Preliminary Geotechnical Engineering Report

for

340 Myrtle Avenue
Brooklyn, New York

Prepared For:

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Hartland Project No.: 1003210301

HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

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INTRODUCTION

Presented herein is the preliminary geotechnical engineering report for the proposed development at 340 Myrtle Avenue, Brooklyn, New York. The purpose of this report is to evaluate the subsurface conditions at the site and to develop preliminary recommendations for foundation design and construction. Our final report will be issued after the remaining outstanding borings are drilled. Our understanding of the project, the results of the field exploration program and a summary of our preliminary recommendations are presented herein.

Recommendations provided herein have been developed based on information provided by the project architect, Rawlings Architect, PC and structural engineer, ADG Engineering, Co. Ground surface elevations provided in this report were taken from a preliminary topographic survey prepared by Boro Land Surveying, PC dated 6 April 2021 and are referenced the North American Vertical Datum of 1988 (NAVD88).

The analysis and recommendations presented herein are in accordance with the 2014 New York City Building Code (Building Code).

SITE DESCRIPTION

The about 8,250 square-foot project site, in the Fort Greene neighborhood of Brooklyn, New York, is a corner lot located on the northwest corner of the block bordered by Adelphi Street to the east, Willoughby Avenue to the south, Carlton Avenue to the west, and Myrtle Avenue to the (Block 2073, Lot 21). While the project site occupies most of the northwest corner of the block, an about 570 square-foot lot (Block 2073, Lot 22) fronting Carlton Avenue is bounded by the project site to the north, east, and south. A site location map is presented as Figure No. 1.

A one-story structure with a full depth cellar fronting Myrtle Avenue and Carlton Avenue currently occupies the project site. The existing structure covers about 90 percent of the site with the exception of the southwest corner which is currently undeveloped. Existing cellar level was measured to be about nine feet below sidewalk grade during our field exploration. First floor grade of the existing one-story structure is at about el 59. Sidewalk grades along the property lines on both Myrtle Avenue and Carlton Avenue are relatively flat at about el 59. Existing grade in the undeveloped southwest corner of the site is about el 59.

Adjacent Structures

The site is currently bordered by existing buildings to the east and south, and an enclosed empty lot to the west, described below:

- 159 Carlton Avenue: A 3 to 4-story residential building bordering the south property line of the project site. Based on site observations and conversations with one of the building tenants, the building has a full cellar level that is about 10 feet below adjacent sidewalk grade. The building, originally constructed in 1888, is on the National Register of Historic Places.

- 450 Myrtle Avenue: A 4-story tall mixed-use brick building with a single cellar level bordering the site to the east. Public records indicate the building was constructed circa 1950.
- Lot 22: The lot fronting Carlton Avenue is currently undeveloped; however, we understand that plans exist for the development of a single-family home in the near future. We understand that the new development will have limited below grade space and is to be supported on deep foundations.

LOCAL GEOLOGIC BACKGROUND

The local landscape was fundamentally reshaped by glacial erosion and deposition during the last major glacial advance in the region. A review of the 1989 Surficial Geologic Map of New York indicates that the surficial geology surrounding the site consists of till moraine. The till moraine consists of a heterogeneous mixture with particles ranging in size from clay to boulders suspended within a finer matrix ranging in particle size from clay to sand. The till moraine band across Queens and Brooklyn in the region is characterized by its dense nature featuring many boulders, cobbles, and gravels. The relevant portion of the Surficial Geologic Map is attached as Figure No. 2.

FEMA FLOOD ZONE DETERMINATION

According to the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the City of New York (Community-Panel No. 360497 0203G), the site was determined to be outside of any special flood hazard area. The relevant portion of the FIRM panel for the project site is attached as Figure No. 3.

PROPOSED DEVELOPMENT

Based on schematic-level drawings, the proposed development includes the partial demolition of the existing structures located on the project site and construction of a new four- to seven-story tall mixed-use building with a full cellar level. A one-story at-grade lobby appended to the building south façade will allow access to the building from Carlton Avenue. The proposed building has a footprint of about 6,000 square feet and will feature residential units on all floors and some commercial space on the ground floor. Mechanical equipment will be housed on the rooftop and within the building cellar.

The proposed building will front Myrtle and Carlton Avenues, and abut Lot 22 and the existing building to the east. The proposed lobby will be offset about 8 feet from the historic structure along the south property line; while the four- to seven-story portion of the proposed building will be offset about 30 feet or more. Based on conversations with the design team, we understand that the proposed cellar will be formed by the existing foundation walls, with the exception of the southeast corner of the cellar where a new foundation wall will be constructed. The remaining existing building elements (i.e. interior walls, slabs, etc.) are planned to be demolished. New building loads will be transferred to a series of new interior and perimeter building columns. Increased loads on the existing foundation walls are not anticipated. Preliminary column loads are estimated to be about 150 tons to 300 tons for perimeter and interior locations, respectively.

PRELIMINARY GEOTECHNICAL SUBSURFACE EXPLORATION

The preliminary subsurface exploration program was developed and performed by Hartland between May 17-20, 2021 in support of the proposed development. Our preliminary geotechnical subsurface study included drilling of two geotechnical borings, installation of one groundwater observation well, and excavation of two test pits. A subsurface exploration plan is included as Figure No. 4.

Geotechnical Borings

Two geotechnical borings identified as Borings B-1 and B-2(OW) were drilled between 17 May and 20 May 2021 under the full-time inspection of Hartland. The borings were drilled by Municipal Testing Laboratory, Inc using a track mounted drill rig and were advanced to depths of about 50 and 75 feet below grade.

The borings were advanced through the overburden soil using mud-rotary drilling techniques with a tri-cone roller bit. Drilling slurry and steel casing was used to provide soil support when necessary. Standard Penetration Tests were performed, and SPT N-Values[1] were recorded. Continuous soil samples were generally obtained through the upper 12 feet and typically at 5-foot intervals thereafter. Soil samples were obtained using a standard two-inch outside-diameter split-spoon sampler driven by a 140-lb automatic hammer, in accordance with ASTM D1586.

Recovered soil samples were visually examined and classified in the field by our engineer in accordance with the Building Code and the Unified Soil Classification System (USCS). All soil samples were returned to our office for confirmation of field classifications. Soil classifications, N-values, and other field observations were recorded on the field log. Detailed logs of the borings are presented in Appendix A.

Observation Well

A groundwater observation well was installed in Boring B-2. The consisted of a 10-ft section of PVC screen set at about 50-ft below grade followed by PVC riser pipe extending to ground surface. The annulus around the well was backfilled with filter sand to about 1 foot above the PVC screen. The filter sand was sealed with an about 2-foot-thick plug of bentonite pellets to prevent surface water from influencing well

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[1] The SPT N-value, is a blow count representation of the penetration resistance of the soil. The N-value, reported in blows per foot, equals the sum of the number of blows (N) required to drive the sampler over the depth interval of 6 to 18 inches, using a 140-pound hammer falling freely for 30 inches.

readings. A flush mount well cap was installed at the ground surface. A copy of the well construction log is included as Appendix B.

Test Pits

Two test pits, identified as TP-1 and TP-2, were excavated at the site between 17 May and 20 May 2021, respectively. Test pit TP-1 was excavated against the north façade of the historic building to the south, and test pit TP-2 was excavated within the existing cellar along the 340 Myrtle Ave east foundation wall. Excavation work was performed by Municipal Testing Laboratory, Inc. under the full-time inspection of Hartland. The test pit sketches are included in Appendix C.

SUBSURFACE CONDITIONS

The generalized subsurface profile encountered during our subsurface exploration consists of a layer of uncontrolled miscellaneous fill overlying loose silt followed by mixed layers of dense sand and gravel with boulders. Though not encountered during the subsurface exploration, bedrock is known to exist at a depth greater than about 200 feet below ground surface. A representative subsurface profile is presented in Figure No. 5. Detailed descriptions of each stratum encountered are provided below in order of increasing depth.

