REPORT OF GEOTECHNICAL EXPLORATION

10-16 Beach 19th Street

Far Rockaway, Queens, New York

February 2023

Prepared for:

Lemle & Wolff Companies
5925 Broadway
The Bronx, New York 10463

Attn: Ms. Shira Gidding

Prepared by:

GTA Engineering Services of New York, P.C.
Geotechnical and Environmental Consultants
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GTA Project No: 34222117

GTA Engineering Services of New York, P.C.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

An affiliate of Geo-Technology Associates, Inc.

February 9, 2023

Lemle & Wolff Companies
5925 Broadway
The Bronx, New York 10463

Attn: Ms. Shira Gidding

Re: Report of Geotechnical Exploration
10-16 Beach 19th Street
Far Rockaway, Queens, New York

Dear Ms. Gidding:

In accordance with our revised agreement dated November 23, 2023, GTA Engineering Services of New York, P.C. (GTA) has performed a geotechnical exploration for a proposed a new building to be located at 10-16 Beach 19th Street, Far Rockway, New York. The site is identified as Block 15560, Lot 8 on the New York City tax map. The results of the field exploration and GTA's recommendations regarding design and construction of the proposed development are included in this report.

GTA appreciates the opportunity to have been of assistance to you on this project. Please contact our office at (201) 641-1850 if you have questions or require additional information.

Very truly yours,
GTA Engineering Services of New York, P.C.

Joseph Skirkie, P.E.
Project Engineer

Robert Dykstra, P.E.
Vice President

GTA Job No. 34222117

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REPORT OF GEOTECHNICAL EXPLORATION
10-16 BEACH 19TH STREET
FAR ROCKAWAY, BOROUGH OF QUEENS, NEW YORK
FEBRUARY 2023

INTRODUCTION

GTA Engineering Services of New York, P.C. (GTA) has performed a geotechnical exploration for a proposed new mixed-use building. The project site is located at 10-16 Beach 19th Street Far Rockway, Borough of Queens, New York. The site location is shown on the Site Location Map, Figure 1 in Appendix A. This report presents the results of the explorations.

The scope of the subsurface exploration included eight (8) test borings, seven (7) soil vapor points, limited laboratory testing, and geotechnical engineering analyses. The scope of services was developed from email and phone conversations with the client. The purpose of the geotechnical investigation was to explore the subsurface soil and groundwater conditions in order to determine the relevant parameters for the design and construction of the proposed building.

SITE CONDITIONS

The project site is located on the east side of Beach 19th Street between Cornaga Avenue. and Mott Avenue. The site is currently occupied by several one-story structures and an unpaved parking lot. The project site is bounded by open pavement, north, south, and east, and a 2-story building at the northeast corner. The property is approximately 18,700 square feet.

PROPOSED CONSTRUCTION

GTA was provided with two *Proposed Schematics* dated 7/10/20 and 7/27/20. The plans presented two options for the proposed building: A 9-story building with a footprint of approximately 13,000 square feet, and a seven 7-story building with a base footprint of approximately 18,600 square feet. Each option has a cellar floor slab at an estimated depth of 10 feet below the sidewalk surface.

SUBSURFACE EXPLORATION

The subsurface exploration program performed for this study consisted of drilling 8 Standard Penetration Test (SPT) borings. The explorations were performed between January 3,

and 10, 2023 by DK Drilling of New York, Inc. using truck mounted drill rig and portable tripod drilling equipment. The borings were advanced to completion depths ranging from approximately 6.7 feet to 102 feet below the existing site grade using mud rotary drilling methods. 3 of the borings had groundwater observation wells installed upon completion and the remaining were backfilled. DK Drilling installed 7 soil vapor points at the approximate locations selected by the Client's environmental consultant. Samples from the vapor points will be collected by the Owner's environmental consultant.

GTA personnel located the explorations in the field, documented drilling procedures, maintained continuous logs of the explorations, and obtained soil samples. The approximate locations of the explorations are shown on the Boring Location Plan, which is included as Figure 2 in Appendix A. Detailed descriptions of the encountered subsurface conditions are indicated on the Logs of Borings which are presented in Appendix B. The elevations shown on the boring logs were interpolated from topographic data provided by the client and should be considered approximate.

Standard Penetration Testing (SPT) was performed using both manual and automatic hammers in accordance with procedures of ASTM D1586. Soil samples were obtained at two- to five-foot intervals within the boreholes. The SPT involves driving a 2-inch O.D., 1⅜-inch I.D. split-spoon sampler with a 140-pound hammer free-falling from a height of 30-inches. The number of blows required to drive the sampler was recorded in six-inch intervals. The SPT N-value, given as blows per foot, is defined as the total number of blows required to drive the sampler from the 6- to 18-inch interval. Bedrock was core drilled in accordance with ASTM D2113.

Soil samples obtained from the explorations were brought to GTA's laboratory for limited laboratory testing and visual classification by a geotechnical engineer. The subsurface materials were classified in accordance with the Unified Classification System (USCS) and New York City Building Code (NYCBC). The descriptions provided on the logs are therefore based on visual observations of the samples and laboratory testing, as summarized in the Notes for Exploration Logs included in Appendix B.

