FAYETTEVILLE PUBLIC WORKS COMMISSION

PROCUREMENT DEPARTMENT

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Bid Addendum

PWC Number:	PWC2324021
Bid Title :	GILLESPIE B1.9 SOLAR PV UTILITY STATION
Bid Opening Date and Time:	Tuesday, October 31, 2023 at 2:00 P.M. EST
Addendum Number:	I
Addendum Date:	October 2, 2023
Procurement Advisor:	*Victoria McAllister, Senior Procurement Advisor* *victoria.mcallister@faypwc.com*

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1. Acknowledgement of this addendum must be done in the following section within Article 3 – Bidder's Representation's section listed within the bid package.

2. The solicitation is hereby modified as follows:

M1. APPENDICES, SECTION 6 -GEOTECHNICAL REPORT

As stated within the bid package, the Geotechnical Report would be made available to bidders by October 2, 2023. Please see Geotechnical Report within this addendum.

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Gillespie Solar Farm
Fayetteville, North Carolina
F&R Project No. 66B-0122

Prepared For:
McKim & Creed, Inc.
1730 Varsity Drive
Venture IV Building, Suite 500
Raleigh, North Carolina 27606

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

September 29, 2023

FROEHLING & ROBERTSON

Engineering Stability Since 1881

September 29, 2023

Mr. Robin Lee
Director of Surveying
McKim & Creed Inc.
1730 Varsity Drive
Venture IV Building, Suite 500
Raleigh, NC 27606

Subject: **Report of Subsurface Exploration & Geotechnical Engineering Evaluation**
Gillespie Solar Farm
Fayetteville, North Carolina
F&R Project No. 66B-0122

Dear Mr. Lee:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed Gillespie Solar Farm located in Fayetteville, North Carolina. Our services were performed in general accordance with F&R's Proposal No. 2366-00163 REV. 1 dated June 21, 2023. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and general subsurface conditions, and presents geotechnical engineering design and construction recommendations.

We have enjoyed working with you on this project, and are prepared to assist you with the recommended quality assurance observation and testing services during construction. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

Brian W. McCarthy

Brian William McCarthy -
F&R
2023-09-29 15:18-04:00

NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL
047377
Brian William McCarthy

Michael S. Sabodish Jr.

2023-09-29
15:15-04:00

Brian W. McCarthy, P.E.
Staff Geotechnical Engineer

Michael S. Sabodish Jr., Ph.D., P.E.
Geotechnical Dept. Manager

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APPENDICES

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of the subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in the area of the proposed development and to provide 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 five (5) soil test borings (B-1 through B-5) to depths ranging from 30 to 50 feet below the existing ground surface;
- Preparation of typed Boring Logs and development of a Subsurface Profile;
- Performance of geotechnical laboratory testing on representative soil samples;
- Performing field electrical resistivity tests at two locations;
- Performing corrosivity and laboratory thermal resistivity testing;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction;
- Preparation of this geotechnical report by professional engineers.

2.0 PROJECT INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The project is located on the west side of Gillespie Street, approximately 250 feet south of the intersection of Gillespie Street and Sally Hill Circle in Fayetteville, North Carolina (See Figure 1 in Appendix I). The project site consists of an approximately 44-acre parcel of land that is identified with Parcel Identification Number (PIN) 0424-66-0123 according to information obtained from the Cumberland County GIS online database.

Based on observations made during our site activities, the project site mostly consists of cleared former pastures on the northern half of the project site, and wooded land in the southern half of the site. Overhead power lines are present along the northeast property line of the project site and run in southeast to northwest direction. A pond is located in the western portion of the site. The pond appears to drain to a smaller pond to the south.

Based on the ground surface elevations obtained from Cumberland County topographic data, the project site slopes from the northeast towards the pond in the western portion of the site, from an approximate elevation of EL 190 to EL 150.

2.2 PROPOSED CONSTRUCTION

The proposed development will involve the construction of rows of solar panels within the northern half of the parcel that will be aligned in an approximate north-south direction. Detailed information related to panel loading and foundation type was not provided. We anticipate the panels will be supported on driven piles embedded to depths roughly 5 to 10 feet below the existing ground surface. Equipment pads with switchboards and transformers is proposed to be located at the eastern side of the site adjacent to the proposed entrance drive. Information provided to F&R regarding the weight of equipment pads (mat loading) should not exceed a net allowable bearing capacity of 500 pounds per square foot (psf). F&R assumes that cut and fills of less than 3 feet will be required to establish site grades.

3.0 EXPLORATION AND LABORATORY TESTING PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced a total of five (5) soil test borings (B-1 to B-5) as part of this exploration at the approximate locations requested by Booth & Associates and as shown on the Boring Location Plan presented as Figure No. 2 in Appendix I.

The test borings locations were established in the field by F&R using a hand-held GPS unit. Ground surface elevations at the boring locations were interpolated from Cumberland County GIS topographic information. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The test borings were advanced with 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. Five (5) Standard Penetration Tests were collected within the top 10 feet and then at a nominal interval of approximately 5 feet thereafter.

A representative portion of the soil was obtained from each SPT sample, sealed in an eight-ounce 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 not attempted at the termination of drilling in the borings due to utilizing mud rotary drilling techniques. Borings B-3 and B-5 were backfilled immediately after drilling. Temporary piezometers were installed in borings B-1, B-2, and B-4 to facilitate the measurement of stabilized groundwater levels. The temporary piezometers consisted of 1-inch diameter, hand-slotted PVC pipe installed into the completed borings. Following the collection of the stabilized groundwater readings, the temporary piezometers were removed from the borings and all of the boreholes were backfilled with soil cuttings.

3.2 FIELD RESISTIVITY TESTING

F&R also performed a field resistivity survey at the referenced project site at two locations selected by Booth & Associates (see Figure 2 in Appendix I). The resistivity testing was performed in general accordance with ASTM G57 by the Wenner 4-point method using a Megger DET 5/4D Digital Earth Tester. Resistance measurements were made at each test area using electrodes spaced approximately 2, 5, 10 and 40 feet. The results of the resistivity testing are presented in Appendix III.

3.3 LABORATORY TESTING

F&R selected two representative soil samples and subjected them to routine geotechnical index testing consisting of Natural Moisture Content, Sieve Analysis and 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 and are presented in Appendix III of this report.

In addition to the geotechnical testing, thermal resistivity and corrosivity tests were also performed. The thermal resistivity/conductivity testing was performed in general accordance with ASTM D 5334. Two undisturbed Shelby tube samples and two five gallon bucket samples from the auger cuttings were collected at/near borings B-2 and B-4 from depths of 1 to 3.5 feet below the ground surface. Thermal resistivity tests were performed on bulk soil samples recompacted to 85% of the Modified Proctor and samples from the Shelby Tubes. The results of the thermal resistivity tests are still pending and will be issued under a separate letter at a later date.

Three SPT jar soil samples were subjected to pH, chloride ion, soluble sulfates, electrical resistivity, redox potential, and sulfides testing to aid in assessing the corrosivity potential of the on-site soils as will be discussed in Section 4.4. The results of the corrosivity tests are presented in Appendix III.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The project site is located in the Coastal Plain Physiographic Province of North Carolina. The near surface Coastal Plain soils have resulted from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic Coast. The Coastal Plain Province is a broad flat plain with widely spaced low rolling hills where the near-surface soils have their origin from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic Coast. It is noted that the Coastal Plain soils vary in thickness from only a few feet along the western border to over ten thousand feet in some areas along the coast.

According to the Geologic Map of North Carolina (1985), the site is located in the Cape Fear Formation. The Cape Fear Formation is mapped as Cretaceous period marine deposits that are described as sandstone and sandy mudstone, yellowish gray to bluish gray, mottled red to yellowish orange, indurated, graded and laterally continuous bedding, blocky clay, faint cross-bedding, feldspar and mica common.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached Boring Logs represent an estimate of the subsurface conditions based on an interpretation of the boring data using normally-accepted, geotechnical engineering judgments. 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. A subsurface profile has been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site. The subsurface profile is presented as Figure No. 3 in Appendix I. Strata breaks designated on the boring logs and subsurface profile represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples. More-detailed descriptions of the subsurface conditions at the individual boring locations are presented on the boring logs provided in Appendix II.

4.2.2 Surficial Materials

Surficial Organic Soils were encountered at the surface of the borings, from the ground surface to a depth of 0.2 feet. The Surficial Organic Soils generally consisted of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and 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 the Surficial Organic Soil depths is subjective. Actual Surficial Organic Soil depths should be expected to vary.

4.2.3 Possible Fill Soils

Possible Fill soils were encountered below the surficial soils in boring B-2 and extended to a depth of 3.5 feet below the existing ground surface. It is noted that sometimes the relatively small and disturbed sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Since man-made materials, deleterious materials, or other obvious evidence of fill were not encountered in the some of the soil samples, the materials believed to be earth fill are referred to as “possible fill”. Based on a review of historical aerial images, it appears the existing possible fill materials are located in areas adjacent to historical agricultural fields.

The possible fill soils consisted of moist, loose silty fine sand (SM) with SPT N-values ranging from 6 to 7 bpf. The possible fill soils appeared to contain trace amounts of roots.

Possible fill soils exhibiting SPT N-values of 4 bpf or less are generally indicative of fill with poor compaction while fill soils exhibiting SPT N-values of 5 to 8 bpf are generally indicative of fill with moderate compaction. Well-compacted fill, that does not contain gravel, would typically exhibit SPT N-values of 9 bpf or higher. In general, it appears that the possible fill was moderately compacted.

4.2.4 Coastal Plain Soils

Native coastal plain soils were encountered in all of the borings below the surficial organic and possible fill soils. The native soils typically consisted of very loose to very dense silty and clayey sands (USCS – SM and SC) with SPT N-values ranging from 2 to 79 bpf, and soft highly plastic clay (USCS – CH) with a SPT N-value of 4 bpf.

Very loose sand layers were encountered in borings B-1, B-3, B-4, and B-5 at depths ranging from just below the existing ground surface to 3.5 feet below the existing ground surface. Deeper layers of very loose sand were encountered in borings B-3 and B-5 at depth of 38.5 and 28.5 feet, respectively, and extended to depths of 43.5 and 33.5 feet, respectively.

A layer of soft, highly plastic clay (CH) was encountered in boring B-5 at a depth of 33.5 feet below the existing ground surface, and extended to the boring termination depth of 35 feet.