Uncontrolled Fill [Class 7][2]

A mixed layer brown to red sand with varying amounts of silt, gravel, and construction debris was encountered immediately below the ground surface in each boring. The thickness of the fill layer varied between about 10 to 13 feet, corresponding to bottom of fill layer elevations between about el 46 to el 48. We note that the construction debris encountered in B-2, performed in the undeveloped area, indicates that possible remnant structure may be present below grade. N-values within the fill layer ranged from 2 to 19 blows per foot (bpf), with an average blow count of about 6 bpf.

The uncontrolled fill is classified as Building Code Class 7, Uncontrolled Fill.

Loose and Medium Silt [Class 6, and Class 5]

A layer of brown silt typically with varying amounts of sand was encountered beneath the fill layer in both borings. The silt layer extended to depths ranging from about 23 to 24 feet, corresponding to about el 35. The silt layer is generally loose throughout the depths encountered. Field N-values within the loose silt layer ranged from 5 bpf to 21 bpf, and more typically ranged from about 5 to 9 bpf, averaging about 7 bpf.

The material is generally classified as non-plastic inorganic silt (ML) in accordance with USCS. The silt layer is designated as Building Code Class 6: Loose Silt, and Class 5: Medium Silt.

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[2] Numbers in brackets that follow the material designation indicate classification of soil in accordance with the Building Code.

Glacial Till [Class 2a and 3a]

A layer of dense glacial till was encountered directly below the loose silt layer in both borings. The glacial till consisted of a heterogeneous mixture of sand, gravel, silt, cobbles, and boulders. The glacial till extended to the terminal depths in both borings.

Upper Sand [Class 3a]

A layer of dense sand with varying amounts of silt and gravel was encountered directly below the silt layer. The upper sand extended to depths ranging from about 33 to 38 feet, corresponding to about el 20 to el 26. Field N-values within the upper sand layer ranged from 46 bpf to sampler refusal, averaging about 80 bpf.

The material is generally classified as poorly graded sand and silty sand (SP or SM) in accordance with USCS. The upper sand layer is designated as Building Code Class 3a: Dense Granular Soil.

Gravel [Class 2a]

A layer of dense gravel typically with some sand and varying amounts of silt was encountered directly below the upper sand layer in both borings. The gravel layer extended to depths ranging from 52 to 68 feet corresponding to about el -9 to el 6. Field N-values within the gravel layer were typically sampler refusal.

The material is generally classified as poorly graded gravel (GP) in accordance with USCS. The upper sand layer is designated as Building Code Class 2a: Dense Gravel.

Lower Sand [Class 3a]

A layer of dense sand with some gravel was encountered below the gravel layer in B-2(OW). The lower sand extended to the terminal depth of the boring at about 77 feet or el -18. The two recorded N-values in the lower sand layer were 85 bpf and 63 bpf.

The material is classified as poorly graded sand (SP) in accordance with USCS. The lower sand layer is designated as Building Code Class 3a: Dense Granular Soil.

Boulders and Cobbles

Based on the observed drill action, cuttings, and recovered materials boulders and cobbles were encountered throughout the glacial till layer. Most of the encountered boulders or cobbles were able to be drilled through using a tri cone roller bit. However, we note that some boulders had to be cored through to advance the boring.

Groundwater

The groundwater level was measured within the observation well installed in B-2. Groundwater was encountered at a depth of about 48 feet below grade, corresponding to about el 11.

Test Pit Findings

The adjacent building's foundations and below-grade walls were explored in the test pits excavated at the project site. A brief description of the findings is presented below; test pit sketches are provided in Appendix C.

Test Pit TP-1 was performed within the undeveloped area against the southern neighbor's foundation wall. Remnant below-grade foundation walls and construction debris was encountered throughout the excavated depth. A 3-inch diameter conduit was encountered at a depth of about 4-ft, running parallel to the remnant and neighboring walls. The test pit was terminated at a depth of 4-ft due to the presence of the conduit; the bottom of the adjacent foundation wall was not encountered.

Test Pit TP-2 was performed within the existing cellar space along the eastern foundation wall at the project site. The cellar slab was about a 3 to 4-inch-thick concrete slab with wire mesh reinforcement. The existing foundation wall's concrete foundation was observed to bear within the loose silt layer at a depth of about 18 inches below the top of cellar slab. The eastern neighbor's foundation was encountered within the test pit and observed to bear at about the same level as the concrete foundation wall.

GEOTECHNICAL EVALUATION AND DESIGN RECOMMENDATIONS

We have identified several key geotechnical challenges which will influence the foundation and earthwork recommendations for the proposed structure.

- A deep layer of loose silt was encountered in both borings and the interior test pit. The loose silt layer was found to extend up to a depth of about 25 feet below existing grade. The silt layer is considered unsuitable material for foundation support.

- The dense nature of the glacial till located below the silt layer is prohibitive of the use of driven piles due to the difficulty to drive the piles though the very dense material and boulders, and the induced vibrations that would be caused by the pile driving. Given the proximity to adjacent masonry structures, and the historic nature of the building to the south, construction induced vibrations should be limited.

- Based on the current scheme the existing foundation walls are to remain and be incorporated into the new structure. Proper sequencing will be required to both partially demolish the existing first and cellar slabs as well as install new foundations.

The following sections provide our recommendations for seismic design parameters, foundation system and other geotechnical-related design parameters including slab support, design groundwater level, and damp proofing.

Seismic Evaluation

The Building Code assigns a seismic site class based on the type, thickness, and average engineering properties in the top 100 feet of bearing stratum. Seismic site class values range from Class A for hard rock to Class E and F for soft and loose deposits sensitive to seismic loading. A site class evaluation was performed based on the results of the subsurface exploration, and the site is assigned Seismic Site Class D in accordance with the Building Code.

Table No. 1 hereafter provides our recommendations of parameters for use in seismic design of the proposed structure. The assumed Structural Occupancy Category (Category II); should be confirmed by the structural engineer.

Table 1: Seismic Design Parameters

Site Class	D
Mapped Spectral Acceleration for short periods (S_s)	0.281 g
Mapped Spectral Acceleration for 1-second period (S_1)	0.073 g
Site Coefficient for short periods (F_a)	1.57
Site Coefficient for 1-second period (F_v)	2.4
Design spectral response acceleration at short periods (S_{DS})	0.294 g
Design spectral response acceleration at 1-sec period (S_{D1})	0.117 g
Seismic Design Category	B
Peak Ground Acceleration (PGA_M)	0.24g

Liquefaction Potential

The Building Code requires an evaluation of the liquefaction potential of non-cohesive soils below the measured groundwater table to a depth of 50 feet below the ground surface. Based on the depth to groundwater and the dense nature of the soil, liquefaction need not be considered.

Foundation Recommendations

Based on the results of the subsurface exploration, it is our judgment that shallow foundations are not feasible for support of the four- to seven-story portion of the proposed development. Shallow foundations appear feasible for the one-story lobby section of the development provided proper site preparation work is done as described below.

Drilled Pressure-Grouted Micropiles

As discussed earlier in this report, driven piles are not recommended. Additionally, the dense till and boulders are problematic for auger-drilled pile systems. Therefore, we recommend a drilled pressure-grouted micropile which consists of a small diameter reinforced concrete column drilled into the subsurface soils. The pile primarily gains its capacity from side shear along the uncased bond length. Pressure grouted piles are installed by first drilling a steel casing to a target depth. Obstructions, if encountered, may be penetrated by the drill bit or limited use of a down-the-hole-hammer. Steel reinforcement is placed, and the pile is pressure-grouted while the casing is withdrawn in sections until the desired bond length is achieved, leaving a permanent cased free length at the pile head through the unsuitable soils.

We estimate that a 9.625-inch-diameter pressure grouted pile embedded 30 feet within the Class 2 and 3 glacial soils can achieve an allowable compressive capacity of 75 tons. The piles should be constructed using a minimum 4,000 psi grout. See Table 2 below for typical pile sections and capacities. We recommend a minimum spacing of 3 pile diameters.