SUBSURFACE CONDITIONS

The subsurface conditions encountered in the explorations generally consisted of a layer of fill overlying natural soils deposited during the Wisconsin glacial period, followed by Gardiners Clay and sands of the Magothy Formation. Generalized descriptions of the encountered strata are presented below in order of increasing depth. Detailed descriptions of the encountered subsurface conditions are indicated on the Logs of Borings in Appendix B

Fill: Fill materials were present below the surficial asphalt and concrete layer in the borings. The fill layer primarily consisted of loose to medium dense silty sand with clay, gravel, and minor amounts of brick and concrete fragments. The fill material extended to depths ranging from approximately 2 to 5 feet below the existing site grade and was identified as Class 7 material in accordance with the NYCBC.

Glacial Soil: A layer of natural soil was encountered beneath the fill layer in each of the borings. The soil deposit consisted of poorly graded silty sand with gravel and occasional cobbles and boulders. The granular soils were dense to very dense in relative density and identified as SP-SM material, Class 3a in accordance with the USCS and NYCBC, respectively.

Clay: Clayey Sand and Clay were encountered below the granular soils in Borings B-1 and B-4. The clay layer is likely the Gardiners Clay layer that was deposited in a marine environment. The clay was medium stiff to hard in terms of relative density and was identified as CL material, Class 6, 4b and 4a om accordance with the USCS and NYCBC, respectively.

Sand: Very dense, poorly-graded Sand within silt was encountered beneath the clay layer and extended to the completion depths of Borings B-1 and B-4. The sand was classified as SP-SM material, Class 3a in accordance with the USCS and NYCBC, respectively.

Groundwater: Groundwater was encountered in borings B-1, B-3W, B-4, and B-7 at depth of approximately 23 feet below the existing site grade. It should be expected that the groundwater level will fluctuate due to several factors, such as variations in precipitation, seasonal changes, and site development activities.

LABORATORY TESTING

Laboratory testing performed for this study included gradation analyses for classification of the soils in accordance with the Unified Soil Classification System (USCS) and natural moisture content determinations. Classification of soils in accordance with the USCS provides information regarding the engineering properties of the on-site materials that will likely support slabs, pavements, or be used as controlled compacted fill and backfill. The results of the gradation testing and moisture content determinations performed for this study are summarized in the following table. Detailed results of the laboratory testing performed for this study are included in Appendix C.

SUMMARY OF GRADATION TESTING

BORING LOCATION	DEPTH (FT.)	NATURAL MOISTURE CONTENT (%)	USCS CLASSIFICATION
B-3W	25	19.9	SP-SM (Poorly-graded SAND with Silt)
B-4	50	27.8	SC (Clayey SAND)
B-8W	14	2.4	SP-SM (Poorly-graded SAND with Silt)

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this study, it is GTA's opinion that development of the site is feasible, given that the geotechnical recommendations are followed, and that the standard level of care is maintained during construction. As currently conceived, we believe that the proposed building could be supported by spread footings bearing in the natural glacial soils. Geotechnical issues that may impact the project include the potential need for underpinning and support of excavation walls.

Site Preparation

Site preparation should begin by razing the existing structures and other site improvements not to remain. All subsurface walls, slabs, etc. of the existing building, and subsurface utilities that will be abandoned, should be completely removed. The excavations to remove the existing building elements and utilities should be backfilled with controlled compacted fill if they extend below the proposed grades in structural areas. We recommend

that the controlled compacted fill be placed by the earthwork contractor (rather than the demolition contractor) under the observation of the geotechnical engineer.

Foundations

The proposed building could be supported by shallow foundations established in the undisturbed natural soils, Class 3a. Spread footings bearing in the glacial soils can be designed using an allowable bearing of 4 tons per square foot (tsf). Settlement estimates of less than 1-inch total and ½-inch differential are anticipated at recommended allowable bearing pressure.

Where soft/loose natural soils or existing fill materials are encountered at the footing subgrade or within the zone of foundation stress influence, the foundation excavations should extend to stable natural materials. Footing subgrades requiring over-excavation may be backfilled to the design bearing grade with lean concrete or crushed stone. The decision to undercut footings or perform other foundation remedial measures should be made in the field by the geotechnical engineer during footing construction. Footing undercuts backfilled with lean concrete or crushed stone should be considered suitable to provide the recommended design bearing pressure.

Footing subgrades should be thoroughly cleaned of all mud, debris, and loose material prior to the placement of concrete. All footing subgrades must be evaluated to verify the bearing capacity of the soil and documented by an engineering technician working under the supervision of a professional engineer licensed in the State of New York. Detailed foundation subgrade evaluations should be performed in each footing excavation, prior to the placement of reinforcing steel or concrete to confirm that the design allowable soil bearing capacity is available. If a mat foundation is used, we recommend that a 6-inch-thick layer of clean, coarse aggregate be placed over the prepared soil subgrade to protect the prepared subgrade from inclement weather.

Groundwater Control

Groundwater was encountered at an approximate depth of 23 feet below the existing surface grade at the time of the investigation and should have minimal effect on the construction. Trapped or perched water, stormwater may accumulate in the foundation excavation. We anticipate that localized sump pits will be able to control trapped or perched water. The site should be pitch away from the foundation excavation to limit the amount of stormwater run-off from entering the excavation.