4.3 SOIL MOISTURE AND GROUNDWATER CONDITIONS

Moist soils (*i.e.,* within 3 percentage points of the estimated optimum moisture content) were encountered in all borings in the upper 2 to 8.5 feet of the soil profile. Wet or saturated soils (3 percentage points or greater over the estimated optimum moisture content) were encountered in the soil profile of all of the borings, at depths ranging from 2 to 8.5 feet below existing borings. Once encountered, these wet or saturated soils extended to the boring termination depths, with the exception of boring B-2, where the wet or saturated soils extended to a depth of 13.5 feet below the existing ground surface. A deeper layer of saturated soils were encountered in boring B-2 at a depth of 18.5 feet and extended to the boring termination depth of 30 feet.

Groundwater level measurements were not attempted at the termination of drilling due to utilizing mud rotary techniques. Borings B-3 and B-5 were backfilled immediately after drilling. After a stabilization period of approximately 24-hours following completion of drilling, groundwater levels were measured in borings B-1, B-2, and B-4. Stabilized groundwater was encountered at depths ranging from 13.9 to 14.8 feet below the existing ground surface in these borings.

It should be noted that the groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. F&R notes that due to the presence of relatively impervious silty and clayey soils, noted on the project site, trapped or perched water conditions may be encountered during periods of inclement weather and during seasonally wet periods.

4.4 SOIL CORROSIVITY EVALUATION

Three soil samples were subjected to laboratory testing to determine pH, Chloride and Sulfate concentrations as well as Electrical Resistivity and Redox Potential. The results of the pH, Chloride, Sulfate, Sulfide, Electricity Resistivity and Redox Potential testing are presented in the following table:

Boring	Sample Depth (ft)	Moisture Content (%)	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Sulfides (mg/kg)	Electrical Resistivity (ohm-cm)	Redox Potential (mV)
B-1	1-3.5	4.63	5.09	<262*	<367*	34.8	3,850	255
B-2	1-3.5	2.21	4.97	<256*	<358*	<25.5*	2,490	263
B-4	1-3.5	3.42	5.00	<259*	<362*	<25.8*	4,460	286

*Below indicated method quantitation limit

Corrosion potential of soils for underground structures is dependent upon several factors including pH, soil moisture, resistivity, sulfates and chlorides. It is F&R's opinion that the soils on this site appear to have a mild to moderate corrosion potential based on the slightly acidic pH readings, relatively low chloride and sulfate concentrations and moderately high resistivity.

We are not aware of the existence of other corrosive factors such as coal, cinders, muck, peat, mine wastes, or landfills at this site, which may categorize the site as highly corrosive and negate the test results.

5.0 PRELIMINARY GEOTECHNICAL DESIGN RECOMMENDATIONS

5.1 GENERAL

The geotechnical engineering recommendations contained in this section of the report are based upon the results of the five soil test borings, the information provided regarding the proposed construction, and our familiarity with geotechnical engineering practices in this area. It is our opinion that the subsurface conditions encountered at the project site are suitable for the proposed construction from a geotechnical engineering perspective provided the recommendations presented in this report are followed throughout the design and construction phases of this project. F&R requests an opportunity to review project structural plans and specifications to confirm that the recommendations presented in this report have been properly interpreted and implemented, and to determine if additional geotechnical recommendations are warranted. Please contact F&R at your earliest convenience if you feel additional recommendations are warranted or if the recommendations in this report need additional clarification.

5.2 SOLAR PANEL FOUNDATION SUPPORT

Details related to solar panel type, foundation type and design foundation loads are not available. We anticipate the proposed solar panels will be supported on deep foundation system i.e. driven piles. The piles should be designed to resist lateral and uplift forces.

In order to assist in the foundation design, L-Pile deep foundation parameters have been provided in the following table. The L-Pile parameters are provided for the subsurface conditions encountered in the borings and represents an idealized subsurface profile. Please note that the tabulated values in Table 1 are for the given layered models with the understanding that the transitions between different soil strata are usually less distinct than those indicated in the table.

TABLE 1: L Pile Parameters

Depth (feet)		Soil Type	Total Unit Weight (pcf)	Cohesive Strength (psf)	L-Pile 5.0 Design Parameters		Friction Angle (degrees)	USCS
Top	Bottom				Strain ε_{50}	Static Soil Modulus, K (pci)		
0	6.5	Silty Sand	115	-	-	25	29	SM
6.5	13.5	Silty Sand	115	-	-	25	29	SM
13.5	18.5	Clayey Sand	120	-	-	60	33	SC
18.5	28.5	Silty Sand	115	-	-	20	29	SM
28.5	35	Clayey Sand/Sandy Clay	110	300	0.02	25	28	SC/CH

Notes:
1. All depths are from existing grade and should be adjusted based on the top of foundation elevation.
2. The soil parameters in the above tables are based on correlations with the SPT values.

5.3 EQUIPMENT PAD Foundation SUPPORT

We understand that equipment pads will be installed for support of various control and monitoring equipment and transformers. F&R understands that the equipment slabs will consist of a reinforced 9-inch thick concrete slab supported by a layer of 1-foot thick washed stone or non-frost structural fill. F&R has been informed that the soil contact pressures generated by the loading on the mats would not exceed 500 psf. Due to the relatively light expected loading and the conditions encountered in boring B-1, settlements of the equipment pads are estimated to be on the order of 1 inch or less. We would expect that the settlements would be relatively uniform across a rigidly designed mat. Provided that the site preparation and fill placement recommendations presented in the subsequent sections of this report are followed, the proposed equipment pad area near B-1 is suitable to support the equipment pads.

The magnitude of settlements will be influenced by the variation in excavation requirements across the along mat footprint, the distribution of loads, and the variability of underlying soil conditions. Our settlement analysis was performed on the basis of the provided structural loading at the time of this report. Actual settlements experienced by the structures and the time required for these soils to settle will be influenced by undetected variations in subsurface conditions, final grading plans, and the quality of fill placement and foundation construction. If the proposed structure loads are greater than indicated in earlier in this section or if there are additional mat foundations proposed that F&R has not been apprised of, please provide pertinent structural information for F&R to review and comment.

For purposes of design, it is recommended that the mat design be based on a coefficient of subgrade reaction (K) of 13 pci. F&R recommends that the layer of non-frost structural fill extend at least 2 feet below exterior grades for frost and bearing capacity considerations. Final slab and reinforcing sizing should be determined by the Project Structural Engineer based on actual design loads, building code requirements and other structural considerations.

5.4 ACCESS ROAD DESIGN CONSIDERATIONS

Due to the presence of some very loose surface soils, unstable subgrade conditions could develop along the access roadway alignment beneath construction equipment during removal of surficial organic soils. In order to help prevent unstable conditions from occurring, it is recommended that the surficial soils be stabilized prior to roadway grading by undercutting and replacing the very loose soils. F&R anticipates that the subgrade undercut/repair depths will be on the order of 12 to 18 inches. Additional repairs may be recommended at the time of construction. These repairs will be based upon actual field conditions observed by the geotechnical engineer and should be determined based upon proofrolling and/or other subgrade evaluations. If these evaluations reveal unstable conditions, the method of repair should be as directed by the project geotechnical engineer. Methods of repair may include, but are not necessarily limited to: drying and re-compaction; additional undercutting; application of lime; use of geotextiles; or other methods deemed appropriate by the project geotechnical engineer. Any necessary repairs should be made based upon actual field conditions observed by the geotechnical engineer at the time of construction, and should be determined based upon proofrolling and other subgrade evaluations.

We have been informed that the first 50 feet of the entrance driveway will consist of asphalt pavement, with the remaining length being unpaved. The pavement structure should comply with the minimum standards for roadways as required by the City of Fayetteville. Proofrolling of the pavement subgrades, placement of ABC base course and asphalt surface courses, should be observed, tested and approved by the project geotechnical engineer. Upon request, F&R would be pleased to provide a site specific pavement design in accordance with the City of Fayetteville requirements based on the actual soil subgrade strength testing (CBR tests) and estimated traffic volumes. However, a this time we believe a preliminary asphalt section consisting of 3 inches of 9.5B asphalt and 8 inches of compacted NCDOT ABC stone would likely be sufficient for the project.

For the interior drives, it is anticipated that one light maintenance pickup truck will visit the site every day. For light maintenance traffic, we recommend an 8 inch layer of compacted ABC stone to be placed on the access road. Since the road will not be paved, we recommend a woven geo-textile (equivalent to Mirafi 500X) be installed on the subgrade prior to placement of the ABC stone. The subgrade should be confirmed to be stable prior to placement of the geo-textile.

We emphasize that good drainage is essential for successful performance of the road. The access road should be maintained in a drained condition at all times. Water build-up in the gravel surface could saturate the underlying soils and result in softening of the subgrade and premature failures. Proper drainage may be aided by grading the site such that surface water is directed away from the road, and construction of swales adjacent to the road. The access road should be graded such that surface water is directed towards the outer limits of the road.

5.5 SITE SEISMIC CLASSIFICATION

The following recommendations are based on the 2018 North Carolina Building Code (NCBC). Our scope of services did not include site specific soil shear wave velocity testing. F&R has evaluated the data obtained from the soil test borings for assignment of Seismic Site Class to this site.

In accordance with procedures outlined in the 2018 NC Building Code for determining Site Class, a weighted average of the soil conditions in the upper 100 feet was performed using SPT N-values with the assumption that very dense/very hard soils are present below the maximum 50 foot exploration depth. Based on this evaluation of the SPT N-values, the soil profile indicates a Site Class **"E"** is applicable to the project. It may be beneficial to consider performing shear wave testing to evaluate whether the site class may be upgraded to Site Class D if the upgrade would provide significant cost benefits to the project.

Although F&R has not performed a liquefaction evaluation, it is F&R's opinion that there does not appear to be a potential for liquefaction due to the presence of moderate consistency silty and clayey sands that typically exist over most of the site within the depths of our exploration. In addition, the relatively high fines content of the finer grained clays encountered across the site also indicate that liquefaction is unlikely. If a detailed evaluation of liquefaction is desired, F&R would be available to perform such an evaluation at your request.