Table 2: 75-ton Micropile Design

Pile Diameter (in)	Casing Thickness (in)	Reinforcement (75 ksi)	Allowable Compressive Capacity (tons)	Lateral Capacity (ton)	Cased Length (ft)	Bond Length (ft)
9.625	0.5	#18	75	1	15	30

Index Piles and Load Testing

The use of piles as a foundation element will require a compressive load testing program in accordance with the Building Code. A series of index piles should be drilled to the required tip elevation and pile load test should be performed prior to the installation of production piles. The index piles are necessary to identify unusual or difficult drilling conditions, confirm pile lengths and capacities, and establish production pile installation criteria.

Based on the proposed building footprint a minimum of two static compression load tests are required to satisfy Building Code requirements. We recommend that the load tests be completed and evaluated before installation of production piles in the event pile redesign is necessary. Index piles may be used as a production pile if the capacity is verified and the piles are installed in design locations.

Shallow Foundations at Lobby

Pressure-grouted piles may be used for support of the one-story lobby. Alternatively, the lobby can be supported on a shallow foundation system (i.e., individual spread footings) bearing within controlled structural fill with an allowable bearing pressure of 1 tons per square foot (tsf). Support of the lobby through shallow foundations will require over excavation to remove the existing basement elements and construction debris and provide a level and uniform bearing strata below the lobby footprint. Over excavation for the lobby should extend a minimum of 2 feet below the bottom of proposed footing; the limits of horizontal over excavation should have a minimum slope of 1H:1V extending from the footprint of the lobby. After excavation, the subgrade should be proof rolled and a geotextile such as a Mirafi 140N should be placed on the subgrade to provide a separation barrier from the uncontrolled fill and controlled fill. Backfilling to the foundation bearing level can be accomplished using traditional backfill material. Recommendations for backfilling and compaction are provided in a later section.

Expected settlements are anticipated to be about 1-inch or less, with most of the settlement expected during construction. Differential settlement between the pile supported structure and a shallow foundation supported lobby are anticipated to be about 1/2-inch or less. Footings should bear a minimum of 4 feet below finished grade for frost protection. The recommended minimum footing width for continuous strip footings is 2 feet. Foundation subgrade should be level and clear of standing or frozen water, debris, or other deleterious materials.

The Building Code requires that a Professional Engineer licensed in the state of New York inspect and approve foundation subgrades before placing concrete, to verify that the subgrade material is adequate to provide the recommended allowable bearing pressure.

Adjacent Foundations and Influence Zone

Based on our discussions with Ownership and the design team, we understand that the intent is to about match the proposed cellar slab elevation with the current cellar slab elevation and to avoid underpinning of the adjacent structures. To avoid the need to underpin the neighboring buildings, new building elements (including pile caps, grade beams, and slabs) should be constructed outside of the influence zone of the neighboring footings to avoid undermining existing foundations. The influence zone for new footings with respect to adjacent footings is presented in Figure No. 6.

Lowest Level Slab Support

A conventional slab-on-grade construction can be used for the ground floor slab. We recommended that the subgrade within the proposed footprint of the cellar be excavated a minimum of 12 inches below the proposed slab-on-grade to provide an aggregate bedding layer. The subgrade should be proof compacted using at least 6 passes of a walk-behind vibratory plate tamper, or other compatible equipment, having a minimum static weight of one ton. The recommended modulus of subgrade reaction for support of gravity loads on the compacted structural fill is 80 psi per inch.

Any soft or unsuitable areas, as identified by an on-site geotechnical inspector, should be removed, and replaced. Over-excavated areas below the slab should be backfilled with controlled granular fill or gravel. Recommendations for fill material compaction criteria are provided in a subsequent section of this report.

Subgrade should be in a firm state after proof compaction, and cleared of standing or frozen water, debris, or other deleterious materials. Subgrade preparation should be performed under the observation and direction of a geotechnical engineer. The subgrade soils at the project site, in particular those adjacent to the neighboring buildings, should be protected from the effects of water and foot traffic disturbance during construction.

Design Groundwater Level

For design purposes, the design groundwater level should be taken at about 3 feet above the measured groundwater level. Based on the measured level, the recommended design groundwater level is el 14.

Lateral Earth Pressures

Building foundation walls will be subjected to lateral pressures due to soil and surcharge loads. Lateral loads can be resisted with a combination of dead weight of the structure, passive earth pressure, and friction between the foundation concrete and the soil subgrade. The recommended coefficient of friction on the bottom of the foundation concrete with a factor of safety of 1.5 is 0.2. The recommended at rest earth pressure diagram has a triangular distribution of 60 lb/ft^2 per foot of depth, assuming a drained condition. Lateral pressure due to surcharge loads should have a uniform rectangular distribution equal to 50 percent of the vertical surcharge pressure. The recommended pressure distribution for below grade walls is presented as Figure No. 7.

Due to the partial abandonment of the existing cellar space new loads may be imparted on the neighboring foundation walls resulting from the required backfilling operations. The neighboring walls should be assessed to determine if backfill can be safely placed against the walls or protective measures are required.

Damp-Proofing

Below grade waterproofing is not required. However, since the structure will be used as occupied space, we recommend damp-proofing the ground floor and lowest level slabs. Damp-proofing can consist of a spray-applied liquid membrane or crystalline membrane. The recommended minimum application thickness is 60 mils.

CONSTRUCTION RECOMMENDATIONS

The following sections provide our recommendations for various construction-related activities.

Building Demolition

We understand that the existing perimeter foundation walls are to remain in place and as such do not foresee the need for a support of excavation system. However, perimeter foundation walls will need to be braced internally before removal of the cellar and first floor slabs. Internal bracing of the existing foundation walls may consist of wales, strongbacks, and rakers bearing on concrete heel blocks or anchored to the existing slab; corner braces spanning between walls can be considered where space constraints exist. Local excavation for pile caps and the elevator pit can be achieved using a sloped excavation or using timber sheeting. Care must be taken not to undermine or disturb the bearing material of the footings of the neighboring buildings. Excavation sides should be sloped at a maximum pitch of 1.5 horizontal to 1 vertical (1.5H:1V).

Fill and Compaction Criteria

Fill material used to establish site grades should be free of organic, frozen, and other deleterious materials, and should have a maximum particle size no greater than 3 inches. Imported fill should contain well-graded sand, gravel, crushed rock, recycled concrete aggregate or a mixture of these, or equivalent materials with a maximum of 10% passing the No. 200 sieve, as determined from the percent passing the No. 4 sieve.

Fill material should be placed in uniform 12-inch-thick loose lifts and compacted to at least 95 percent of the maximum dry density as determined by Modified Proctor tests in accordance with ASTM D1557. Water content at the time of compaction should be within a few percentage points of optimum. Grain-size distributions, maximum dry density and optimum water-content determinations should be made on representative samples of the proposed fill. Fill materials placed in open areas should be compacted using two passes of a five-ton roller; in smaller confined areas fill material should be compacted using six passes of a one-ton vibratory plate. All fill placement and compaction should be subject to special inspection and testing. No fill should be placed on areas where free water is standing, on frozen subsoil, or on surfaces that have not been approved by the on-site geotechnical engineer.

ADDITIONAL RECOMMENDATIONS

Additional Subsurface Explorations

Two additional borings located within the proposed building footprint are required to satisfy Building Code requirements. Additionally, the two borings will fill in data gaps and provide additional information regarding the suitability of the subsurface material for the new building foundations.

Preconstruction Conditions Documentation and Monitoring

We recommend that preconstruction conditions documentation be performed for the existing foundation walls and neighboring buildings before the start of construction. The purpose of these observations is to provide photographic and/or video documentation of the general existing conditions and to identify obvious visual deficiencies. The preconstruction conditions documentation should also identify areas requiring specific monitoring during construction, including optical surveying and vibration monitoring. Structural integrity of the structure is not addressed in such documentation. This baseline information is often critical in the event of future damage claims resulting from construction activities.

The City of New York Department of Buildings Technical Policy and Procedure Notice (TPPN) #10/88 “Procedures for Avoidance of Damage to Historic Structures” dated 6 June 1988, requires special monitoring of all adjacent historic structures. The Historic Place to the south of the project site, 159 Carlton Avenue, falls within the 90-foot lateral distance for a lot undergoing development and will require baseline documentation.

