAND (SM) with Trace Gravel	12-22-22	8.5	44	
				10.0		
			48-48-50/5"	13.5	100+	
306.5	14.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Fine Sandy Clayey Silt (CL)		14.9		
			50/5.5"	18.5		
302.1	18.9	Boring Terminated at 18.9 feet.		19.0	100+	

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Froehling & Robertson, Inc.

BORING LOG

Boring: B-23 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 330.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/26/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
329.7	0.3	SURFICIAL ORGANIC SOILS	1-2-3	0.0	5	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: 13.2', Hole Caved at 14.0'
		NATIVE SOILS: Soft to Firm, Gray-Brown, Moist, Fine Sandy SILT (ML) with Trace Roots		1.5		
328.0	2.0	Very Stiff, Gray-Brown, Moist, Fine Sandy Silty CLAY (CL/ML)	4-7-10	2.0	17	
			6-10-15	3.5	25	
				5.0		
323.5	6.5	Dense to Medium Dense, Tan-Brown, Moist, Silty Fine to Medium SAND (SM)	7-19-18	6.5	37	
				8.0		
			10-12-12	8.5	24	
				10.0		
318.0	12.0	Very Hard, Gray-Maroon, Moist, Fine Sandy SILT (ML)				
			20-20-32	13.5	52	
				15.0		
311.5	18.5		50/2"	18.5		
311.2	18.8	PARTIALLY WEATHERED ROCK: Sampled as Gray-Maroon, Fine Sandy Silt (ML)			100+	
		Boring Terminated at 18.8 feet.				

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BORING LOG

Boring: B-24 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 332.0
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/26/15
Driller: J. Gilchrist

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
331.8	0.2	SURFICIAL ORGANIC SOILS	1-1-1	0.0		GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: 12.5', Hole Caved at 13.2'
		NATIVE SOILS: Very Loose, Dark Gray, Moist, Silty Fine SAND (SM) with Trace Roots			2	
				1.5		
330.0	2.0	Very Soft to Firm, Gray-Brown, Moist, Fine Sandy Silty CLAY (CL)	1-1-1	2.0		
					2	
			2-2-6	3.5		
					8	
				5.0		
325.5	6.5	Medium Dense to Very Dense, Brown, Moist, Silty Fine to Medium SAND (SM)	8-9-10	6.5		
					19	
				8.0		
			25-42-25	8.5		
					67	
				10.0		
320.0	12.0	Very Hard to Hard, Maroon-Gray, Moist, Fine Sandy SILT (ML)				
			14-21-31	13.5		
					52	
				15.0		
			10-12-21	18.5		
					33	
312.0	20.0	Boring Terminated at 20 feet.		20.0		

Froehling & Robertson, Inc.

BORING LOG

Boring: B-25 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 310.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/15/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
309.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: 8.0', Hole Caved at 15.0'
		NATIVE SOILS: Very Loose to Loose, Brown, Moist, Silty Fine to Medium SAND (SM) with Roots		1.5		
			3-3-4	2.0	7	
306.5	3.5	Very Stiff, Yellow-Brown, Moist, Very Fine to Medium Sandy SILT (ML)	7-12-14	3.5	26	
				5.0		
303.5	6.5	Very Hard, Maroon, Moist, Fine Sandy SILT (ML)	7-20-36	6.5	56	
				8.0		
			25-44-50/5"	8.5	100+	
300.5	9.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Moist, Fine Sandy Silt (ML)		9.9		
			50/2"	13.5	100+	
291.2	18.8	Boring Terminated at 18.8 feet.	50/4"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-26 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 316.0
Total Depth: 18.7'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/15/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
315.4	0.6	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: 9.5', Hole Caved at 13.0'
		NATIVE SOILS: Very Loose, Gray-Brown, Wet, Silty Clayey Fine SAND (SM-SC)		1.5		
314.0	2.0	Stiff, Brown-Maroon, Moist, Silty CLAY (CL)	2-3-6	2.0	9	
312.5	3.5	Hard, Maroon-Brown, Moist, Fine Sandy SILT (ML)	16-40-50/5"	3.5	100+	
311.5	4.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon-Gray, Moist, Fine Sandy Silt (ML)		4.9		
			50/5"	6.5 6.9	100+	
			50/5.5"	8.5 8.9	100+	
			50/3"	13.5	100+	
297.3	18.7	Boring Terminated at 18.7 feet.	50/2"	18.5	100+	

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Froehling & Robertson, Inc.