6.0 GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS

6.1 SITE PREPARATION

Initial site development should include stripping all surficial organic soils, roots, vegetation and any other deleterious materials from load bearing areas. The stripping should extend a distance of at least 5 feet beyond the building/foundation perimeters. Following the stripping operations, the exposed subgrade soils at the finished subgrade level and in fill sections should be proofrolled with a loaded tandem axle dump truck, scraper, or other similar type of construction equipment at the option of the geotechnical engineer to confirm the stability of the subgrade soils. The proofroll operations should be observed by a geotechnical engineer or his representative. If proofrolling reveals unstable conditions, the method of repair should be as directed by the project geotechnical engineer. Methods of repair may include, but are not necessarily limited to drying and re-compaction; undercutting and replacement with suitable structural fill; use of geo-textiles and/or geo-grids with select fill; use of lime stabilization; or other methods deemed appropriate by the project geotechnical engineer. Very loose soils were encountered within the upper 2 to 6.5 feet of the soil profile of the borings and as such, F&R anticipates that subgrade repairs may be required to establish stable subgrades across portions of the site.

Wet to saturated soils conditions were encountered in the borings at depths ranging from 2 to 8.5 feet to termination depths of the borings. As such, the cut soils from mass grading operations and from utility trench excavations will likely be wet and require drying in order to be successfully used as compacted, structural fill and backfill. In addition, it is possible that relatively shallow perched and subsurface water could be encountered during construction depending upon the time of the year site grading is performed. Open ditches and/or interceptor drains may be required to improve site and soil profile drainage, improve soil moisture conditions, and help stabilize near surface conditions.

6.2 STRUCTURAL FILL PLACEMENT AND COMPACTION

Below the surficial and existing possible fill soils, the on-site native near-surface soils that were encountered typically consisted of silty and clayey sands (SM and SC). These soils should be suitable for re-use as structural fill but may require drying to achieve adequate compaction and stability. Structural fill should have moisture contents within 2 to 3 percent of optimum moisture at the time of placement. If highly plastic soils (CH and MH) soils are encountered during site grading activities they should not be used as structural fill.

Approved structural fill, not including NCDOT ABC stone, should consist of granular material or low plasticity (PI less than 15) silty and clayey sandy soils (SM and SC). If imported structural fill is required for the project, the fill should be approved by the geotechnical engineer prior to these materials being transported to the site. All structural fill should be within 2 to 3 percentage points of optimum moisture content at the time of placement.

Structural fill should be placed in lifts not to exceed 6 to 8 inches and compacted to at least 95 percent of the Standard Proctor (ASTM D-698) maximum dry density. The top 12 inches of subgrades in all load bearing building and pavement areas should be compacted to at least 98 percent of the Standard Proctor (ASTM D-698) maximum dry density. Utility trench backfill in load bearing areas should be compacted to at least 95 percent of the Standard Proctor (ASTM D-698) maximum dry density. Fill and backfill materials placed in non-load bearing areas (e.g., nonvehicular grassed areas) areas should be compacted to at least 92 percent of the Standard Proctor (ASTM D-698) maximum dry density.

Monitoring of all site preparation including stripping, undercutting and backfilling operations; fabric/stabilization material placement; and density testing on each lift of backfill to verify that adequate compaction is being achieved should be performed by a qualified soils technician working under the direct supervision of the geotechnical engineer.

Depending upon the cut depths and site conditions at the time of construction, some soils may require moisture conditioning (i.e., drying of wet soils, or wetting of dry soils) prior to use as structural fill. As such, it is recommended that earthwork be performed during the summer and early fall months (mid-April through November) when the weather conditions are more conducive to moisture conditioning of soils.

As previously stated, the on-site soils have sufficient silt/clay content to render them moisture sensitive. The on-site soils will become unstable (i.e., pump and rut) during normal construction activities when in the presence of excess moisture. Soils with a moisture content greater than 3 percentage points above the optimum moisture content are generally considered to have excessive moisture. During earthwork and construction activities, surface-water runoff should be drained away from construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades.

6.3 EQUIPMENT PAD FOUNDATION CONSTRUCTION RECOMMENDATIONS

We recommend that all foundation subgrades and bearing grades be observed by a qualified geotechnical engineer or their representative prior to placement of reinforcing steel and concrete. The purpose of the engineering observation would be to determine that the foundations bear in suitable soils at the proper embedment depths, and that unsuitable soft or loose materials are undercut and backfilled with approved structural fill material. Hand auguring and Dynamic Cone Penetrometer (DCP) testing should be performed at the direction of the project geotechnical engineer to verify the consistency of the subgrade soils and underlying support soils.

It is recommended that a smooth bladed backhoe bucket be used to remove the final 6 to 12 inches of soils above the subgrade in order to prevent disturbing soils below the subgrade and/or prevent gouging narrow grooves in the subgrade as may occur with a toothed-end bucket.

If soft, very loose, or otherwise unsuitable soils are encountered at the subgrade elevation, undercutting and repair may be required. If undercutting is performed, the undercut excavations should be backfilled with materials approved by the project geotechnical engineer. We anticipate that most undercuts can be backfilled with clean sands (less than 10 percent fines), NCDOT ABC stone, and/or No. 57 washed stone up to the planned subgrade. If ABC stone is utilized, it may be placed in 12 inch thick lifts and compacted to at least 95 percent of the Standard Proctor maximum dry density (ASTM D-698). If clean sand is used, it may be placed in a single 8 to 12 inch thick lifts and compacted to at least 95 percent of the Standard Proctor maximum dry density (ASTM D-698). The washed stone thickness should not exceed 2 feet before the surface of the washed stone is densified with a heavy vibratory plate compactor to the satisfaction of the geotechnical engineer or their representative. In some circumstances, the geotechnical engineer may recommend that the undercuts be backfilled with lean concrete or flowable fill.

Exposure to the environment may weaken the soils at the subgrade level if excavations remain open for long periods of time. The subgrade surface should be level or suitably benched and free of loose soil, ponded water, and debris. If the subgrade soils are softened by surface water intrusion or exposure, the softened soils must be removed from the excavation immediately prior to placement of concrete. Excavations must be maintained in a drained/de-watered condition throughout the foundation construction process. If the foundation excavations must remain open overnight, or if rainfall becomes imminent while the subgrade soils are exposed, we strongly recommend that a 2 to 3 inch thick “mud mat” of lean concrete (2,000 psi) be placed on the subgrade before placing the reinforcing steel. In addition, F&R stresses the need for positive perimeter surface drainage around structure areas to direct all runoff water away from structures and foundations.

6.4 PAVEMENT CONSTRUCTION RECOMMENDATIONS

Pavement subgrades should be prepared as outlined in previous sections of this report. All base course stone beneath flexible pavement should be compacted to at least 100 percent of the modified Proctor maximum dry density (ASTM D-1557).

We emphasize that good base course drainage is essential for successful pavement performance. The ABC stone should be maintained in a drained condition at all times. Water build-up in the base course could result in premature pavement failures. Proper drainage may be aided by grading the site such that surface water is directed away from pavements and construction of swales adjacent to pavements. All pavements should be graded such that surface water is directed towards the outer limits of the paved area or to catch basins located such that surface water does not remain on the pavement.

Flexible asphalt pavements and bases should be constructed in accordance with the guidelines of the latest applicable NCDOT Standard Specifications for Roads and Structures. Materials, weather limitations, placement and compaction are specified under appropriate sections of this publication.

6.5 TEMPORARY EXCAVATION RECOMMENDATIONS

We anticipate that the excavations at some locations may not be able to be sufficiently sloped and may require temporary shoring. Trench boxes or internally-braced excavations are anticipated; however, the type of excavation stabilization or shoring system used should be selected and designed by the contractor.

Mass excavations and other excavations required for construction of this project must be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations) or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas and protective systems by a “competent person” for evidence of situations that could result in caveins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, building supplies, etc., should be placed away from the edges of excavations at a distance equaling or exceeding the depth of the excavation. F&R cautions that the actual excavation slopes will need to be evaluated frequently each day by the "competent person" and flatter slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation-specific circumstances. The contractor is responsible for providing the "competent person" and all aspects of site excavation safety. F&R can evaluate specific excavation slope situations if we are informed and requested by the owner, designer, or contractor's "competent person".

7.0 CONTINUATION OF SERVICES

As previously discussed, a geotechnical engineer should be retained to monitor and test earthwork activities, and observe subgrade preparations for foundations and pavements. It should be noted that the actual soil conditions at the various subgrade levels and footing bearing grades will vary across this site and thus the presence of the geotechnical engineer and/or their representative during construction will serve to validate the subsurface conditions and recommendations presented in this report.

A geotechnical engineer should be employed to monitor the earthwork, foundation construction, and pile testing performed by others and to report that the recommendations contained in this report are completed in a satisfactory manner. The continued geotechnical engineering involvement on the project will aid in the proper implementation of the recommendations discussed herein. The following is a recommended scope of services:

- Review of project plans and construction specifications to verify that the recommendations presented in this report have been properly interpreted and implemented;
- Observe the earthwork process to document that subsurface conditions encountered during construction are consistent with the conditions anticipated in this report;
- Observe the subgrade conditions before placing structural fill including proofroll observations;
- Observe the placement and compaction of any structural fill and backfill, and perform laboratory and field compaction testing of the fill;

- Observe the installation and testing of piles for the solar panel support systems; and,
- Observe all foundation excavations and footing bearing grades for compliance with the recommended design soil bearing capacity. We also stress the importance of conducting hand auger and DCP testing at and extending several feet below the footing bearing grade in order to give an indication of the anticipated subsurface conditions and define footings that should be undercut and repaired as outlined in this report.

8.0 LIMITATIONS

This report has been prepared for the exclusive use of McKim & Creed and/or their agents, for specific application to the referenced project 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 previously-described, 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.