A precise optical survey program should be implemented by the foundation contractors during below grade work to monitor for vertical and horizontal movements of the existing building walls and surrounding structures and utilities. The work shall be executed so that no damage occurs to the existing foundation walls that are to remain, adjacent structures, streets, or utilities.

During excavation and foundation construction, ground vibrations within the adjacent building should also be monitored using a threshold-type seismograph. The ground vibrations should be monitored full time while pile installation is performed. Thresholds should be in line with TPPN #10/88.

We recommend that a monitoring plan be completed for the project. The monitoring plan should provide details of the methods and equipment for monitoring movement, as well as movement criteria and requirements for frequency of readings and reporting. Criteria for allowable movements of structures should be finalized after a building pre-construction conditions report is completed.

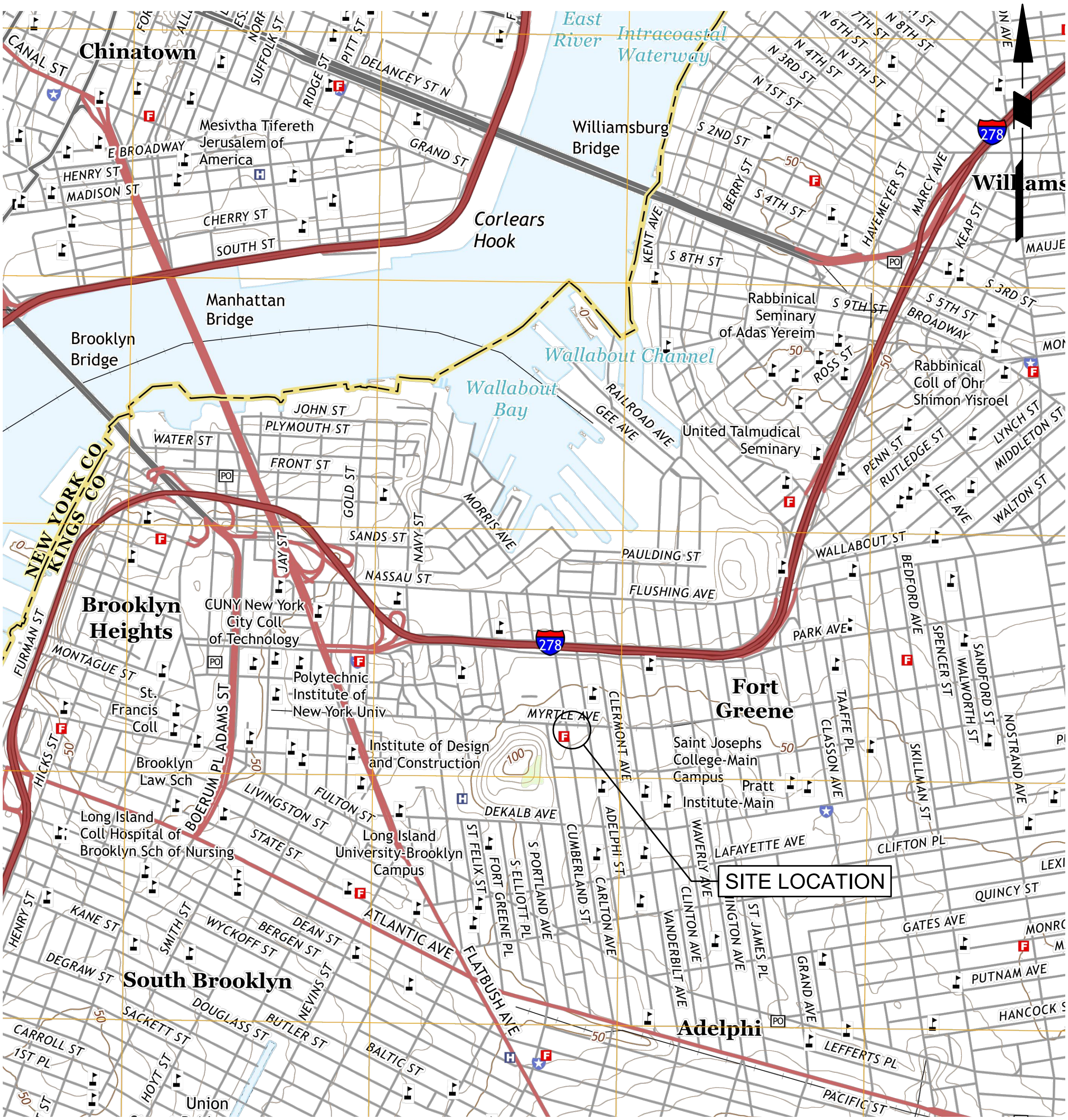
LIMITATIONS

The conclusions and recommendations provided in this preliminary report have been prepared based on professional judgment of the subsurface conditions inferred from a limited number of borings and test pits made at the site, as well as plans and/or drawings provided by the design team. The recommendations provided are solely for the conditions encountered at the site and should not be used independently at other sites where other subsurface conditions are presumed to exist. Environmental issues (including potentially contaminated soil and groundwater) are outside the scope of this study and should be addressed in a separate study.

If the proposed building is changed, modified, or its location moved, Hartland should be informed to determine whether such modification would change Hartland’s recommendations as presented herein. Geological and groundwater conditions presented herein represent conditions encountered at the time and specific locations where exploration work was performed and may vary from conditions encountered during construction. If conditions during construction differ from those presented in this report, they should be brought to Hartland’s immediate attention for evaluation, as recommendations in this report may be affected.

Hartland has prepared this preliminary geotechnical engineering report for the 340 Myrtle Avenue Brooklyn, New York project to assist the owner, architect, and structural engineer in the design process and is only applicable for this specific site and the specific project identified. The information in this report should not be relied upon by engineers or contractors involved in other unrelated aspects of design or construction work at the site. Special Inspections for foundation construction are required per Building Code.

FIGURES



SOURCE: "BROOKLYN QUADRANGLE MAP, NEW YORK 7.5-MINUTE SERIES", U.S. GEOLOGICAL SURVEY, 2016

2000 0 1000 2000

SCALE IN FEET

HARTLAND ENGINEERING

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152 Edgar Street, 2nd Floor
Weehawken, NJ 07086
347.899.4710

PROJECT

340 MYRTLE AVENUE

BROOKLYN, NY 11205

TITLE

SITE LOCATION MAP

PROJECT NUMBER: 1003210301

DATE: 1 JUNE 2021

DRAWN/CHECKED BY: DPO/TM

SCALE: 1" = 2000'

FIGURE NUMBER: 1

SHEET 1 OF 7

LEGEND:

t

t — Till
Variable texture (e.g. clay, silt-clay, boulder clay),
usually poorly sorted diamict,
deposition beneath glacier ice,
relatively impermeable (loamy matrix),
variable clast content — ranging from abundant well-rounded diverse lithologies in valley tills to relatively angular, more limited lithologies in upland tills, tends to be sandy in areas underlain by gneiss or sandstone,
potential land instability on steep slopes,
thickness variable (1-50 meters).

SOURCE: "SURFICIAL GEOLOGIC MAP OF NEW YORK, LOWER HUDSON SHEET", 1989, DONALD H. CADWELL.