Floor Design

It is GTA's opinion that the cellar floor slab can be designed as a concrete slab-on-grade bearing on natural undisturbed soils or compacted fill placed in accordance with the recommendations of the *Backfill and Compaction* section of this report. Existing fill materials are generally not suitable for support of floor slabs and should be replaced with compacted fill if encountered at slab bearing elevation. The floor slabs can be designed using a modulus of subgrade reaction (k) of 150 pounds per cubic inch (pci).

GTA recommends that concrete floor slabs supported on grade be founded on a four-inch (minimum) coarse granular layer meeting the gradation of AASHTO Size No. 57 aggregate. Where moisture sensitive floor finishes are planned, it is generally recommended that a polyethylene vapor retarder be installed in accordance with ACI guidelines to interrupt the rise of capillary moisture through the slabs.

Floor subgrade soils should be evaluated by a representative of the geotechnical engineer immediately prior to stone and concrete placement. This evaluation may include a combination of visual observations, proof rolling, hand-probing, and field density tests to verify that the subgrade soils have been prepared properly. Contractors should anticipate that remedial work could be required to achieve a stable subgrade prior to stone placement, even if the subgrade soils had previously been compacted to the required densities. All interior utility trenches should be backfilled and compacted in accordance with our *Backfill and Compaction* recommendations.

Lateral Earth Pressure and Waterproofing

Below-grade cellar foundation walls and temporary Support of Excavation walls will have to be designed to resist the lateral earth pressure. These elements should also be designed for appropriate hydrostatic and surcharge pressures. The following soil properties can be used for design of below grade structural elements, assuming horizontal backfill:

- Soil Unit Weight (γ) = 125 pcf
- Internal Friction Angle (φ) = 30°
- Active Earth Pressure Coefficient (K_A) = 0.3
- Passive Earth Pressure Coefficient (K_P) = 3.0
- At-Rest Earth Pressure Coefficient (K_0) = 0.5

The foundation walls should be water-proofed in accordance with section BC 1807 of the NYCBC to reduce dampness within below-ground areas, GTA recommends that that the foundation walls be waterproofed with a pre-applied membrane such as Preprufe. A manufactured drainage composite should be placed over the wall waterproofing membrane for protection during backfilling.

Seismic Information and Liquefaction Potential

The proposed building must be designed in accordance with all applicable New York City Building Code seismic design criteria. The site classes are based on the average properties in the upper 100 feet. We believe the materials encountered in the borings most closely resemble a "Stiff Soil" profile, Site Class D. The following table presents the seismic parameters for the site.

Mapped max. considered earthquake spectral response at short periods	S_S	=	0.296 g
Mapped max. considered earthquake spectral response at 1-s periods	S_1	=	0.061 g
Site coefficient - NYCBC Table 1613.3.3(1)	F_a	=	1.57
Site coefficient - NYCBC Table 1613.3.3(2)	F_v	=	2.40
$S_{MS} = F_a S_S$ (Equation 16-44)	S_{MS}	=	0.465 g
$S_{M1} = F_v S_1$ (Equation 16-45)	S_{M1}	=	0.146 g
$S_{DS} = 2/3\ S_{MS}$ (Equation 16-46)	S_{DS}	=	0.31 g
$S_{D1} = 2/3\ S_{M1}$ (Equation 16-47)	S_{D1}	=	0.10 g
Peak Ground Acceleration - NYCBC Table 1816.2.1	$PGA_{M(g)}$	=	0.26

Liquefaction during a seismic event is a critical issue with respect to the subsurface conditions for the site development. The NYCBC requires an evaluation of the liquefaction potential of non-cohesive soils and cohesive soils (with a plasticity index less than 20), below the groundwater table and to a depth of 50 feet below the ground surface. The initial step in the evaluation process is to plot the adjusted SPT N-values (N_{60}) versus depth on the *Liquefaction Assessment Diagram, Figure 1813.1* of the NYCBC. The diagram is divided into either in the "Liquefaction Evaluation Required" area, or the "Liquefaction Evaluation Not Required" area, based on side of the Structural Occupancy Category line for the proposed building that the points plot. The data points fall in the "Liquefaction Evaluation Not Required" area for the subject property and we believe liquefaction is not likely during a seismic event at this site.

Excavation and Support of Excavation Walls

All construction excavations should be sloped and shored per OSHA excavation regulations or stricter local governing safety codes. It is GTA's opinion that the existing fill, undisturbed natural soils, or controlled compacted fill composed of similarly-graded materials would generally be classified as "Type C" soils under the OSHA excavation regulations. Flatter excavation side slopes will be required where water seepage occurs. Positive drainage should be maintained during construction to prevent inundation of subgrade soils by surface water runoff.

Support of excavation (SOE) walls will be required along portions of the property lines where proper side slopes cannot be maintained. They will be required to prevent ground loss and undermining of adjacent structures, sidewalks, utilities, properties and roadways. The SOE walls will need to be designed for the appropriate surcharge loads and lateral earth pressures. Depending on the depth of the excavation, one or more levels of bracing may be required to resist lateral earth pressures and surcharges. Interlocking steel sheeting may be needed to help reduce groundwater infiltration. The SOE walls can be designed using the parameters listed in the *Lateral Earth Pressure* section of this report, and appropriate hydraulic and surcharge pressures. The SOE walls should be designed by

an engineer licensed in the State of New York. Survey monitoring of the SOE walls should be considered to measure structural deflections and potential ground movements.