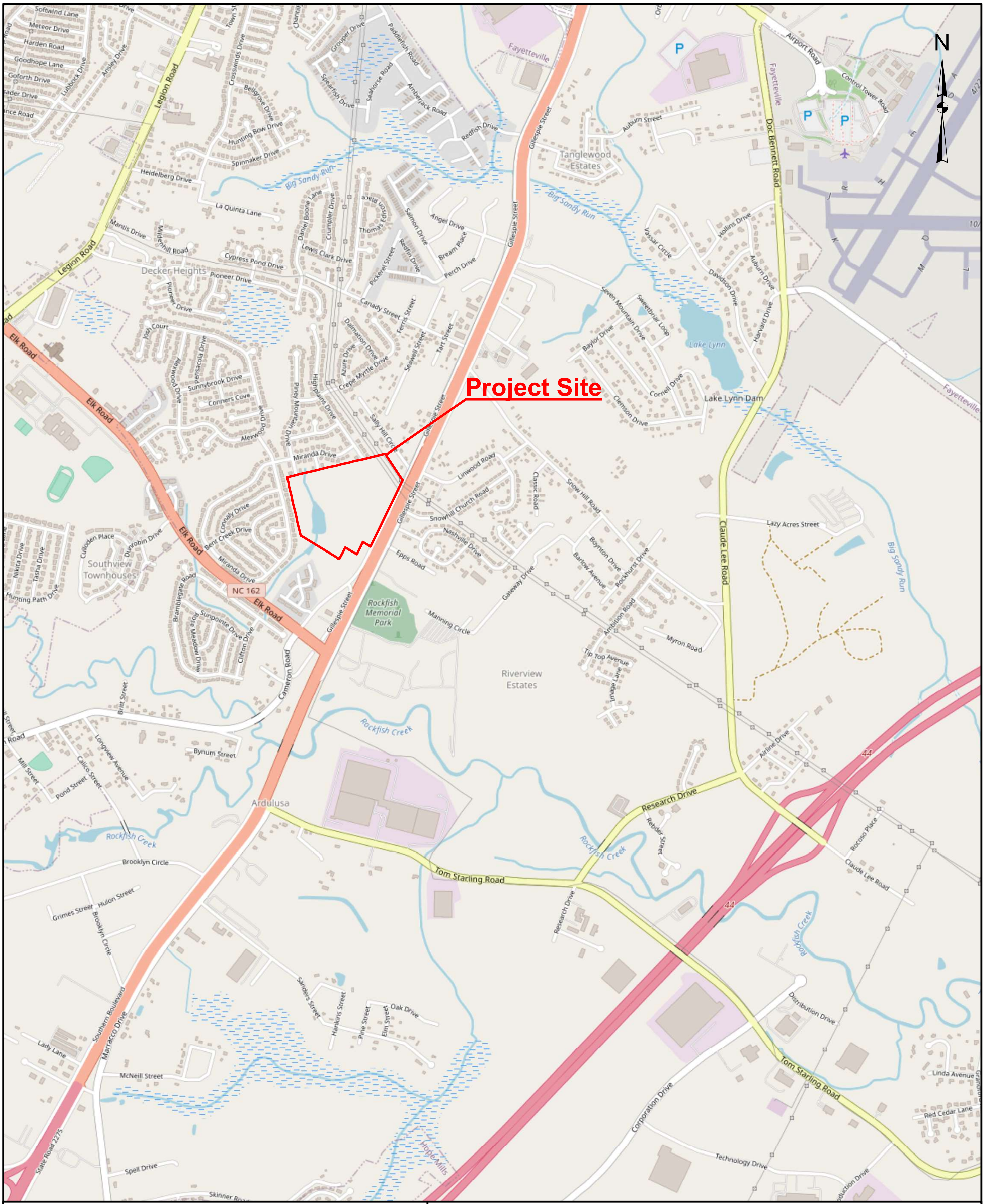
There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix IV. We ask that you please review this information.

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.

In the event that changes are made in the design or location of the proposed structures, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. 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.

APPENDIX I

FIGURES



Site Vicinity Map

0 500 1,000 2,000 3,000 4,000 Feet

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310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	McKim & Creed
Project:	Gilliespie Solar Farm
Location	Fayetteville, Cumberland County, NC
Project Number:	66B-0122
Data:	Open Street
Date:	September 2023
Scale:	1 inch = 2,000 feet

FIGURE No.: 1

Boring Location Plan

0 100 200 400 600 800 Feet

N

FROEHLING & ROBERTSON
Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	McKim & Creed	
Project:	Gillespie Solar Farm	
Location	Fayetteville, Cumberland County, NC	
Project Number:	66B-0122	
Data:	NCOne Map Parcel 2023/Aerial 2021	
Date:	September 2023	Scale: 1 inch = 400 feet

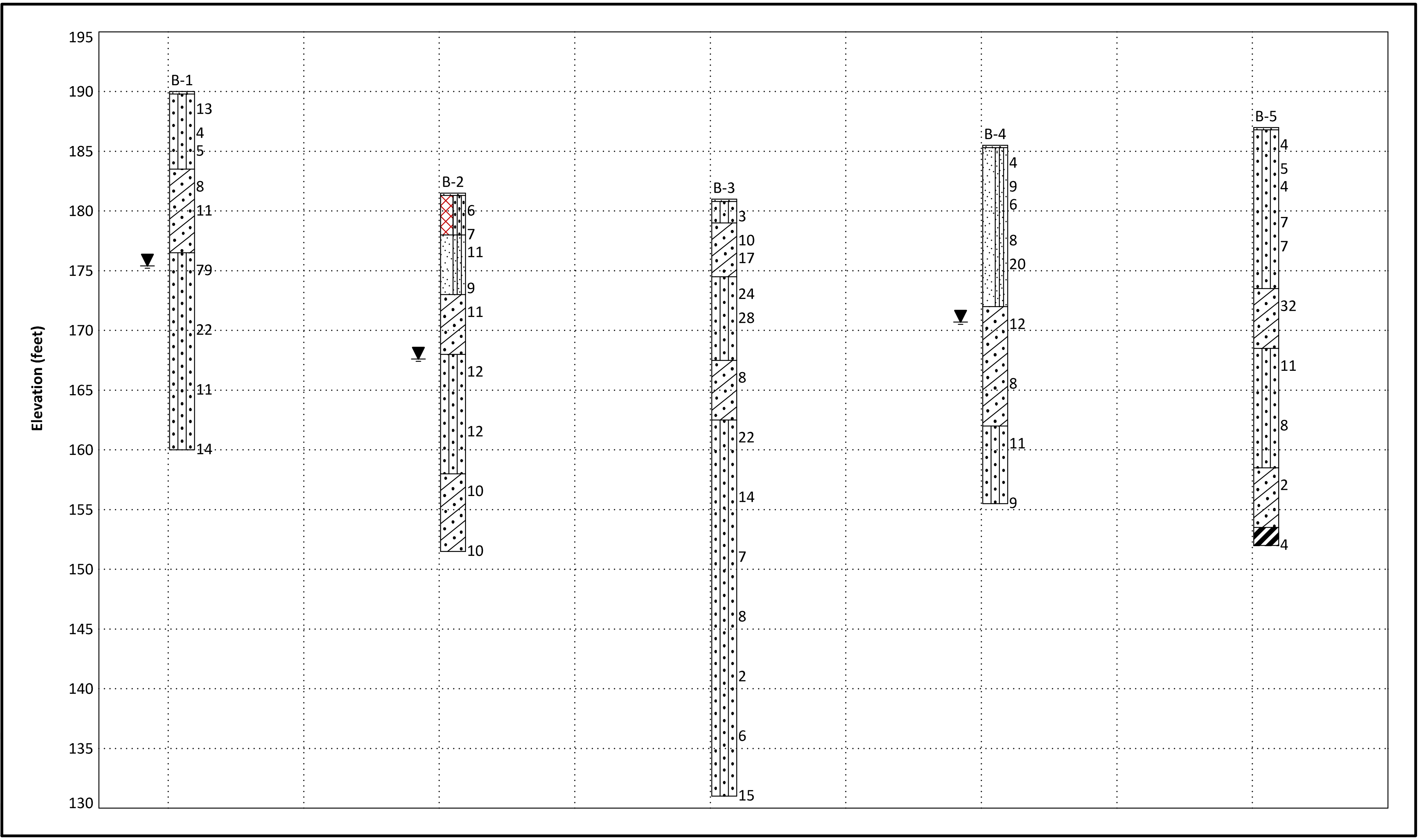
FIGURE No.: 2

FROEHLING & ROBERTSON
Engineering Stability Since 1881

SUBSURFACE PROFILE

Plot Based on Elevation
Profile Name: Figure No. 3

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC



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

Ground Water

▽	Water Level in Bore Hole Immediately after Drilling
▼	Static Water Level after 24 Hours

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

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BORING LOG

Boring: B-1 (1 of 1)

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC

Elevation: 190 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type:
Date Drilled: 8/16/23
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
189.8	0.2	SURFICIAL ORGANIC SOILS	5-6-7	0.0	13	GROUNDWATER DATA: 0 Hr: Not Measured due to mud rotary techniques 24 Hrs: 14.6' inside PVC
		COASTAL PLAIN: Very Loose to Medium Dense, Tan, Moist to Wet, Silty Fine to Coarse SAND (SM) Wet at 2.0'		1.5		
			3-2-2	2.0	4	
			3-2-3	3.5	5	
				5.0		
183.5	6.5	Loose to Medium Dense, Red, Orange, Wet, Clayey Fine to Coarse SAND (SC)	3-4-4	6.5	8	
				8.0		
			5-5-6	8.5	11	
				10.0		
176.5	13.5 ▼	Medium Dense to Very Dense, Red-Yellow-Orange, Wet to Saturated, Silty Fine to Coarse SAND (SM) Saturated 13.5'-28.5'	15-32-47	13.5	79	
				15.0		
			11-11-11	18.5	22	
				20.0		
			2-4-7	23.5	11	
				25.0		
			5-6-8	28.5	14	
160.0	30.0	Boring Terminated at 30.0 feet.		30.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

BORING_LOG 66B-0122 BORE LOGS.GPJ F&R.GDT 9/29/23

BORING LOG

Boring: B-2 (1 of 1)

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC

Elevation: 181.5 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type:
Date Drilled: 8/18/23
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
181.3	0.2	SURFICIAL ORGANIC SOILS	3-3-3	0.0 1.5	6	GROUNDWATER DATA: 0 Hr: Not Measured due to mud rotary techniques 24 Hrs: 13.9' inside PVC
		POSSIBLE FILL: Loose, White to Yellow-Tan and Brown, Dry to Moist, Poorly Graded SAND (SP-SM) with Silt and Trace Roots Moist at 2.0'	3-4-3	2.0 3.5	7	
178.0	3.5	RESIDUAL: Loose to Medium Dense, Tan, Moist to Saturated, Poorly Graded SAND (SP-SM) with Silt and Trace Roots (3.5'-6.5')	3-6-5	3.5 5.0	11	
		Saturated at 6.5'	4-4-5	6.5 8.0	9	
173.0	8.5	Medium Dense, Orangish Tan, Wet, Slightly Clayey Fine to Medium SAND (SC)	5-6-5	8.5 10.0	11	
168.0	▼ 13.5	Medium Dense, Pink and White to Yellow-Tan, Moist to Saturated, Silty Fine to Medium SAND (SM)	3-5-7	13.5 15.0	12	
		Saturated at 18.5'	5-6-6	18.5 20.0	12	
158.0	23.5	Loose, Red-Orange-Brown, Saturated, Clayey Fine to Medium SAND (SC) with Trace Mica	3-5-5	23.5 25.0	10	
			3-5-5	28.5 30.0	10	
151.5	30.0	Boring Terminated at 30.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-3 (1 of 1)