BORING LOG

Boring: B-27 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 334.0
Total Depth: 19.5'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/14/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
333.7	0.3	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA
		NATIVE SOILS: Very Soft, Yellow, Moist, Fine Sandy SILT (ML) with Trace Roots		1.5		
332.0	2.0	Very Stiff to Very Hard, Maroon, Moist, Fine Sandy SILT (ML)	4-10-15	2.0	25	
			11-21-30	3.5	51	
				5.0		
			16-30-48	6.5	78	
				8.0		
			18-26-48	8.5	74	
				10.0		
320.5	13.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Fine Sandy Silt (ML)	50/5.5"	13.5 14.0	100+	
			30-50/5"	18.5 19.2	100+	
314.5	19.5	Boring Terminated at 19.5 feet.				

Froehling & Robertson, Inc.

BORING LOG

Boring: B-28 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 338.0
Total Depth: 19.4'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/15/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
337.9	0.1	SURFICIAL ORGANIC SOILS	2-3-5	0.0	8	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: 14.5', Hole Caved at 15.0'
		NATIVE SOILS: Firm to Very Stiff, Orange-Brown, Moist, Silty CLAY (CH) with Trace Organics from 0.1'-2.0'		1.5		
			5-8-11	2.0	19	
				3.5		
			5-6-6		12	
				5.0		
331.5	6.5	Very Hard, Maroon, Moist, Fine Sandy SILT (ML)	17-29-49	6.5	78	
				8.0		
			25-50/5"	8.5		
329.0	9.0	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Moist, Fine Sandy Silt (ML)		9.4	100+	
			27-50/5.5"	13.5	100+	
				14.5		
			42-50/5"	18.5	100+	
318.6	19.4	Boring Terminated at 19.4 feet.		19.4		

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Froehling & Robertson, Inc.

BORING LOG

Boring: B-29 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 342.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/15/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
341.8	0.2	SURFICIAL ORGANIC SOILS	1-1-1	0.0	2	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 14.0'
		NATIVE SOILS: Very Soft to Soft, Yellow-Brown, Moist, Slightly Fine Sandy Silty CLAY (CL) with Trace Organics		1.5		
340.0	2.0	Stiff to Very Stiff, Maroon-Brown, Moist, Silty CLAY (CL)	3-6-9	2.0	15	
			7-10-13	3.5	23	
				5.0		
335.5	6.5	Very Hard, Tan-Gray, Moist, Very Fine to Medium Sandy SILT (ML)	38-47-46	6.5	93	
				8.0		
333.5	8.5	Very Stiff, Maroon, Moist, Fine Sandy SILT (ML)	13-12-18	8.5	30	
				10.0		
328.5	13.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Maroon, Moist, Fine Sandy Silt (ML)	50/4"	13.5	100+	
323.2	18.8	Boring Terminated at 18.8 feet.	50/3"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-30 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 312.0
Total Depth: 18.6'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/14/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
311.8	0.2	SURFICIAL ORGANIC SOILS	WOH-WOH-2	0.0	2	GROUNDWATER DATA: 0 HR: 22.0' inside HSA 24 Hrs: 5.5' inside PVC
		NATIVE SOILS: Gray-Black, Very Loose, Moist to Wet, Very Silty Fine SAND (SM) with Trace Roots		1.5		
310.0	2.0	Tan-Gray, Stiff to Very Hard, Moist, Fine Sandy SILT (ML) with Trace Roots	2-5-9	2.0	14	
			8-12-44	3.5	56	
				5.0		
305.5	6.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Maroon, Silty Fine Sand (SM) and Fine Sandy Silt (ML)	50/3"	6.5	100+	
			50/3"	8.5	100+	
			9-30-50/2"	13.5	100+	
				14.7		
293.4	18.6	Boring Terminated at 18.6 feet.	50/1"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-31 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 320.0
Total Depth: 20.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/14/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
319.7	0.3	SURFICIAL ORGANIC SOILS	WOH-2-3	0.0	5	GROUNDWATER DATA: 0 Hr: Dry inside HSA 24 Hrs: Dry, Hole Caved at 9.0'
		NAVTIVE SOILS: Firm, Yellow-Brown, Moist, Very Silty CLAY (CL/CH)		1.5		
318.0	2.0	Medium Dense, Tan, Moist, Silty Fine SAND (SM)	6-14-10	2.0	24	
316.5	3.5	Stiff, Yellow-Brown, Moist, Fine Sandy SILT (ML-SM)	4-5-6	3.5	11	
				5.0		
313.5	6.5	Hard, Yellow, Moist, Silty Fine SAND (SM)	2-15-33	6.5	48	
				8.0		
			30-50/3"	8.5		
311.0	9.0	PARTIALLY WEATHERED ROCK: Sampled as Yellow, Silty Fine Sand (SM)		9.3	100+	
			8-31-50/5.5"	13.5	100+	
305.5	14.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon, Fine Sandy Silt (ML)		15.0		
301.5	18.5	Very Hard, Maroon, Moist, Fine Sandy SILT (ML)	26-27-27	18.5	54	
300.0	20.0	Boring Terminated at 20 feet.		20.0		