Subsurface Utilities

GTA has not been provided with information regarding proposed underground utilities; however, it is our opinion that the natural soils or controlled compacted fill are considered suitable for support of subsurface utilities, which will likely include gas, water, storm, and sanitary sewer lines. GTA recommends that a six-inch thick granular bedding consisting of AASHTO No. 57 stone aggregate be placed where loose or soft soil is encountered to provide uniform support as dictated by site conditions. Utilities installed below slabs, sidewalks, and other structural areas should be backfilled using controlled fill, compacted in accordance with the *Backfill and Compaction* section of this report.

Contractors should provide adequate earth support and dewatering systems in utility trench excavations as required. Problems associated with water seepage include partial loss of stability, sloughing of soils, and running sands. These problems can be reduced at the time of construction through the use of "sump and pump" dewatering techniques.

Backfill and Compaction

All fill placed beneath sidewalks, slabs-on-grade, and used for backfilling foundation walls and utilities should consist of controlled compacted fill. Backfill should be spread in layers on the order of 8 to 12 inches in loose thickness and each layer should be compacted to at least 95 percent of the maximum dry density at moisture contents required to achieve the required densities per the ASTM D-1557 (Modified Proctor) test procedure. All compactive effort should be verified by in-place density testing by an engineering technician working under the supervision of a professional engineer licensed in the State of New York. The New York City Building Code requires that fill subgrades and each lift of fill be observed and tested.

The granular natural site soils and granular fill material free of deleterious materials are considered suitable for use as controlled fill or backfill with some limitations. Moisture

conditioning of the on-site soils may be necessary to attain the recommended degree of compaction, depending on the prevailing weather conditions at the time the earthwork is performed. Off-site borrow, if required, should meet USCS designation SM, SP, SW, GP, GM, or GW and be approved by the geotechnical engineer before use.

Pre-construction Survey and Monitoring

A pre-construction survey should be conducted for the neighboring building, structures, and properties to document existing conditions. Each building and/or structure should be inspected and photographed, inside and out, to record existing conditions. The pre-condition survey will provide the owner and foundation contractor with a baseline to assess potential future damage claims. The survey should be prepared prior to the start of construction.

A survey-monitoring program should be implemented for the neighboring buildings for the duration of the dewatering operations, installation of SOE piles, underpinning and foundation work. A series of benchmark locations should be established on the exterior of each of the adjacent buildings prior to the start of new construction. The benchmarks should be read a minimum of one time per week throughout the duration of the SOE and foundation construction. Any observable movement, horizontal or vertical displacement, should be immediately brought to the attention of the construction manager and excavation should be suspended until the issue is addressed by the Owner and his appropriate professionals.

Special Inspection Scope

We recommend that GTA be retained to provide geotechnical consultation during the foundation construction. Special inspections directly related to the foundation construction will include but are not limited to the following:

1. Subgrade Inspection -BC 1704.7.1
2. Subsurface Conditions – Fill Placement & In-place density- BC 1704.7.2 and 1704.7.3
3. Excavations – Sheeting, Shoring, and Bracing – BC 1704.20.2
4. Underpinning - BC 1704.20.3 and BC 1814

LIMITATIONS

This report, including all supporting exploration logs, field data, field notes, laboratory test data, calculations, estimates and other documents prepared by GTA in connection with this Project have been prepared for the exclusive use of Lemle & Wolff Companies (Client), pursuant to the revised agreement between GTA and Client dated November 23, 2022 and in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreements and the General Provisions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Client is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Test borings indicate subsurface conditions only at specific locations and times, and only at the depths penetrated. They do not necessarily reflect strata or variations that may exist between the exploration locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations of subsurface conditions from those described in this report are noted during construction, recommendations in this report may need to be re-evaluated.

In the event that any changes in the nature, design, or locations of the buildings are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. GTA is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of GTA.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site.

Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

This report and the attached logs are instruments of service. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be construed by the reader to imply approval by the writer.

34222117 **GTA ENGINEERING SERVICES OF NEW YORK, P.C.**

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, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them 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 herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences 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.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

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

- for a different client;
- for a different project or purpose;
- 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, the reliability of a geotechnical-engineering report can be 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 you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site 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.

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

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement 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 through project completion to obtain 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 judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed 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 continuing 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 available 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-phase observations.

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 information 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. 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. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. 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 provide 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 obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

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, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX A

Figures

SITE LOCATION MAP

211-K Gates Road
Little Ferry, New Jersey 07643
(201) 641-1850
fax (201) 641-1655

GTA ENGINEERING SERVICES OF NEW YORK, P.C.

10-16 Beach 19th Street

Borough of Queens, New York

Prepared For: Lemle

SOURCE: Open Street Maps, 2020

SCALE: NTS	DATE: FEB 2020	PROJECT #: 34200212

Figure 1

BORING LOCATION PLAN

211-K Gates Road
Little Ferry, New Jersey 07643
(201) 641-1850
fax (201) 641-1655

GTA ENGINEERING SERVICES OF NEW YORK, P.C.