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC

Elevation: 181 ±
Total Depth: 50.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type:
Date Drilled: 8/18/23
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
180.8	0.2	SURFICIAL ORGANIC SOILS	1-1-2	0.0 1.5	3	0 Hr: Not Measured due to mud rotary techniques
179.0	2.0	COASTAL PLAIN: Very Loose, Tan-Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots	4-5-5	2.0 3.5	10	
		Loose to Medium Dense, Red-Brown, Moist, Clayey Fine to Medium SAND (SC)	4-5-12	5.0	17	
174.5	6.5	Medium Dense, Red-Orange and Yellow, Wet, Silty Fine to Coarse SAND (SM)	10-11-13	6.5 8.0	24	
			16-12-16	8.5 10.0	28	
167.5	13.5	Loose, Red-Orange and Yellow, Wet, Clayey Fine to Coarse SAND (SC)	3-3-5	13.5 15.0	8	
162.5	18.5	Very Loose to Medium Dense, Red-Yellow-Tan, Wet to Saturated, Slightly Clayey Silty Fine to Coarse SAND (SM) with Trace Mica and Fine Gravel (38.5'-48.5')	8-10-12	18.5 20.0	22	
			5-7-7	23.5 25.0	14	
		Saturated at 28.5'	3-3-4	28.5 30.0	7	
			3-3-5	33.5 35.0	8	
			1-1-1	38.5 40.0	2	
			2-3-3	43.5 45.0	6	
			5-7-8	48.5 50.0	15	
131.0	50.0	Boring Terminated at 50.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

BORING LOG

Boring: B-4 (1 of 1)

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC

Elevation: 185.5 ±
Total Depth: 30.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type:
Date Drilled: 8/17/23
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
185.3	0.2	SURFICIAL ORGANIC SOILS COASTAL PLAIN: Loose to Medium Dense, Red-Orange-Tan, Moist to Wet, Poorly Graded SAND (SP-SM) with Silt and Trace Roots (0.0'-2.0')	3-3-1	0.0 1.5	4	GROUNDWATER DATA: 0 Hr: Not Measured due to mud rotary techniques 24 Hrs: 14.8' inside PVC
			2-2-7	2.0 3.5	9	
			2-3-3	3.5 5.0	6	
			5-4-4	6.5 8.0	8	
		Wet (8.5'-13.5')	5-6-14	8.5 10.0	20	
172.0	13.5 ▼	Loose to Medium Dense, Pink and Tan to Red-Orange, Wet, Silty Clayey Fine SAND (SC)	4-5-7	13.5 15.0	12	
			3-3-5	18.5 20.0	8	
162.0	23.5	Loose to Medium Dense, Yellow-Tan to Red-Orange, Saturated, Slightly Clayey Silty Fine to Coarse SAND (SM)	4-5-6	23.5 25.0	11	
			4-4-5	28.5 30.0	9	
155.5	30.0	Boring Terminated at 30.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-5 (1 of 1)

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC

Elevation: 187 ±
Total Depth: 35.0'
Boring Location: See Boring Location Plan

Drilling Method: Mud Rotary
Hammer Type:
Date Drilled: 8/17/23
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
186.8	0.2	SURFICIAL ORGANIC SOILS	2-2-2	0.0 1.5	4	0 Hr: Not Measured due to mud rotary techniques
		COASTAL PLAIN: Very Loose to Loose, Yellowish-Orangish Tan, Moist to Saturated, Silty Fine to Coarse SAND (SM)	2-2-3	2.0 3.5	5	
			2-2-2	3.5 5.0	4	
		Wet at 6.5'	4-3-4	6.5 8.0	7	
		Saturated at 8.5'	3-3-4	8.5 10.0	7	
173.5	13.5	Dense, Orange-Tan-Gray, Wet, Clayey Fine to Medium SAND (SC)	16-16-16	13.5 15.0	32	
168.5	18.5	Loose to Medium Dense, Red-Yellow-Orange, Wet, Slightly Clayey Silty Fine to Coarse SAND (SM)	7-6-5	18.5 20.0	11	
			4-4-4	23.5 25.0	8	
158.5	28.5	COASTAL PLAIN: Very Loose, Brown, Gray, Red, Yellow, Saturated, Very Clayey Coarse SAND (SC) with Fine to Coarse Gravel	5-1-1	28.5 30.0	2	
153.5	33.5	Soft, Blackish Gray, Wet, Fine to Medium Sandy Very Silty CLAY (CH) with Trace Mica	3-1-3	33.5 35.0	4	
152.0	35.0	Boring Terminated at 35.0 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

APPENDIX III

FIELD RESISTIVITY TEST RESULTS

LABORATORY TESTING RESULTS

FROEHLING & ROBERTSON
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Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, NC 27603-2302|USA
T 919.828.3441 | F 919.828.5751
www.fandr.com

FROEHLING & ROBERTSON

Soil Resistivity Data Sheet

PROJECT NAME: Gillespie Solar Farm
CLIENT NAME: McKim & Creed
PROJECT MANAGER: Brian McCarthy
PROJECT NO.: 66B-0122
DATE: 8/17/2023
TEST PERFORMED BY: Joshua Davis

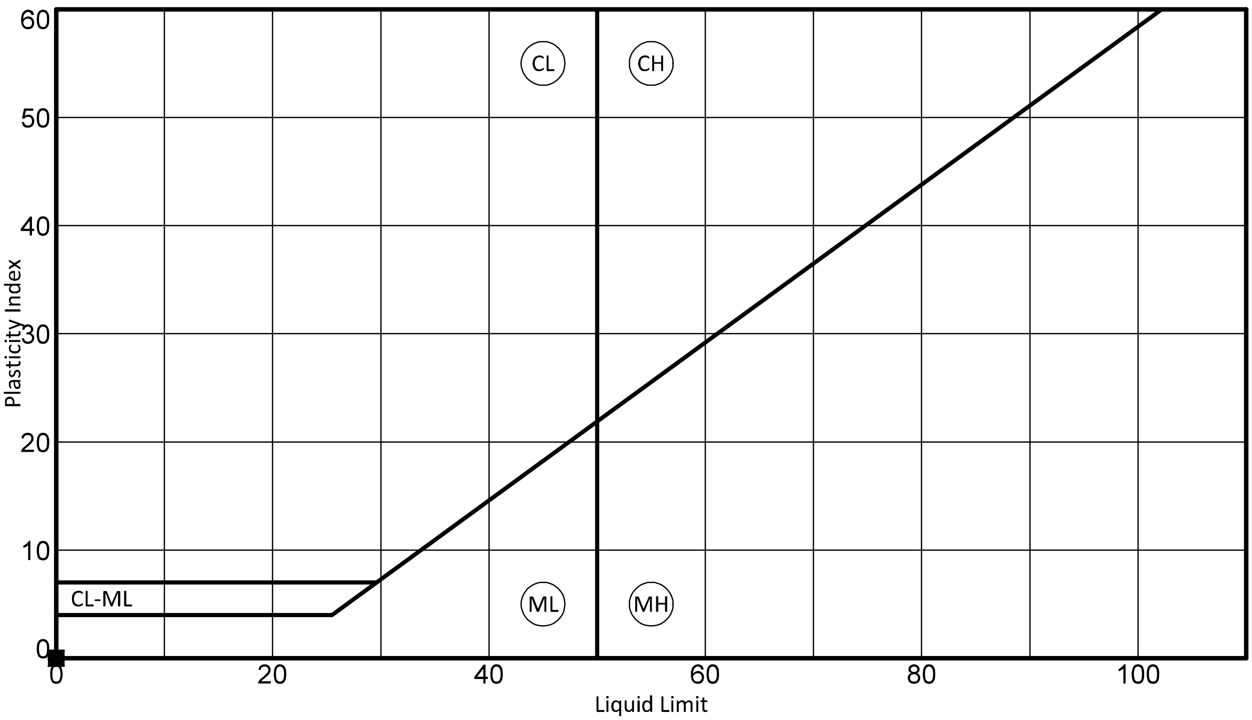
A = (ft)	**5**	**10**	**25**	**50**	**-**		
Formula	**957.56 *R**	**1915 *R**	**4788 *R**	**9576 *R**	**-**		
Area 1 (East to West) Measured Resistance, R (Ω)	453.00	259.00	67.60	40.00	-	**Average Resistance, R (Ω)**	204.90
Area 1 (East to West) Calculated Resistivity, Δ (Ω - cm)	433773.52	496014.75	323654.41	383022.98	-	**Average Resistivity, Δ (Ω - cm)**	409116.42
Area 1 (North to South) Measured Resistance, R (Ω)	425.00	211.00	74.10	36.00	-	**Average Resistance, R (Ω)**	186.53
Area 1 (North to South) Calculated Resistivity, Δ (Ω - cm)	406961.91	404089.24	354775.03	344720.68	-	**Average Resistivity, Δ (Ω - cm)**	377636.72

Average Measured Resistance, R (Ω)	195.71
Average Calculated Resistivity, Δ (Ω - cm)	393376.57