10,000 0 5000 10,000

SCALE IN FEET

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PROJECT

340 MYRTLE AVENUE

BROOKLYN, NY 11205

TITLE

SURFICIAL GEOLOGY MAP

PROJECT NUMBER: 1003210301

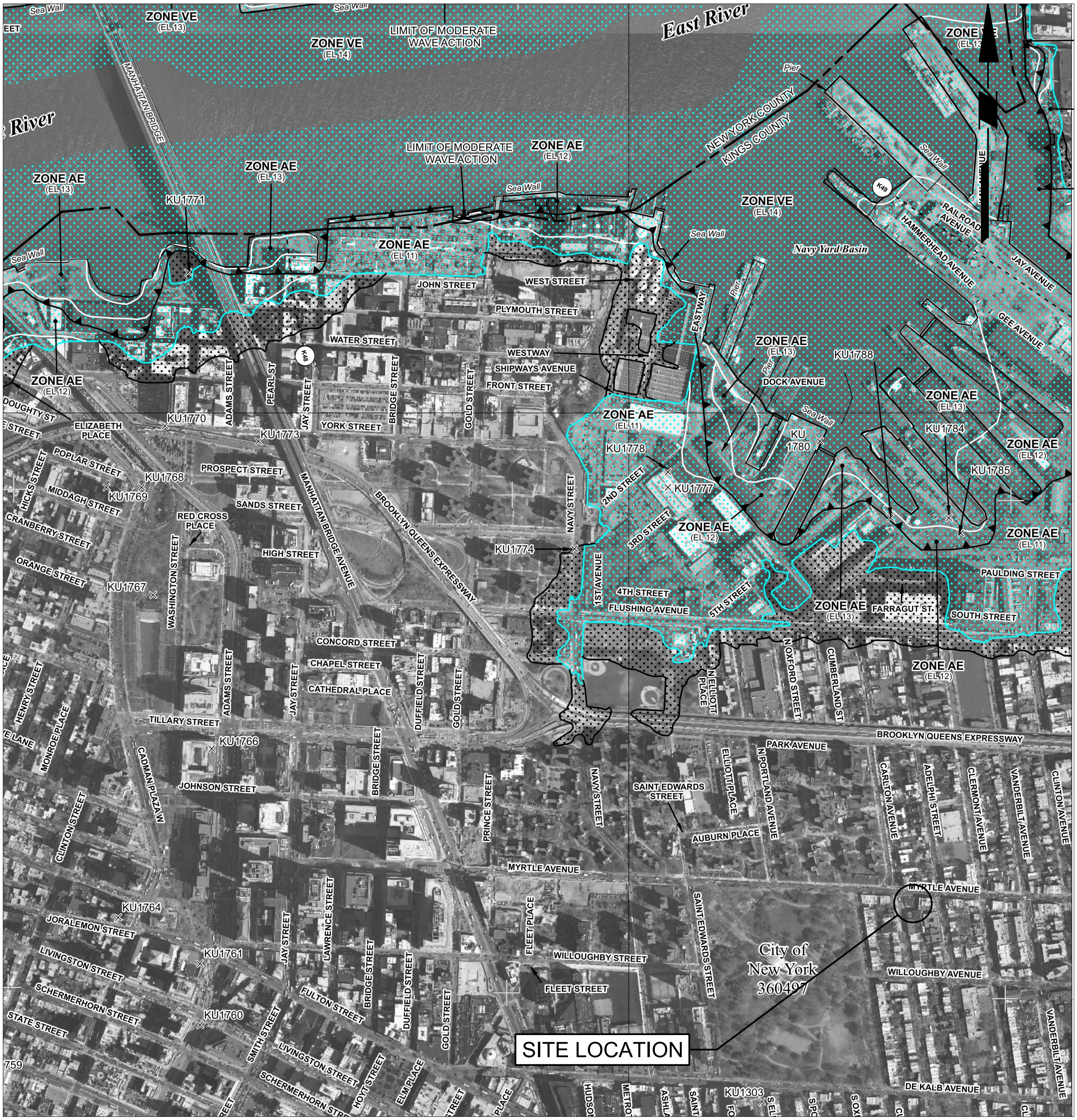
DATE: 1 JUNE 2021

DRAWN/CHECKED BY: DPO/TM

SCALE: 1" = 10,000'

FIGURE NUMBER: 2

SHEET 2 OF 7



SOURCE: PRELIMINARY 5 DECEMBER 2013 FLOOD INSURANCE RATE MAP. FEDERAL EMERGENCY MANAGEMENT AGENCY MAP NO. 3604970203G. FLOOD ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

1000 0 500 1000

SCALE IN FEET

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PROJECT

340 MYRTLE AVENUE

BROOKLYN, NY 11205

TITLE

FEMA PRELIMINARY FLOOD INSURANCE RATE MAP

PROJECT NUMBER: 1003210301

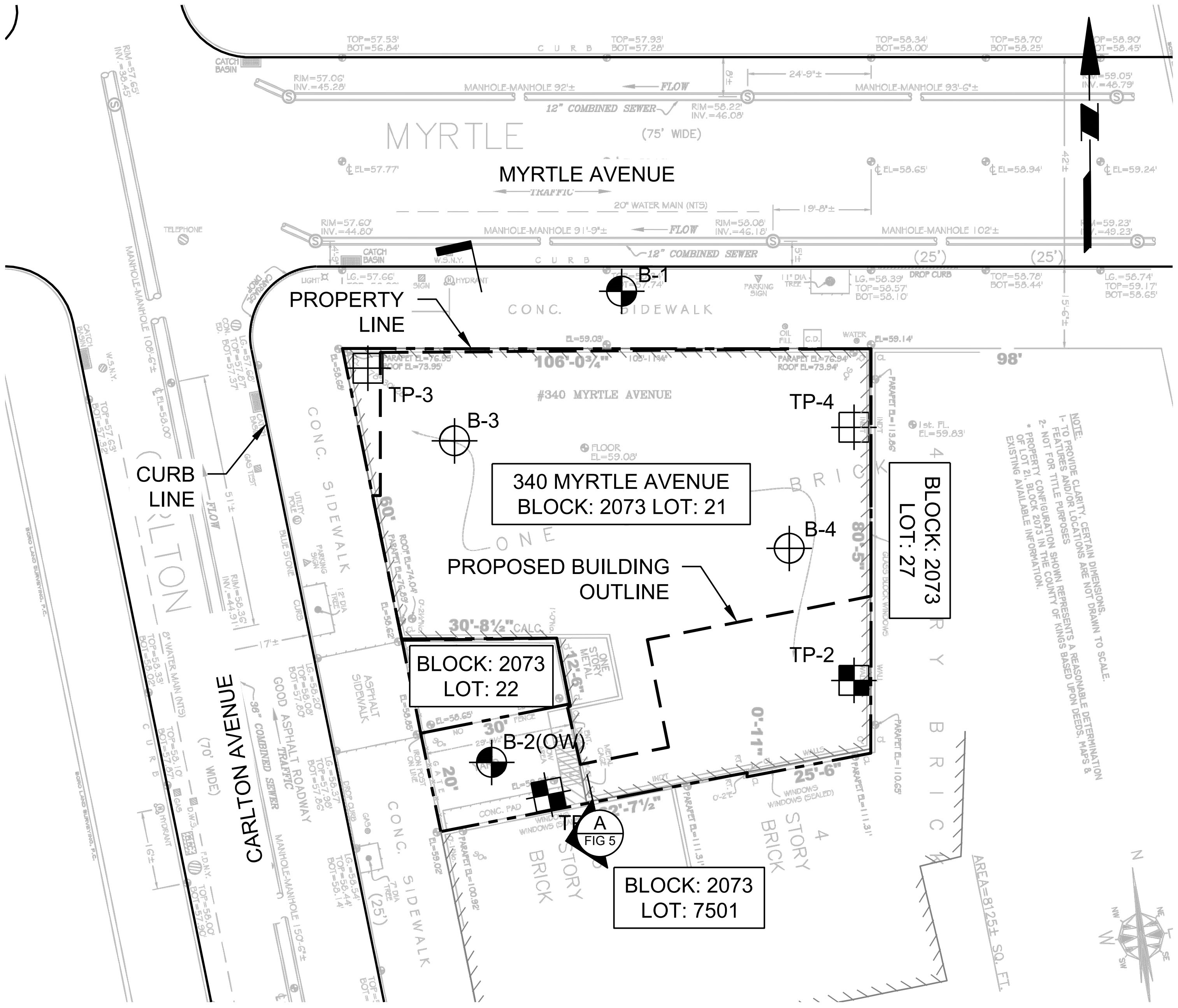
DATE: 1 JUNE 2021

DRAWN/CHECKED BY: DPO/TM

SCALE: 1" = 1000'