Froehling & Robertson, Inc.

BORING LOG

Boring: B-32 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 339.0
Total Depth: 18.8'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/14/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
338.9	0.1	SURFICIAL ORGANIC SOILS	WOH-1-1	0.0		GROUNDWATER DATA:
		NATIVE SOILS: Very Soft, Yellow-Brown, Moist, Fine Sandy SILT (ML) with Trace Roots			2	0 Hr: Dry inside HSA
				1.5		24 Hrs: Dry, Hole Caved at 13.5'
337.0	2.0	Very Stiff, Yellow-Brown, Moist, Silty CLAY (CH) with Trace Root	3-6-11	2.0	17	
335.5	3.5	Very Stiff to Hard, Brown-Maroon, Moist, Fine Sandy SILT (ML)	6-8-19	3.5	27	
				5.0		
			12-22-26	6.5	48	
				8.0		
330.5	8.5	PARTIALLY WEATHERED ROCK: Sampled as Gray-Maroon, Silty Fine to Medium SAND and Fine to Medium Sandy SILT (SM-ML)	50/4"	8.5	100+	
			16-50/5"	13.5	100+	
				14.4		
320.2	18.8	Boring Terminated at 18.8 feet.	50/4"	18.5	100+	

Froehling & Robertson, Inc.

BORING LOG

Boring: B-33 (1 of 1)

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC

Elevation: 353.0
Total Depth: 18.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 10/15/15
Driller: D. Tignor

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
352.8	0.2	SURFICIAL ORGANIC SOILS	1-1-2	0.0	3	GROUNDWATER DATA: 0 Hr: Dry 24 Hrs: Dry, Hole Caved at 13.5'
		NATIVE SOILS: Soft, Orange-Brown, Moist, Silty CLAY (CH) with Trace Roots		1.5		
351.0	2.0	Firm to Very Stiff, Maroon-Gray, Moist, Silty CLAY (CL)	2-3-4	2.0	7	
			3-6-11	3.5	17	
				5.0		
346.5	6.5	Very Hard, Maroon-Brown, Moist, Fine Sandy SILT (ML)	33-44-39	6.5	83	
				8.0		
			34-29-35	8.5	64	
				10.0		
339.5	13.5	PARTIALLY WEATHERED ROCK: Sampled as Maroon-Gray, Moist, Fine Sandy Silt (ML)	50/5"	13.5 13.9	100+	
			50/5"	18.5		
334.1	18.9	Boring Terminated at 18.9 feet.		18.9	100+	