ATTERBERG LIMITS

Sheet: 1 of 1

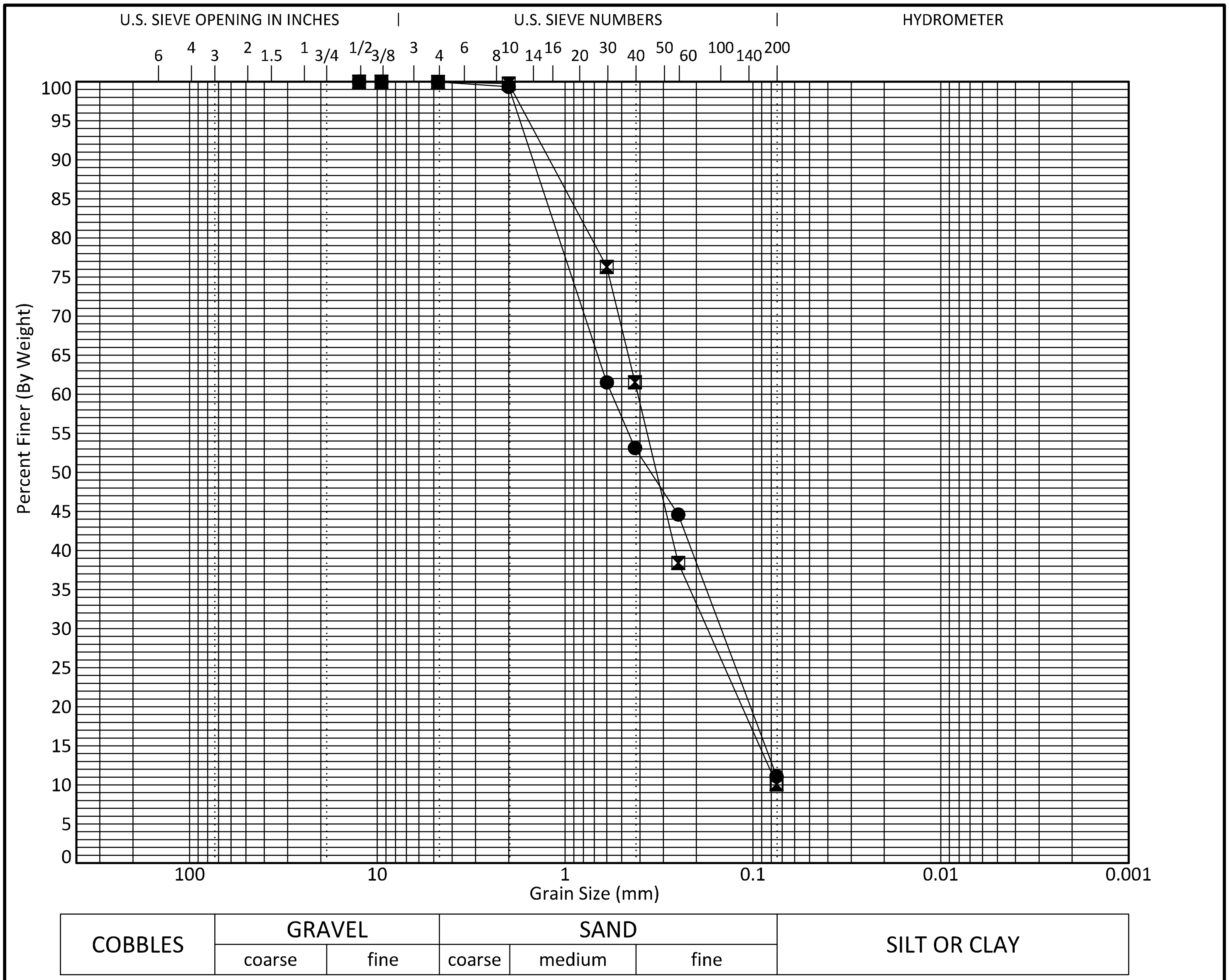
Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC



	Boring No.	Sample #	Depth	LL	PL	PI	% PASSING #200	Classification	% Natural Water Content
●	**B-2**	**BS-1**	1.0' - 4.0'	NP	NP	NP	11.1	PG SAND with SILT (SP-SM)	2.3
☒	**B-4**	**BS-2**	1.0' - 4.0'	NP	NP	NP	10.1	PG SAND with SILT (SP-SM)	4.1

GRAIN SIZE DISTRIBUTION

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC

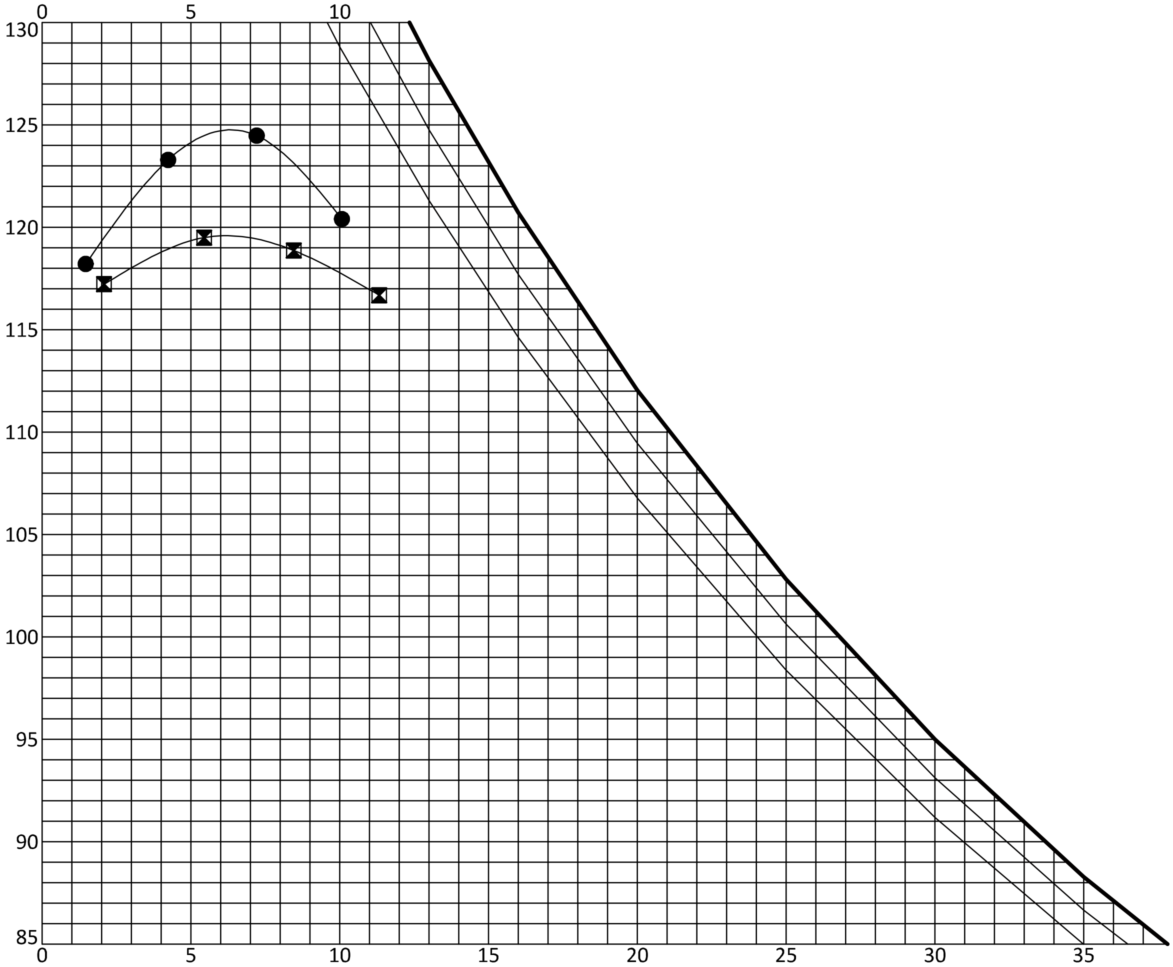


	Boring No.	Depth	Classification	LL	PL	PI	Cc	Cu
●	B-2	1.0' - 4.0'	POORLY GRADED SAND with SILT (SP-SM)	NP	NP	NP	0.54	7.82
☒	B-4	1.0' - 4.0'	POORLY GRADED SAND with SILT (SP-SM)	NP	NP	NP	1.00	5.49

	Boring No.	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	% Water Content
●	B-2	1.0' - 4.0'	12.5	0.564	0.148		0.0	88.9	11.1		2.3
☒	B-4	1.0' - 4.0'	12.5	0.41	0.175		0.0	89.9	10.1		4.1

ASTM MOISTURE-DENSITY RELATIONSHIP

Project No: 66B-0122
Client: McKim & Creed
Project: Gillespie Solar Farm
City/State: Fayetteville, NC



Sample	Depth (ft)	Classification	LL	PL	PI	% GRAVEL (+ #4)	% SAND (#4 - #200)	% FINES (- #200)
● B-2	1.0' - 4.0'	Brown, POORLY GRADED SAND with SILT (SP-SM)	NP	NP	NP	0.0	88.9	11.1
☒ B-4	1.0' - 4.0'	Tan, POORLY GRADED SAND with SILT (SP-SM)	NP	NP	NP	0.0	89.9	10.1

Sample	Max Dry Density (pcf)	Optimum Moisture (%)	ASTM	Sample Location	Natural Moisture (%)	Sample Notes
● B-2	124.8	6.3	D-1557 A	B-2	2.3	10.0 lb. Hammer, 18" drop
☒ B-4	119.6	6.2	D-1557 A	B-4	4.1	10.0 lb. Hammer, 18" drop

Waypoint ANALYTICAL

449 Springbrook Rd, Charlotte, NC 28217
Main 704.529.6364
www.waypointanalytical.com

9/20/2023

Froehling & Robertson, Inc. (Raleigh)
Brian McCarthy
310 Hubert Street
Raleigh, NC, 27603

Ref: Analytical Testing
Lab Report Number: 23-250-0101
Client Project Description: Gillespie Solan Farm

Dear Brian McCarthy:

Waypoint Analytical, LLC (Charlotte) received sample(s) on 9/7/2023 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in accordance with the applicable analytical method.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, method validations, instrumentation maintenance and calibration for all parameters were performed in accordance with guidelines established by the USEPA (including 40 CFR 136 Method Update Rule May 2021) unless otherwise indicated.

Certain parameters (chlorine, pH, dissolved oxygen, sulfite...) are required to be analyzed within 15 minutes of sampling. Usually, but not always, any field parameter analyzed at the laboratory is outside of this holding time. Refer to sample analysis time for confirmation of holding time compliance.

The results are shown on the attached Report of Analysis(s). Results for solid matrices are reported on an as-received basis unless otherwise indicated. This report shall not be reproduced except in full and relates only to the samples included in this report.

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Angela D Overcash
Senior Project Manager

Laboratory's liability in any claim relating to analyses performed shall be limited to, at laboratory's option, repeating the analysis in question at laboratory's expense, or the refund of the charges paid for performance of said analysis.