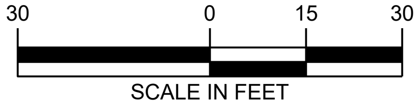
FIGURE NUMBER: **3**

SHEET 3 OF 7



SUBSURFACE INVESTIGATION PLAN

SCALE: 1" = 30'



GENERAL NOTES:

1. BACKGROUND PLAN IS REFERENCED FROM AN ARCHITECTURAL SURVEY PREPARED BY BORO LAND SURVEYING, PC DATED 6 APRIL 2021.
2. PROPOSED BUILDING LIMITS ARE REFERENCED FROM SCHEMATIC DRAWINGS PREPARED BY RAWLINGS ARCHITECTS, PC RECEIVED 5 MAY 2021.
3. ELEVATIONS SHOWN ON THE PLAN REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. THE PERFORMED SUBSURFACE EXPLORATIONS WERE PERFORMED BY MUNICIPAL TESTING LABORATORY, INC. BETWEEN 17 MAY AND 20 MAY 2021 UNDER THE FULL-TIME SPECIAL INSPECTION OF A HARTLAND REPRESENTATIVE.
5. ALL INDICATED DEPTHS AND INVESTIGATION LOCATIONS ARE BASED ON FIELD MEASUREMENTS AND ARE CONSIDERED APPROXIMATE. SUBSURFACE CONDITIONS MAY VARY BETWEEN INVESTIGATION LOCATIONS.

LEGEND:

B-2 ◕	COMPLETED GEOTECHNICAL BORING LOCATION
B-4 ⊕	PROPOSED POST-DEMOLITION BORING LOCATION
(OW)	OBSERVATION WELL
TP-2 ▚	COMPLETED TEST PIT LOCATION
TP-4 ⊞	PROPOSED POST-DEMOLITION TEST PIT LOCATION

HARTLAND ENGINEERING

Hartland Engineering, DPC
152 Edgar Street, 2nd Floor
Weehawken, NJ 07086
347.899.4710

PROJECT

340 MYRTLE AVENUE

340 MYRTLE AVENUE, BROOKLYN, NY 11205

TITLE

SUBSURFACE EXPLORATION PLAN

PROJECT NUMBER: 1003210301

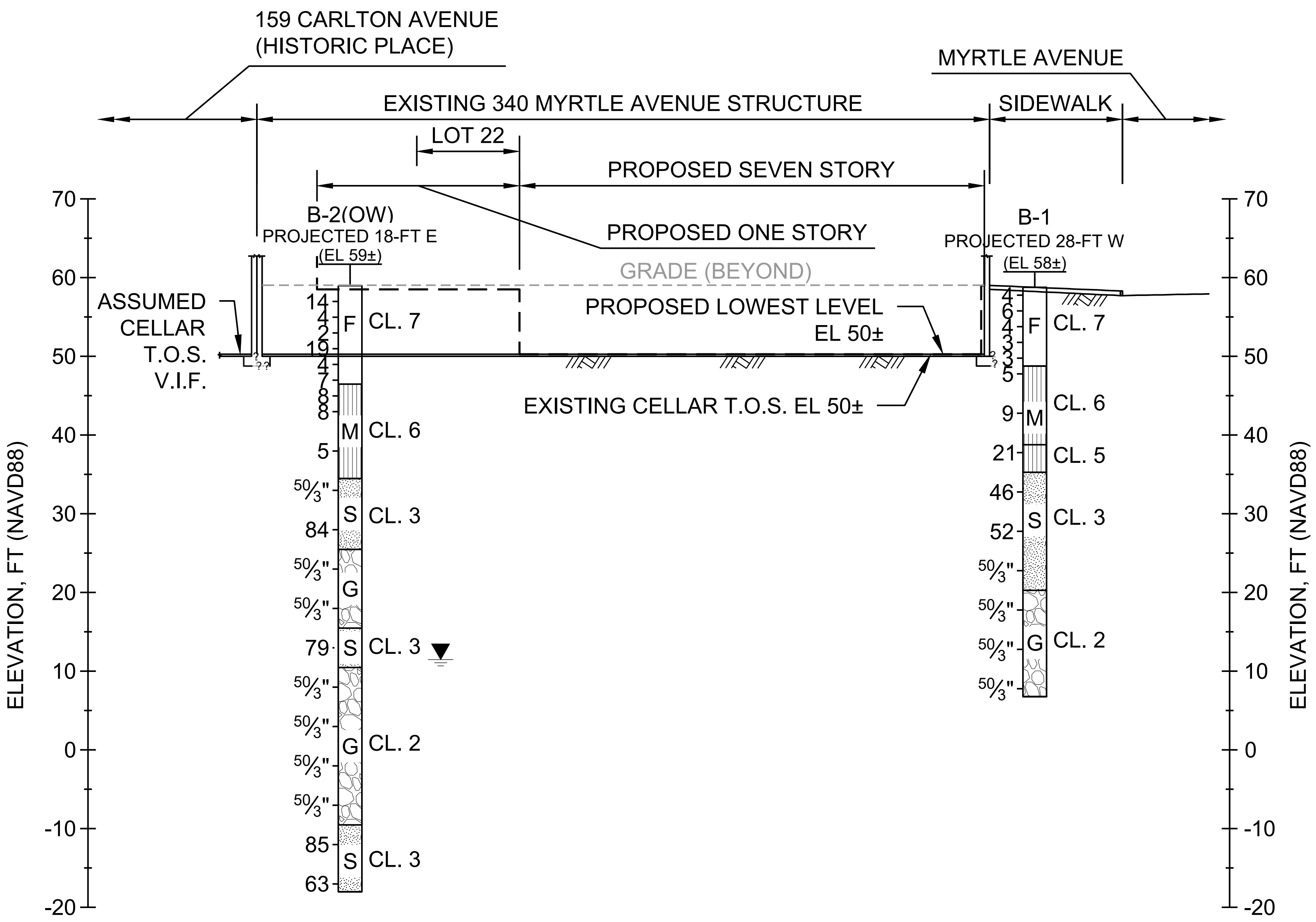
DATE: 1-JUNE-2021

DRAWN BY / CHECKED BY: DPO/TM

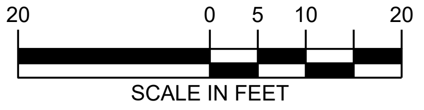
SCALE: 1" = 30'

FIGURE NUMBER: 4

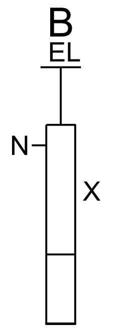
SHEET 4 OF 7



SUBSURFACE PROFILE A



BORING KEY



LEGEND

B	BORING IDENTIFICATION
EL	GROUND SURFACE ELEVATION AT TIME OF BORING
N	STANDARD PENETRATION RESISTANCE NUMBER OF BLOWS OF A 140 LB. HAMMER FREE FALLING 30 IN. TO DRIVE A 2 IN O.D. SPLIT SPOON SAMPLER 12 IN. AFTER 6 INCHES OF INITIAL PENETRATION
X	NEW YORK CITY BUILDING CODE CLASSIFICATION
(OW)	GROUNDWATER OBSERVATION WELL
▼	MEASURED GROUNDWATER LEVEL

MATERIAL SYMBOLS

G	GRAVEL
S	SAND
M	SILT
F	UNCONTROLLED FILL

NEW YORK CITY BUILDING CODE CLASSIFICATION NUMBER

2B/2A	MEDIUM TO DENSE SANDY GRAVEL & GRAVEL
3B/3A	MEDIUM TO DENSE GRANULAR SOILS
5B	MEDIUM SILTS & SILTY SOILS
6	ORGANIC SILTS & CLAYS, PEATS, SOFT CLAYS, LOOSE GRANULAR SOILS, AND VARVED SILTS
7	CONTROLLED & UNCONTROLLED FILLS

NOTES:

1. REFER TO SUBSURFACE EXPLORATION PLAN FOR GENERAL NOTES.
2. ELEVATIONS SHOWN ON THIS FIGURE REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.