BORING_LOG 66T-0192 BORING LOG.GPJ F&R.GDT 11/5/15

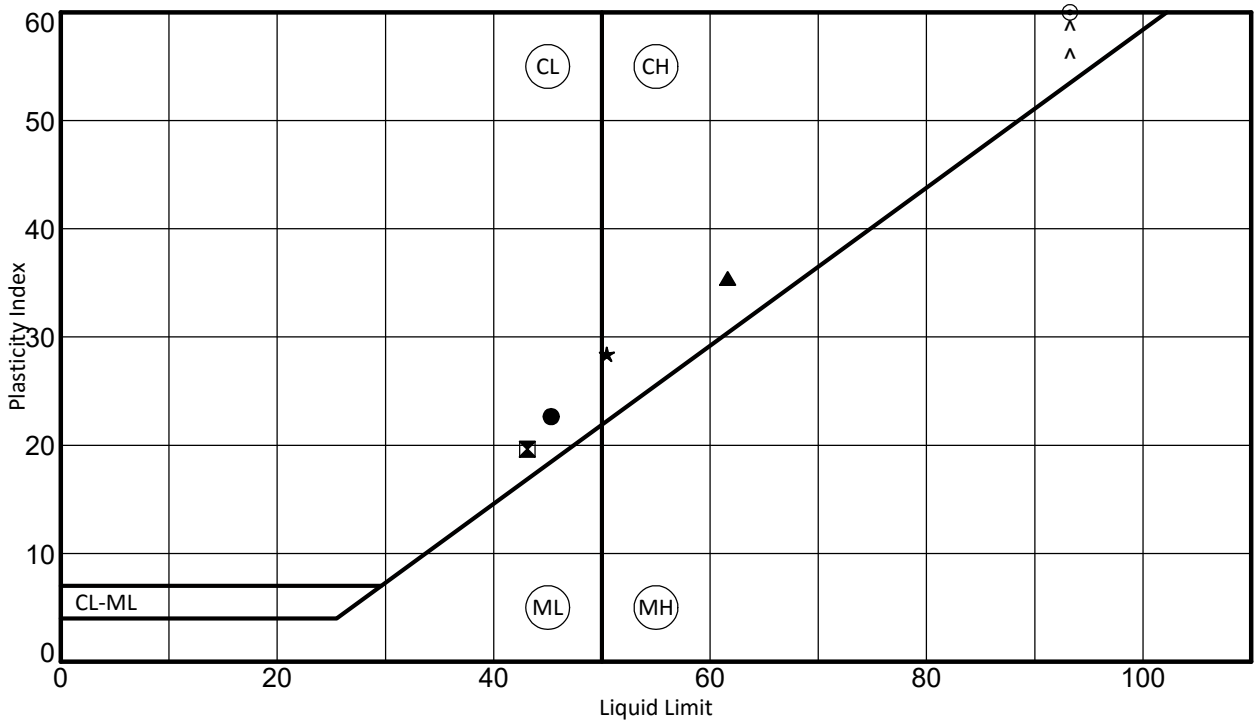
APPENDIX III

LABORATORY TEST RESULTS

Froehling & Robertson, Inc.

ATTERBERG LIMITS

Project No: 66T-0192
Client: Wake Co. Board of Education
Project: E-50 Elementary School
City/State: Morrisville, NC



	Boring No.	Depth	LL	PL	PI	Fines	Classification	% Natural Water Content
●	B-1	2.0 - 3.5	45	23	22		Yellow-Brown, Silty Clay	20.3
⊠	B-29	0.0 - 1.5	43	23	20		Yellow-Brown, slightly fine Sandy, Silty Clay	18.1
▲	B-3	0.0 - 1.5	62	26	36		Reddish-Brown, Silty Clay	27.0
★	B-31	0.0 - 1.5	50	22	28		Yellow-Brown, Silty Clay	19.9
⊙	B-32	2.0 - 3.5	93	29	64		Yellow-Brown, Silty Clay	23.8

APPENDIX IV

GBA DOCUMENT

Important Information about Your

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.

Geotechnical 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 civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical-Engineering Report Is Based on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- 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,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- 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. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical-engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical-engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of 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 equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold-prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical-engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold-prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your GBA-Member Geotechncial Engineer for Additional Assistance

Membership in the GEOPROFESSIONAL BUSINESS ASSOCIATION exposes geotechnical engineers to a wide array of risk confrontaton techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your GBA-member geotechnical engineer for more information.

GEOPROFESSIONAL BUSINESS ASSOCIATION

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