Certification Summary

Laboratory ID: WP CNC: Waypoint Analytical Carolina, Inc. (C), Charlotte, NC

State	Program	Lab ID	Expiration Date
North Carolina	State Program	37735	07/31/2024
North Carolina	State Program	402	12/31/2023
South Carolina	State Program	99012	07/31/2024
South Carolina	State Program	99012	12/31/2023

Laboratory ID: WP MTN: Waypoint Analytical, LLC., Memphis, TN

State	Program	Lab ID	Expiration Date
Alabama	State Program	40750	02/29/2024
Arkansas	State Program	88-0650	02/07/2024
California	State Program	2904	06/30/2024
Florida	State Program - NELAP	E871157	06/30/2024
Georgia	State Program	C044	11/14/2025
Georgia	State Program	04015	06/30/2024
Illinois	State Program - NELAP	200078	10/31/2024
Kentucky	State Program	80215	06/30/2024
Kentucky	State Program	KY90047	12/31/2023
Louisiana	State Program - NELAP	LA037	12/31/2023
Louisiana	State Program - NELAP	04015	06/30/2024
Mississippi	State Program	MS	11/14/2025
North Carolina	State Program	47701	07/31/2024
North Carolina	State Program	415	12/31/2023
Pennsylvania	State Program - NELAP	68-03195	05/31/2024
South Carolina	State Program	84002	06/30/2023
Tennessee	State Program	02027	11/14/2025
Texas	State Program - NELAP	T104704180	09/30/2023
Virginia	State Program	00106	06/30/2024
Virginia	State Program - NELAP	460181	09/14/2024

Sample Summary Table

Report Number: **23-250-0101**

Client Project Description: **Gillespie Solan Farm**

Lab No	Client Sample ID	Matrix	Date Collected	Date Received	Method	Lab ID
94378	B-1,S-2,S-3	Solids	09/06/2023	09/07/2023		
94378	B-1,S-2,S-3	Solids	09/06/2023	09/07/2023	ASTM-G57-95	WP MTN
94378	B-1,S-2,S-3	Solids	09/06/2023	09/07/2023	9045D	WP MTN
94378	B-1,S-2,S-3	Solids	09/06/2023	09/07/2023	SW-9034	WP MTN
94379	B-2,S-2,S-3-1	Solids	09/06/2023	09/07/2023		
94379	B-2,S-2,S-3-1	Solids	09/06/2023	09/07/2023	9045D	WP MTN
94379	B-2,S-2,S-3-1	Solids	09/06/2023	09/07/2023	ASTM-G57-95	WP MTN
94379	B-2,S-2,S-3-1	Solids	09/06/2023	09/07/2023	SW-9034	WP MTN
94380	B-4,S-2,BS-2	Solids	09/06/2023	09/07/2023		
94380	B-4,S-2,BS-2	Solids	09/06/2023	09/07/2023	SW-9034	WP MTN
94380	B-4,S-2,BS-2	Solids	09/06/2023	09/07/2023	9045D	WP MTN
94380	B-4,S-2,BS-2	Solids	09/06/2023	09/07/2023	ASTM-G57-95	WP MTN

WP MTN - Memphis, TN: Waypoint Analytical - TN, Memphis, TN

Summary of Detected Analytes

Project: **Gillespie Solan Farm**

Report Number: **23-250-0101**

Client Sample ID	**Lab Sample ID**					
Method	**Parameters**	**Result**	**Units**	**Report Limit**	**Analyzed**	**Qualifiers**
B-1,S-2,S-3	**V 94378**					
9045D	pH	5.09	s.u.		09/08/2023 14:44	
9045D	Oxidation Reduction Potential	255	mV		09/18/2023 09:50	
ASTM-G57-95	Resistivity (soil)	3850	ohm-cm		09/18/2023 13:00	
SW-9034	Sulfide	34.8	mg/Kg - dry	26.2	09/15/2023 09:24	
SW-DRYWT	Moisture	4.63	%		09/08/2023 16:45	
B-2,S-2,S-3-1	**V 94379**					
9045D	pH	4.97	s.u.		09/08/2023 14:44	
9045D	Oxidation Reduction Potential	263	mV		09/18/2023 09:50	
ASTM-G57-95	Resistivity (soil)	2490	ohm-cm		09/18/2023 13:00	
SW-DRYWT	Moisture	2.21	%		09/08/2023 16:45	
B-4,S-2,BS-2	**V 94380**					
9045D	pH	5.00	s.u.		09/08/2023 14:44	
9045D	Oxidation Reduction Potential	286	mV		09/18/2023 09:50	
ASTM-G57-95	Resistivity (soil)	4460	ohm-cm		09/18/2023 13:00	
SW-DRYWT	Moisture	3.42	%		09/08/2023 16:45	

Client: Froehling & Robertson, Inc. (Raleigh)
Project: Gillespie Solan Farm66B-0122-00002
Lab Report Number: 23-250-0101
Date: 9/20/2023

CASE NARRATIVE

Sulfide by Titration Method SW-9034
Analyte: Sulfide
QC Batch No: L704739
Matrix spike recovery is outside of control limits. Acceptable LCS recovery indicates the system was in control, but the reported result could be affected by matrix interference.

Anions by Ion Chromatography Method 9056A
Sample 94378 (B-1,S-2,S-3)
Analyte: Sulfate
QC Batch No: V37931/V37906
Relative Percent Difference (RPD) for the duplicate analysis was outside of the allowable QC limits.

Sample 94378 (B-1,S-2,S-3)
Analyte: Sulfate
QC Batch No: V37931/V37906
Matrix spike/matrix spike duplicate recoveries are outside of control limits. Acceptable LCS recovery indicates the system was in control, but the reported result could be affected by matrix interference.

Sample 94379 (B-2,S-2,S-3-1)
Analyte: Sulfate
QC Batch No: V37931/V37906
Matrix spike/matrix spike duplicate recoveries are outside of control limits. Acceptable LCS recovery indicates the system was in control, but the reported result could be affected by matrix interference.

01083
Froehling & Robertson, Inc. (Raleigh)
Brian McCarthy
310 Hubert Street
Raleigh , NC 27603

Project Gillespie Solan Farm

Information :

Report Date : 09/20/2023
Received : 09/07/2023

Report Number : **23-250-0101**

REPORT OF ANALYSIS

Lab No : **94378**
Sample ID : **B-1,S-2,S-3**

Matrix: **Solids**
Sampled: **9/6/2023 0:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	**3850**	ohm-cm		1	09/18/23 13:00	VVP	ASTM-G57-95
Oxidation Reduction Potential	**255**	mV		1	09/18/23 09:50	TKM	9045D
Moisture	**4.63**	%		1	09/08/23 16:45	CNC	SW-DRYWT
Chloride	<262	mg/Kg - dry	262	10	09/15/23 15:22	KNC	9056A
pH	**5.09**	s.u.		1	09/08/23 14:44	EKF	9045D
Sulfate	<367	mg/Kg - dry	367	10	09/15/23 15:22	KNC	9056A
Sulfide	**34.8**	mg/Kg - dry	26.2	1	09/15/23 09:24	ANV	SW-9034

Qualifiers/ Definitions				
	DF	Dilution Factor	MQL	Method Quantitation Limit

01083
Froehling & Robertson, Inc. (Raleigh)
Brian McCarthy
310 Hubert Street
Raleigh , NC 27603

Project Gillespie Solan Farm

Information :

Report Date : 09/20/2023
Received : 09/07/2023

Report Number : **23-250-0101**

REPORT OF ANALYSIS

Lab No : **94379**
Sample ID : **B-2,S-2,S-3-1**

Matrix: **Solids**
Sampled: **9/6/2023 0:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	**2490**	ohm-cm		1	09/18/23 13:00	VVP	ASTM-G57-95
Oxidation Reduction Potential	**263**	mV		1	09/18/23 09:50	TKM	9045D
Moisture	**2.21**	%		1	09/08/23 16:45	CNC	SW-DRYWT
Chloride	<256	mg/Kg - dry	256	10	09/15/23 15:35	KNC	9056A
pH	**4.97**	s.u.		1	09/08/23 14:44	EKF	9045D
Sulfate	<358	mg/Kg - dry	358	10	09/15/23 15:35	KNC	9056A
Sulfide	<25.5	mg/Kg - dry	25.5	1	09/15/23 09:24	ANV	SW-9034

Qualifiers/ Definitions

DF Dilution Factor

MQL Method Quantitation Limit

01083
Froehling & Robertson, Inc. (Raleigh)
Brian McCarthy
310 Hubert Street
Raleigh , NC 27603

Project Gillespie Solan Farm

Information :

Report Date : 09/20/2023
Received : 09/07/2023

Report Number : **23-250-0101**

REPORT OF ANALYSIS

Lab No : **94380**

Sample ID : **B-4,S-2,BS-2**

Matrix: **Solids**

Sampled: **9/6/2023 0:00**

Test	Results	Units	MQL	DF	Date / Time Analyzed	By	Analytical Method
Resistivity (soil)	**4460**	ohm-cm		1	09/18/23 13:00	VVP	ASTM-G57-95
Oxidation Reduction Potential	**286**	mV		1	09/18/23 09:50	TKM	9045D
Moisture	**3.42**	%		1	09/08/23 16:45	CNC	SW-DRYWT
Chloride	<259	mg/Kg - dry	259	10	09/15/23 15:47	KNC	9056A
pH	**5.00**	s.u.		1	09/08/23 14:44	EKF	9045D
Sulfate	<362	mg/Kg - dry	362	10	09/15/23 15:47	KNC	9056A
Sulfide	<25.8	mg/Kg - dry	25.8	1	09/15/23 09:24	ANV	SW-9034

Qualifiers/ Definitions DF Dilution Factor MQL Method Quantitation Limit

Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Gillespie Solan Farm**
Report No: **23-250-0101**

QC Analytical Batch: L704846
Analysis Method: 9045D
Analysis Description: ORP

Laboratory Control Sample LCS

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Oxidation Reduction Potential	mV	200	181	91.0	90-110

Duplicate V 94376-DUP

Parameter	Units	Result	DUP Result	Criteria	Analyzed
Oxidation Reduction Potential	mV	175	183	+/- 20	09/18/23 09:50

Quality Control Data

Client ID:	**Froehling & Robertson, Inc. (Raleigh)**
Project Description:	**Gillespie Solan Farm**
Report No:	**23-250-0101**

QC Analytical Batch:	V37602
Analysis Method:	9045D
Analysis Description:	pH in Solids

Laboratory Control Sample LCS

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
pH	s.u.	6.86	6.91	101	3.54-101.4

Duplicate V 94004-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
pH	s.u.	8.25	8.25	0.0	20.0	09/08/23 14:44

Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Gillespie Solan Farm**
Report No: **23-250-0101**

QC Prep: V37906
QC Prep Batch Method: SW-9056A (PREP)

QC Analytical Batch(es): V37931
Analysis Method: 9056A
Analysis Description: Anions by Ion Chromatography

Lab Reagent Blank LRB-V37906 Matrix: SOL
Associated Lab Samples: 94378, 94379, 94380

Parameter	Units	Blank Result	MQL	Analyzed
Chloride	mg/Kg	<250	250	09/15/23 19:05
Sulfate	mg/Kg	<350	350	09/15/23 19:05