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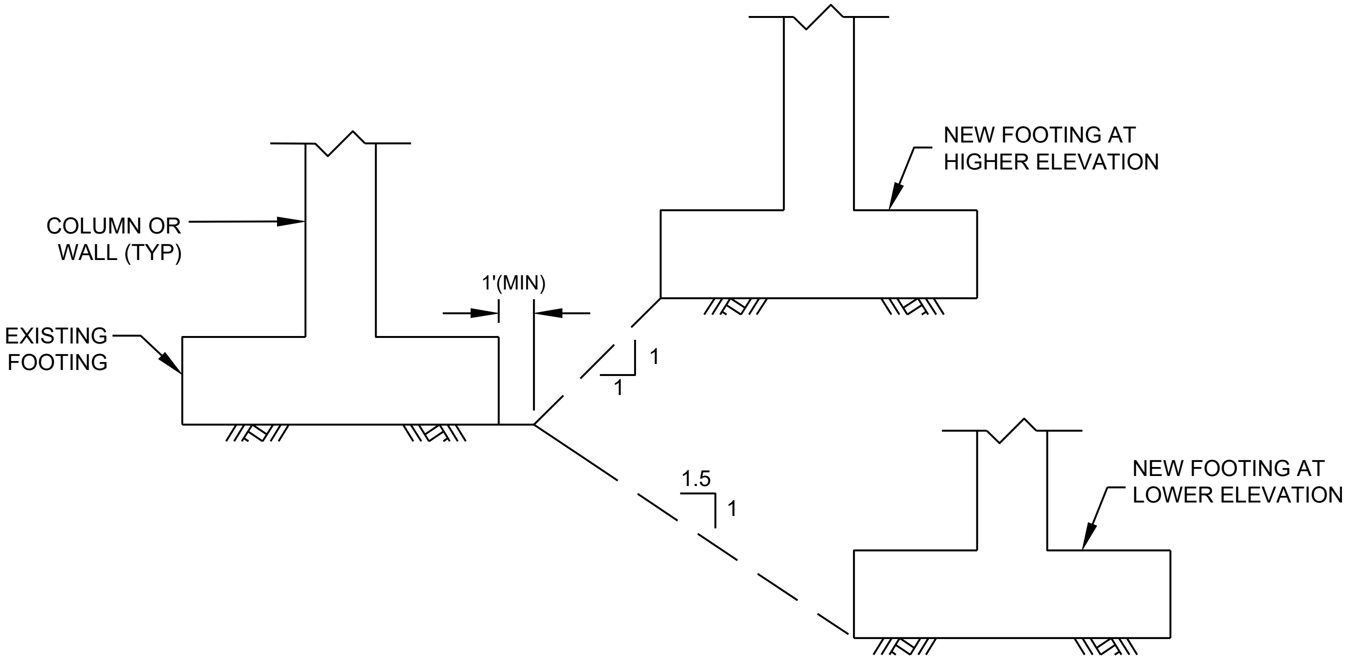
PROJECT
340 MYRTLE AVENUE
340 MYRTLE AVENUE, BROOKLYN, NY 11205

TITLE
SUBSURFACE PROFILE A

PROJECT NUMBER: 1003210301
DATE: 1-JUNE-2021
DRAWN BY / CHECKED BY: DPO/TM
SCALE: 1" = 20'

FIGURE NUMBER:
5

SHEET 5 OF 7



EXISTING FOOTING

PROPOSED FOOTING

NOTES:

1. NEW FOOTINGS SHALL BE CONSTRUCTED A MINIMUM OF 1 FOOT BEYOND THE INFLUENCE ZONE OF THE EXISTING FOOTING.
2. FOR A NEW FOOTING CONSTRUCTED AT A HIGHER ELEVATION THAN THE EXISTING FOOTING, THE INFLUENCE ZONE IS DEFINED BY A LINE WITH A 1H:1V SLOPE EXTENDING UPWARD FROM THE BASE OF THE EXISTING FOOTING.
3. FOR A NEW FOOTING CONSTRUCTED AT A LOWER ELEVATION THAN THE EXISTING FOOTING, THE INFLUENCE ZONE IS DEFINED BY A LINE WITH A 1.5H:1V SLOPE EXTENDING DOWNWARD FROM THE BASE OF THE EXISTING FOOTING.

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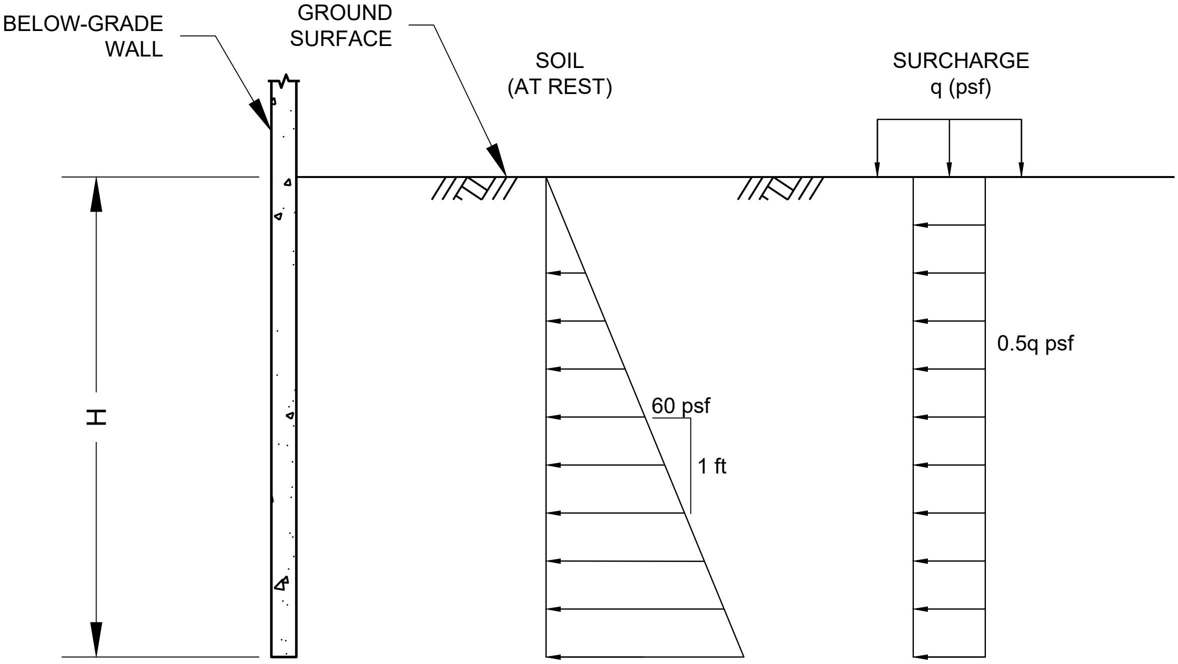
PROJECT
340 MYRTLE AVENUE
BROOKLYN, NY 11205

TITLE
FOOTING INFLUENCE DIAGRAM

PROJECT NUMBER: 1003210301
DATE: 1 JUNE 2021
DRAWN/CHECKED BY: DPO/TM
SCALE: NTS

FIGURE NUMBER: **6**
SHEET 6 OF 8



LEGEND:

H = HEIGHT OF BELOW GRADE WALL (FT)