LEGEND:

B-X Approximate location of test boring performed for this study

10-16 Beach 19th Street

Far Rockaway, Queens

Prepared For:
Lemle & Wolff

DESIGN BY: *	DRAWN BY: BG	REVIEWED BY: RD
SCALE: NTS	DATE: OCT 2022	PROJECT #: 34222117

Figure 2

APPENDIX B

Exploration Logs

NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)				SYMBOLS GRAPHIC	SYMBOLS LETTER
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			GW
					GP
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			GM
					GC
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)			SW
					SP
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)			SM
					SC
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY (<15% RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE) SANDY OR GRAVELLY SILT OR CLAY (>30% RETAINED ON THE NO. 200 SIEVE)	SILTS AND LEAN CLAYS LIQUID LIMIT LESS THAN 50			ML
					CL
					OL
		ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50			MH
					CH
					OH
HIGHLY ORGANIC SOILS					PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

	DESCRIPTION		GRAPHIC SYMBOLS
ADDITIONAL DESIGNATIONS	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

COARSE-GRAINED SOILS
(GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS
(SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
WOH = WEIGHT OF HAMMER
WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	▽
UPON COMPLETION OF DRILLING	▼
24 HOURS AFTER COMPLETION	▼

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF BORING NO. B-1

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	23 ft.	----	BOC
DATE:	1-5-22	----	1-6-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-05-2022**
DATE COMPLETED: **01-06-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **Mud Rotary**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **CME 75**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	6	3-2-2-2	4	0.0	0			10" Concrete	
S-2	2.0	10	2-3-4-7	7	-0.8	2.5	FILL		FILL: Dark brown, moist, loose, silty sand with gravel, concrete fragments and debris (Class 7)	
S-3	5.0	10	10-18-16-21	34	-3.0	5	SP-SM		Orange-brown, moist, medium dense, Poorly-graded SAND with Silt and Gravel (Class 3b)	
						7.5			-same, light brown, dense (Class 3a)	
S-4	10.0	15	10-19-29-33	48		10			-same	
						12.5				
S-5	15.0	12	11-19-34-33	53	-15.0	15	SP		Light brown, moist, dense, Poorly-graded SAND (Class 3a)	
						17.5				
S-6	20.0	16	22-36-37-50/2"	73+		20			-same	
						22.5				-boulder encountered at 21.5 ft.
S-7	25.0	11	36-39-41-38	80		25			-same, wet	
						27.5				
S-8	30.0	12	22-20-24-36	44		30			-same	
						32.5				
S-9	35.0	10	21-19-24-26	43		35			-same	
						37.5				
S-10	40.0	12	10-10-10-11	20	-40.0	40	SP-SM		Brown, wet, medium dense, Poorly-graded SAND with Silt (Class 3b)	
						42.5				
S-11	45.0	24	10-11-12-14	23		45			-same	
						47.5				
S-12	50.0	24	3-2-2-3	4	-50.0	50	SC		Gray-brown, moist, soft, Clayey SAND with Silt (Class 6)	
						52.5				
S-13	55.0	24	6-6-7-7	13		55			-same, medium dense with shell fragments (Class 3b)	
						57.5				
						60				

NOTES: **BOC = Backfilled on completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
3518-B Concord Road
York, PA 17402

LOG OF BORING NO. B-1

LOG OF BORING NO. B-1

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	23 ft.	----	BOC
DATE:	1-5-22	----	1-6-22
CAVED (ft):	----	----	----

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					-61.0	62.5				
S-14	61.0	24	2-2-1-2	3			CL		Gray, wet, soft, Sandy CLAY (Class 6)	
						65			-same, Stiff (Class 4b)	
S-15	65.0	24	2-3-6-11	9		67.5				
						70			-same, very stiff	
S-16	70.0	24	3-6-10-7	16		72.5				
						75			-same, hard (Class 4a)	
S-17	75.0	22	18-15-15-17	30		77.5				
						80			-same	
S-18	80.0	24	11-15-17-21	32		82.5				
						85			-same, very stiff (Class 4b)	
S-19	85.0	24	11-14-14-18	28		87.5				
					-90.0	90	SP-SM		Gray, wet, very dense, Poorly-graded SAND with Silt (Class 3a)	
S-20	90.0	17	18-29-27-28	56		92.5				
						95			-same	
S-21	95.0	20	22-24-29-31	53		97.5				
						100			-same, dense	
S-22	100.0	20	32-20-21-30	41	-102.0				Boring complete at 102 ft.	

LOG OF BORING NO. B-2W

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	NE	----	BOC
DATE:	1-3-22	----	1-3-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-03-2022**
DATE COMPLETED: **01-03-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Dorabl**
DRILLING METHOD: **Mud Rotary**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **Tripod**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	MONITORING WELL	REMARKS
S-1	0.0	12	9-8-8-5	16	0.0	0	FILL		4" Concrete		
S-2	2.0	6	3-3-4-3	7	-0.3	2			FILL: Dark brown, moist, medium dense, silty sand with gravel, concrete fragments, and debris (Class 7)		
S-3	4.0	14	4-4-19-32	23		4			-same		
S-4	6.0	6	26-100/3"	100+	-5.0	6	SP-SM		Orange-brown, moist, dense, Poorly-graded SAND with Silt and Gravel (Class 3a)		
						8					
					-10.0	10			Boring terminated at 6.7 ft due to spoon refusal		

NOTES: **BOC = Backfilled on completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
3518-B Concord Road
York, PA 17402