Laboratory Control Sample LCS-V37906

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Chloride	mg/Kg	400	374	94.0	80-120
Sulfate	mg/Kg	400	411	103	80-120

Matrix Spike & Matrix Spike Duplicate V 94378-MS-V37906 V 94378-MSD-V37906

Parameter	Units	Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS %Rec	MSD %Rec	%Rec Limits	RPD	Max RPD
Chloride	mg/Kg	<250	400	401	419	415	105	103	80-120	0.9	15
Sulfate	mg/Kg	<350	400	401	572	706	143*	176*	80-120	20.9*	15

Matrix Spike & Matrix Spike Duplicate V 94379-MS-V37906 V 94379-MSD-V37906

Parameter	Units	Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS %Rec	MSD %Rec	%Rec Limits	RPD	Max RPD
Chloride	mg/Kg	<250	400	399	424	421	106	106	80-120	0.7	15
Sulfate	mg/Kg	<350	400	399	542	526	136*	132*	80-120	2.9	15

* QC Fail

Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Gillespie Solan Farm**
Report No: **23-250-0101**

QC Analytical Batch: L704770
Analysis Method: ASTM-G57-95
Analysis Description: Resistivity

Duplicate V 94376-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Resistivity (soil)	ohm-cm	2210	2240	1.3	20.0	09/18/23 13:00

Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Gillespie Solan Farm**
Report No: **23-250-0101**

QC Prep: L704616
QC Prep Batch Method: SW-9030B
QC Analytical Batch(es): L704739
Analysis Method: SW-9034
Analysis Description: Sulfide by Titration

Lab Reagent Blank LRB-L704616 Matrix: SOL
Associated Lab Samples: 94378, 94379, 94380

Parameter	Units	Blank Result	MQL	Analyzed
Sulfide	mg/Kg	<25.0	25.0	09/15/23 09:24

Laboratory Control Sample LCS-L704616

Parameter	Units	Spike Conc.	LCS Result	LCS %Rec	% Rec Limits
Sulfide	mg/Kg	248	168	68.0	32-85

Duplicate V 94377-DUP-L704616

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Sulfide	mg/Kg	<25.0	<25.0	0.0	20	09/15/23 09:24

Matrix Spike V 94377-MS-L704616

Parameter	Units	Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS %Rec	%Rec Limits	Max RPD
Sulfide	mg/Kg	<25.0	99.1		80.0		81.0*	25-75	

Quality Control Data

Client ID: **Froehling & Robertson, Inc. (Raleigh)**
Project Description: **Gillespie Solan Farm**
Report No: **23-250-0101**

QC Analytical Batch: V37617
Analysis Method: SW-DRYWT
Analysis Description: Dry Weight Determination

Duplicate V 94378-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Moisture	%	4.63	4.25	8.5	20.0	09/08/23 16:45

Duplicate V 94389-DUP

Parameter	Units	Result	DUP Result	RPD	Max RPD	Analyzed
Moisture	%	11.7	11.8	0.8	20.0	09/08/23 16:45

449 Springbrook Rd, Charlotte, NC 28217
Main 704.529.6364
www.waypointanalytical.com

Shipment Receipt Form

Customer Number: **01083**
Customer Name: **Froehling & Robertson, Inc. (Raleigh)**
Report Number: **23-250-0101**

Shipping Method

○ Fed Ex	○ US Postal	● Lab	○ Other :	
○ UPS	○ Client	○ Courier	Thermometer ID:	IRT15 0.7C

Shipping container/cooler uncompromised?	● Yes	○ No	
Number of coolers/boxes received	1		
Custody seals intact on shipping container/cooler?	○ Yes	○ No	● Not Present
Custody seals intact on sample bottles?	○ Yes	○ No	● Not Present
Chain of Custody (COC) present?	● Yes	○ No	
COC agrees with sample label(s)?	● Yes	○ No	
COC properly completed	● Yes	○ No	
Samples in proper containers?	● Yes	○ No	
Sample containers intact?	● Yes	○ No	
Sufficient sample volume for indicated test(s)?	● Yes	○ No	
All samples received within holding time?	● Yes	○ No	
Cooler temperature in compliance?	● Yes	○ No	
Cooler/Samples arrived at the laboratory on ice. Samples were considered acceptable as cooling process had begun.	● Yes	○ No	
Water - Sample containers properly preserved	○ Yes	○ No	● N/A
Water - VOA vials free of headspace	○ Yes	○ No	● N/A
Trip Blanks received with VOAs	○ Yes	○ No	● N/A
Soil VOA method 5035 – compliance criteria met	○ Yes	○ No	● N/A

☐ High concentration container (48 hr) ☐ Low concentration EnCore samplers (48 hr)
☐ High concentration pre-weighed (methanol -14 d) ☐ Low conc pre-weighed vials (Sod Bis -14 d)

Special precautions or instructions included? ○ Yes ● No

Comments:

Signature: Angela D Overcash Date & Time: 09/07/2023 16:33:03

Waypoint ANALYTICAL
449 Springbrook Road • Charlotte, NC 28217
Phone 704/529-6364 • Fax: 704/525-0409

CHAIN OF CUSTODY RECORD

PAGE ___ OF ___ QUOTE # TO ENSURE PROPER BILLING: ___

Client Company Name: Froehling & Robertson
Report To/Contact Name: Brian McCarthy
Reporting Address: 310 Hubert Street
Raleigh, NC 27603
Phone: 919 719 1847 **Fax (Yes)(No):** ___
Email Address: bmccarthy@fandr.com
EDD Type: PDF ✓ **Excel** ___ **Other** ___
Site Location Name: Gillespie
Site Location Physical Address: Fayetteville, NC

Project Name: 66B-0122 Gillespie Solan Farm
Short Hold Analysis (Yes) [✓ (No)] **UST Project:** (Yes) [✓ (No)]
***Please ATTACH any project specific reporting (QC LEVEL I II III IV) provisions and/or QC Requirements**
Invoice To: Froehling & Robertson
Address: 310 Hubert Street
Raleigh, NC 27603
Purchase Order No./Billing Reference 66B-0122-00002
Requested Due Date ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days ☐ 5 Days
"Working Days" ☐ 6-9 Days ☑ Standard 10 days ☐ Rush Work Must Be Pre Approved
Samples received after 15:00 will be processed next business day.
Turnaround time is based on business days, excluding weekends and holidays.
(SEE REVERSE FOR TERMS & CONDITIONS REGARDING SERVICES RENDERED BY WAYPOINT ANALYTICAL, LLC TO CLIENT)

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?	X		
Received IN ICE?	X		
PROPER PRESERVATIVES indicated?	X		
Received WITHIN HOLDING TIMES?	X		
CUSTODY SEALS INTACT?			X
VOLATILES rec'd W/OUT HEADSPACE?			X
PROPER CONTAINERS used?	X		

TEMP: Therm ID: TJT Observed 0.7 °C /Corr. 0.7 °C

TO BE FILLED IN BY CLIENT/SAMPLING PERSONNEL
Certification: NC ___ **SC** ___
Other ___ **N/A** ___
Water Chlorinated: YES ___ **NO** ___
Samples Iced Upon Collection: YES ___ **NO** ___

	CLIENT SAMPLE DESCRIPTION	DATE COLLECTED	TIME COLLECTED MILITARY HOURS	MATRIX (SOIL, WATER, OR SLUDGE)	SAMPLE CONTAINER *TYPE SEE BELOW	SAMPLE CONTAINER NO.	SAMPLE CONTAINER SIZE	PRESERVATIVES	ANALYSIS REQUESTED pH	sulfate	Chloride	electric resistivity	oxidation potential		REMARKS	ID NO.
1	B-1, S-2			S	G	1			/	/	/	/	/			
	B-1, S-3			S	G	1			/	/	/	/	/			
2	B-2, S-2			S	G	1			/	/	/	/	/			
	B-2, BS-1			S	G	1			/	/	/	/	/			
3	B-4, S-2			S	G	1			/	/	/	/	/			
	B-4, ~~B~~S-2			S	G	1			/	/	/	/	/			

PRESS DOWN FIRMLY - 2 COPIES

23-250-0101
01083
09-07-2023
12:14:46
Froehling & Robertson, Inc. (Raleigh)
Gillespie Solan Farm66B-0122-00002

Sampler's Signature ___ Sampled By (Print Name) ___ Affilia

Upon relinquishing, this Chain of Custody is your authorization for Waypoint Analytical to proceed with the analyses as requested above. Any changes must be submitted in writing to the Waypoint Analytical Project Manager. There will be charges for any changes after analyses have been initialized.

Relinquished By: (Signature)	Received By: (Signature)	Date	Military/Hours
		9.7.23	11:00
Relinquished By: (Signature)	Received By: (Signature)	Date	
Relinquished By: (Signature)	Received For Waypoint Analytical By:	Date 9.7.23	15:40

Method of Shipment: **NOTE: ALL SAMPLE COOLERS SHOULD BE TAPED SHUT WITH CUSTODY SEALS FOR TRANSPORTATION TO THE LABORATORY. SAMPLES ARE NOT ACCEPTED AND VERIFIED AGAINST COC UNTIL RECEIVED AT THE LABORATORY.**

COC Group No.

☐ Fed Ex ☐ UPS ☐ Hand-delivered ☐ Waypoint Analytical Field Service ☐ Other

Additional Comments:

LAB USE ONLY
Site Arrival Time:
Site Departure Time:
Field Tech Fee:
Mileage:

NPDES: ☐ NC ☐ SC ☐ ___
UST: ☐ NC ☐ SC ☐ ___
GROUNDWATER: ☐ NC ☐ SC ☐ ___
DRINKING WATER: ☐ NC ☐ SC ☐ ___
SOLID WASTE: ☐ NC ☐ SC ☐ ___
RCRA: ☐ NC ☐ SC ☐ ___
BRWNFLD ☐ NC ☐ SC ☐ ___
LANDFILL ☐ NC ☐ SC ☐ ___
OTHER: ☐ NC ☐ SC ☐ ___

SEE REVERSE FOR TERMS & CONDITIONS

ORIGINAL

APPENDIX IV

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

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

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

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

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

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

Read this Report in Full

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

You Need to Inform Your Geotechnical Engineer about Change

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

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

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

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

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

This Report May Not Be Reliable

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

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

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

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

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

This Report's Recommendations Are Confirmation-Dependent

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

This Report Could Be Misinterpreted

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

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

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

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

Geoenvironmental Concerns Are Not Covered

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

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

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

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