LOG OF BORING NO. B-2W

LOG OF BORING NO. B-3W

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	23 ft.	----	WELL
DATE:	1-6-22	----	1-9-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-06-2022**
DATE COMPLETED: **01-09-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **Mud Rotary**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **CME 75**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	MONITORING WELL	REMARKS
S-1	0.0	3	8-5-4-4	9	0.0	0	FILL		4" Concrete		
S-2	2.0	16	3-4-8-6	12	-0.3	2			FILL: Dark brown, moist, loose, silty sand with gravel, concrete fragments, and debris (Class 7)		
S-3	5.0	11	7-17-24-35	41	-3.0	4	SP-SM		Orange-brown, moist, medium dense, Poorly-graded SAND with Silt and Gravel (Class 3b)		
S-4	10.0	2	20-22-24-26	46		6			-same, light brown, dense, more Gravel (Class 3a)		
S-5	15.0	6	14-21-27-30	48		8			-same		
S-6	20.0	10	18-25-29-31	54		10			-same		
S-7	25.0	14	10-12-19-26	31		12			-same, very dense, fine Sand, no Gravel		
S-8	30.0	14	21-26-21-25	47		14			-same		
S-9	35.0	16	22-26-31-31	57		16			-same, dense, wet		
S-10	40.0	18	12-11-9-12	20		18			-same		
						20			-same		
						22			-same		
						24			-same		
						26			-same		
						28			-same		
						30			-same		
						32			-same		
						34			-same		
						36			-same		
						38			-same		
						40			-same		
					-42.0	42			Boring complete at 42 ft.		

NOTES: **WELL: Monitoring well installed on completion; 20 ft. of screen; 20 ft. of riser**

GEO-TECHNOLOGY ASSOCIATES, INC.
3518-B Concord Road
York, PA 17402

LOG OF BORING NO. B-3W

LOG OF BORING NO. B-4

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	23 ft.	----	BOC
DATE:	1-4-22	----	1-5-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-04-2022**
DATE COMPLETED: **01-05-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **Mud Rotary**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **CME 75**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	15	2-2-2-2	4	0.0	0	FILL		6" Concrete	
S-2	2.0	18	6-10-15-18	25	-0.5	2.5			FILL: Dark brown, moist, loose, silty sand with gravel, concrete fragments and debris (Class 7)	
S-3	5.0	16	13-19-21-27	40	-3.0	5	SP-SM		Orange-brown, moist, medium dense, Poorly-graded SAND with Silt and Gravel (Class 3b)	
						7.5			-same, light brown, dense (Class 3a)	
S-4	10.0	20	13-22-27-28	49		10			-same	
						12.5				
S-5	15.0	16	18-24-28-32	52		15			-same, very dense, less Gravel	
						17.5				
S-6	20.0	15	17-20-20-22	40		20			-same	
						22.5				▼
S-7	25.0	6	30-50/3"	50+		25			-same, wet	
						27.5				
S-8	30.0	17	17-17-21-24	38		30			-same	
						32.5				
S-9	35.0	17	17-18-20-20	38		35			-same	
						37.5				
S-10	40.0	17	6-8-8-10	16		40			-same, medium dense (Class 3b)	
						42.5				
S-11	45.0	16	7-8-8-8	16		45			-same	
						47.5				
S-12	50.0	14	8-7-6-8	13	-50.0	50	SC		Light to Dark brown, wet, medium dense, Clayey SAND (Class 3b)	
						52.5				
S-13	55.0	17	3-3-4-5	7	-55.0	55	CL		Gray, wet, medium stiff, Sandy CLAY (Class 4c)	
						57.5				
						60				

NOTES: **BOC = Backfilled on completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
3518-B Concord Road
York, PA 17402

LOG OF BORING NO. B-4

LOG OF BORING NO. B-4

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	23 ft.	----	BOC
DATE:	1-4-22	----	1-5-22
CAVED (ft):	----	----	----

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-14	61.0	18	1-1-3-5	4		62.5	CL		Gray, wet, soft, Sandy CLAY (Class 6)	
						65			-same, medium stiff (Class 4b)	
S-15	65.0	14	3-4-6-9	10		67.5				
						70			-same	
S-16	70.0	12	3-4-6-9	10		72.5				
						75			-same	
S-17	75.0	22	4-5-7-11	12		77.5				
					-80.0	80	SC		Gray, wet, dense, Clayey SAND (Class 3a)	
S-18	80.0	24	10-10-21-24	31		82.5				
					-85.0	85	SP-SM		Gray, wet, very dense, Poorly-graded SAND with Silt and Gravel (Class 3a)	
S-19	85.0	22	19-22-31-34	53		87.5				
						90			-same	
S-20	90.0	22	26-37-35-32	72		92.5				
						95			-same	
S-21	95.0	22	29-22-34-41	56		97.5				
						100			-same	
S-22	100.0	18	33-29-31-36	60	-102.0				Boring complete at 102 ft.	

LOG OF BORING NO. B-5

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	NE	----	BOC
DATE:	1-6-22	----	1-6-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-03-2022**
DATE COMPLETED: **01-03-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Dorbal**
DRILLING METHOD: **Continuos**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **Tripod**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	6	6-3-4-3	7	0.0	0	FILL		4" Concrete	
					-0.3				FILL: Gray-brown, moist, loose, silty sand with gravel, concrete fragments, and debris (Class 7)	
S-2	2.0	8	20-30-44-41	74	-2.0	2.5	SP-SM		Orange-brown, moist, very dense, Poorly- graded SAND with Gravel (Class 3a)	
S-3	4.0	12	34-42-48-73	90		5			-same	
S-4	6.0	8	86-67-88-73	155		7.5			-same	
S-5	8.0	15	66-91-93-89	184					-same	
S-6	10.0	9	90-100/3"	100+	-10.7	10			Boring terminated at 10.7 ft. due to spoon refusal on boulder	

NOTES: **BOC = Backfilled on completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
3518-B Concord Road
York, PA 17402

LOG OF BORING NO. B-5

LOG OF BORING NO. B-6

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	NE	----	BOC
DATE:	1-6-22	----	1-6-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-04-2022**
DATE COMPLETED: **01-04-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Dorbal**
DRILLING METHOD: **Continuos**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **Tripod**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	2	6-3-4-3	7	0.0	0	FILL		4" Concrete	
S-2	2.0	8	20-30-44-41	74	-0.3				FILL: Brown, moist, loose, silty sand with gravel, concrete fragments and debris (Class 7)	
S-3	4.0	14	34-42-48-73	90	-2.0	2.5	SP-SM		Orange-brown, moist, very dense, Poorly- graded SAND with Silt and Gravel (Class 3a)	
S-4	6.0	6	86-67-88-73	155		5			-same	
S-5	8.0	16	66-81-93-89	174		7.5			-same	
S-6	10.0	9			-10.0	10			-same	

NOTES: **BOC = Backfilled on completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
3518-B Concord Road
York, PA 17402

LOG OF BORING NO. B-6

LOG OF BORING NO. B-7

PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	23 ft.	----	BOC
DATE:	1-5-22	----	1-5-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-05-2022**
DATE COMPLETED: **01-05-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **Mud Rotary**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **CME 75**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	20	9-9-7-4	16	0.0	0	FILL		4" Asphalt	
S-2	2.0	10	4-4-7-18	11	-0.3	2.5			FILL: Dark brown, moist, medium dense, silty sand with gravel, asphalt fragments, and debris (Class 7)	
S-3	5.0	6	16-17-22-31	39	-3.0	5	SP-SM		Orange-brown, moist, medium dense, Poorly-graded SAND with Silt and Gravel (Class 3b)	
						7.5			-same, dense (Class 3a)	
S-4	10.0	6	7-16-16-19	32		10			-same, light brown, less Gravel	
S-5	15.0	4	6-12-18-19	30		12.5			-same	
S-6	20.0	18	11-18-19-22	37		15			-same	
S-7	25.0	12	14-22-29-35	51		17.5			-same, very dense	
S-8	30.0	15	16-16-19-23	35		20			-same	
S-9	35.0	10	19-22-22-29	44		22.5			-same	
					-37.0	25			Boring completed at 37 ft.	
						27.5				
						30				
						32.5				
						35				

NOTES: **BOC = Backfilled on completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
3518-B Concord Road
York, PA 17402

LOG OF BORING NO. B-7

LOG OF BORING NO. B-8W

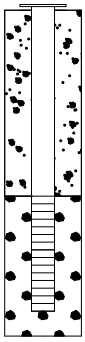
PROJECT: **10-16 Beach 19th Street**
PROJECT NO.: **34222117**
PROJECT LOCATION: **Queens, New York**

WATER LEVEL (ft):	NE	----	WELL
DATE:	1-10-22	----	1-10-22
NORTHING:	----	EASTING:	----

DATE STARTED: **01-06-2022**
DATE COMPLETED: **01-09-2022**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Dorbal**
DRILLING METHOD: **Chop and Wash**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **0.0 +/-**
DATUM: **LOT**
EQUIPMENT: **Tripod**
LOGGED BY: **BG**
CHECKED BY: **RD**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	MONITORING WELL	REMARKS
S-1	0.0	1	3-3-3-4	6	0.0	0	FILL		4" Concrete		
S-2	2.0	20	16-41-52-59	93	-0.3	2			FILL: Dark-brown, moist, loose		
S-3	4.0	22	49-58-87-65	145	-2.0	4	SP-SM		Orange-brown, moist, very dense, Poorly- graded SAND with Silt and Gravel (Class 3a)		
S-4	6.0	6	61-83-72-91	155		6			-same		
S-5	8.0	15	81-116-95-102	211		8			-same		
S-6	10.0	16	66-74-98-112	172		10			-same		
S-7	12.0	6	58-71-104-126	175		12			-same		
S-8	14.0	12	72-91-108-94	199		14			-same		
S-9	16.0	14	86-125-100/3"	225+		16					
					-17.3				Broing terminated at 17.3 ft due to spoon refusal		



NOTES: **WELL: Monitoring well installed on completion; 20 ft. of screen; 20 ft. of riser**

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LOG OF BORING NO. B-8W

APPENDIX C

Laboratory Data

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	5.1	6.7	15.5	59.9	12.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			1.4009	0.3239	0.2693	0.1834	0.1059			

Material Description	USCS	AASHTO
○ Light brown, Poorly-graded SAND with Silt and Gravel	SP-SM	

Project No. 34222117 **Client:** Lemle & Wolff Companies

Project: 10-16 Beach 19th Street

○ **Source of Sample:** B-3W **Depth:** 25 **Sample Number:** S-7

Remarks:

○NMC = 19.9%

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Little Ferry, NJ 07643

Figure

ASTM Specifications performed may include: D421, D422, D2216, D2217, and D4318.

Tested By: BG **Checked By:** RD

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.3	0.3	5.0	75.2	19.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			0.3474	0.2279	0.1927	0.1232				

Material Description	USCS	AASHTO
○ Light to Dark brown, Clayey SAND	SC	

Project No. 34222117 **Client:** Lemle & Wolff Companies

Project: 10-16 Beach 19th Street

○ **Source of Sample:** B-4 **Depth:** 50 **Sample Number:** S-12

Remarks:

○NMC = 27.8

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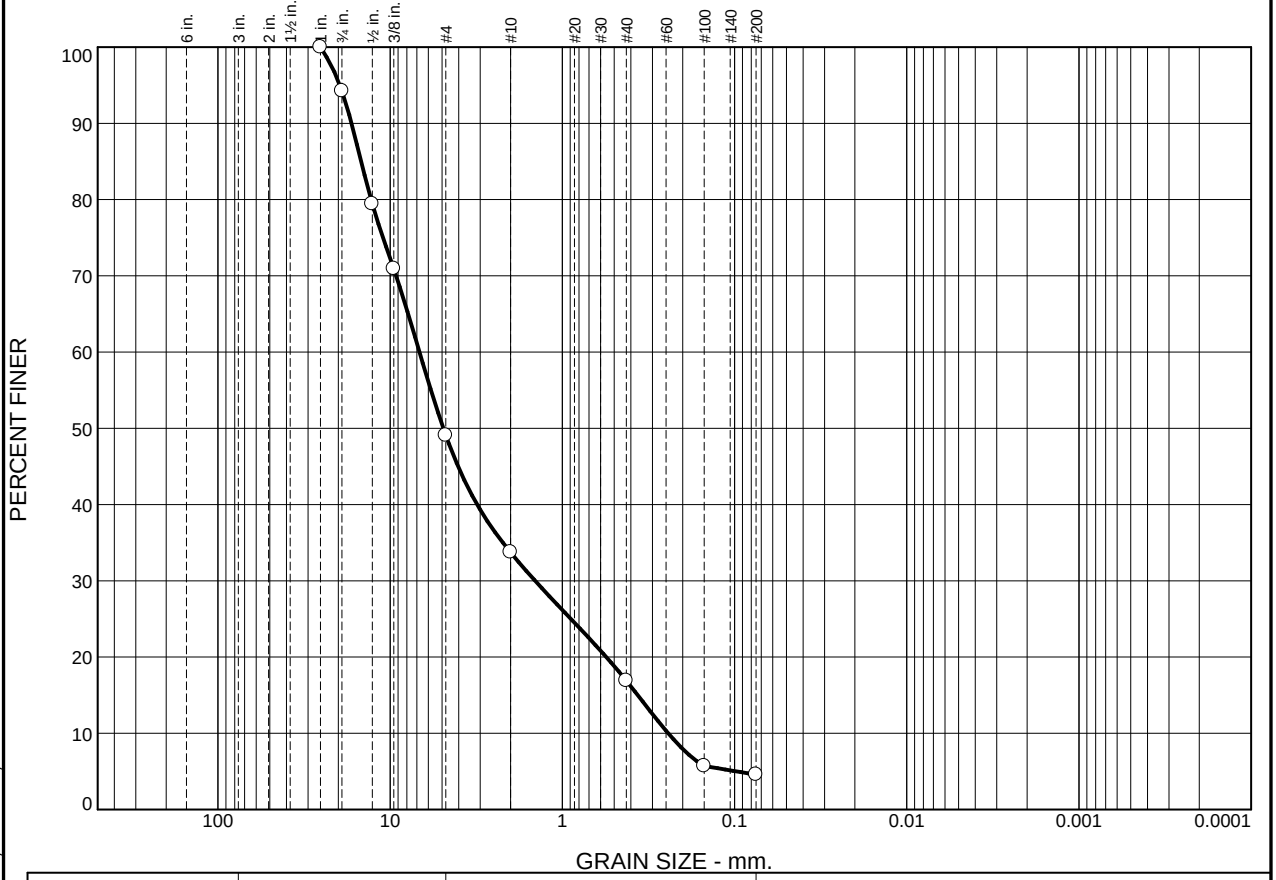
Figure

ASTM Specifications performed may include: D421, D422, D2216, D2217, and D4318.

Tested By: BG **Checked By:** RD

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	5.8	45.1	15.4	16.8	12.3	4.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			14.7380	6.7568	4.9102	1.4391	0.3647	0.2427	1.26	27.83

Material Description	USCS	AASHTO
○ Light brown, Poorly-graded SAND with Silt and Gravel	SP-SM	

Project No. 34222117 **Client:** Lemle & Wolff Companies

Project: 10-16 Beach 19th Street

○ **Source of Sample:** B-8W **Depth:** 14 **Sample Number:** S-8

Remarks:

○NMC = 2.4%

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Figure

ASTM Specifications performed may include: D421, D422, D2216, D2217, and D4318.

Tested By: BG **Checked By:** RD