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347.899.4710

PROJECT

340 MYRTLE AVENUE

BROOKLYN, NY 11205

TITLE

LATERAL EARTH PRESSURES DIAGRAM

PROJECT NUMBER: 1003210301

DATE: 1 JUNE 2021

DRAWN/CHECKED BY: DPO/TM

SCALE: NTS

FIGURE NUMBER: **7**

SHEET 7 OF 7

Appendix A – Boring Logs

HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

LOG OF BORING B-1

SHEET 1 OF 3

PROJECT	340 Myrtle Avenue	ELEVATION AND DATUM	58+/- (NAVD88)	DATE STARTED	19-May-21	DATE FINISHED	20-May-21
LOCATION	Brooklyn, NY	COMPLETION DEPTH (ft)	52				
		ROCK DEPTH (ft)	N/A				
HARTLAND PROJECT NO	1003210301	WATER DEPTH (ft)		FIRST		COMPL.	24HR
HARTLAND REP.	Daniel O'Donnell	NO. SAMPLES	14	DIST.	14	UNDIST. 0	CORE (ft) 0
CONTRACTOR	Municipal Testing Laboratory Inc.	DRILL BIT SIZE AND TYPE	3-7/8-in Tricone				
		CASING Ø (in)	4-in Flush Mount St	CASING DEPTH (ft)	15		
FOREMAN	Adnan	CASING HAMMER	Automatic	WEIGHT (lbs)	140	DROP (in)	30
DRILLING EQUIPMENT	Geoprobe 3126GT Track Rig	SOIL SAMPLER	2-in O.D. Split Spoon (SS)				
		SAMPLING HAMMER	Automatic	WEIGHT (lbs)	140	DROP (in)	30

SAMPLE DESCRIPTION	2014 NYCBC	DEPTH (ft)	SAMPLE INFO. Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	REMARKS
6-inch Concrete		0					[ ] = USCS Classification bgs = below ground surface <u>5/19/21</u> Hartland on site @ 7.00 am. MTL on site @ 6.45 am. Complete observation well annulus construction and install flush mount well cap. Mobilize to B-1 around 9.00am Rollerbit through concrete sidewalk. Take S1 through S6. Advance casing to 15-ft bgs. Rollerbit to 15-ft bgs; smooth drilling, brown wash
S1: Dark brown m-f SAND, so. Silt, concrete fragments (dry)[FILL]		1 2	S1	SS	7	3 2 2 2	
S2: Brown m-f SAND, tr. Silt, concrete fragments (dry)[FILL]		3 4	S2	SS	3	1 4 2 2	
S3: Brown m-f SAND, so. Silt, brick/concrete fragments (dry)[FILL]	7	5 6	S3	SS	6	3 2 2 3	
S4: Brown m-f SAND, tr. Silt, tr. Gravel (dry)[FILL]		7 8	S4	SS	13	2 1 2 2	
S5: Brown m-f SAND, so. Silt, concrete fragments (dry)[FILL]		9 10	S5	SS	4	2 1 2 2	
S6: Brown Sandy SILT (dry)[ML]		11 12	S6	SS	16	3 2 3 4	
	6	13 14 15					

LOG OF BORING B-1

PROJECT	340 Myrtle Avenue	DATE	5/19/2021
HARTLAND PROJECT NO.	1003210301	HARTLAND REP.	Daniel O'Donnell

SAMPLE DESCRIPTION	2014 NYCBC CLASS	DEPTH (ft)	SAMPLE INFO.				REMARKS
			Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	
S7: Brown Varved SILT, so. Sand (dry)[ML]	6	16	S7	SS	17	2 4 5 5	[ ] = USCS Classification bgs = below ground surface Take S7
		17 18 19					Rollerbit to 20-ft bgs; smooth drilling, brown wash.
S8: Brown SILT (moist)[MH]	5b	20 21	S8	SS	24	3 3 18 21	Take S8
		22 23 24					Rollerbit to 25-ft bgs; brown wash, some rig chatter from 22-ft bgs.
S9: Brown Silty SAND, so. Gravel (moist)[SM]	3a	25 26	S9	SS	12	15 22 24 50	Take S9
		27 28 29					Rollerbit to 30-ft bgs; some rig chatter, brown wash.
S10: Reddish brown Silty SAND, so. Gravel (moist)[SM]		30 31	S10	SS	15	17 20 32 22	Take S10
		32 33 34					Rollerbit to 35-ft bgs; heavy rig chatter/racking at 34-ft (likely boulder), brown wash.

HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

LOG OF BORING B-1

SHEET 3 OF 3

PROJECT	340 Myrtle Avenue	DATE	5/20/2021
HARTLAND PROJECT NO.	1003210301	HARTLAND REP.	Daniel O'Donnell

SAMPLE DESCRIPTION	2014 NYCBC CLASS	DEPTH (ft)	SAMPLE INFO.				REMARKS
			Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	
							[ ] = USCS Classification bgs = below ground surface
		35					
S11: Reddish Brown Silty SAND, so. Gravel (moist)[SM]	3a	36	S11	SS	3	6 33 50/3"	Take S11
		37					
		38					Rollerbit to 40-ft bgs, hard drilling from 36-ft to 37-ft bgs, brown wash
		39					
		40					
S12: Brown Sandy GRAVEL, tr. Silt (moist)[GP]		41	S12	SS	9	17 50/3"	Take S12 End of Day
		42					
		43					Start of 5/20/2021
		44					Rollerbit to 45-ft bgs; brown wash, hard drilling, possible boulder at 42-ft bgs
		45					
S13: Brown fine GRAVEL (moist)[GP]	2a	46	S13	SS	14	12 50/3"	Take S13
		47					
		48					Rollerbit to 50-ft bgs; brown wash, hard drilling. Swap to core barrel from 47-ft to 50-ft, boulder fragments recovered in barrel, rollerbit to 50-ft bgs
		49					
		50					
S14: Reddish Brown Sandy GRAVEL, so. Silt (wet)[GP]		51	S14	SS	5	18 81 50/3"	Take S14
		52					
End of Boring at 52-ft bgs							End of Boring at 52-ft bgs, backfilled to grade and patched with concrete
		53					

HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

LOG OF BORING B-2

SHEET 1 OF 5

PROJECT	340 Myrtle Avenue	ELEVATION AND DATUM	59+/- (NAVD88)	DATE STARTED	DATE FINISHED		
LOCATION	Brooklyn, NY	COMPLETION DEPTH (ft)	77	17-May-21	18-May-21		
		ROCK DEPTH (ft)	N/A				
HARTLAND PROJECT NO	1003210301	WATER DEPTH (ft)	FIRST		COMPL.		24HR
HARTLAND REP.	Tommy M.	NO. SAMPLES	20	DIST.	20	UNDIST.	0
						CORE (ft)	0
CONTRACTOR	Municipal Testing Laboratory Inc.	DRILL BIT SIZE AND TYPE	3-7/8-in Tricone				
		CASING Ø (in)	4-in Flush Mount St	CASING DEPTH (ft)	15		
FOREMAN	Adnan	CASING HAMMER	Automatic	WEIGHT (lbs)	140	DROP (in)	30
		SOIL SAMPLER	2-in O.D. Split Spoon (SS)				
DRILLING EQUIPMENT	Geoprobe 3126GT Track Rig	SAMPLING HAMMER	Automatic	WEIGHT (lbs)	140	DROP (in)	30

SAMPLE DESCRIPTION	2014 NYCBC	DEPTH (ft)	SAMPLE INFO. Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	REMARKS
6-inch Concrete	7						[ ] = USCS Classification bgs = below ground surface <u>5/17/21</u>
S1: Mottle m-f SAND, some pieces of concrete [FILL]		1 2	S1	SS	14	10 7 7 5	Hartland on site @ 6.30 am. MTL on site @ 6.45 am. Mobilize to B-2. Rollerbit through concrete slab. Take S1 through S3. Advance casing to 5-ft bgs. Rollerbit to 7-ft bgs.
S2: Red and Brown m-f SAND, come concrete & brick [FILL]		3 4	S2	SS	14	4 2 2 4	
S3: Brown silty f SAND, tr brick [FILL]		5 6	S3	SS	20	3 1 1 3	
S4: Red and brown m-f SAND and brick [FILL]		7 8	S4	SS	8	4 9 10 13	Take S4
S5: Red and brown m-f SAND and brick [FILL]		9 10	S5	SS	10	2 2 2 5	Take S5 Advance casing to 10-ft bgs. Rollerbit to 11-ft bgs
S6A (Top 7"): Red and brown m-f SAND and brick [FILL] S6B (Bottom 4"): Brown SILT, tr f sand [ML]		11 12	S6	SS	11	4 3 4 3	Take S6
S7: Brown SILT, tr f sand [ML]	6	13 14 15	S7	SS	24	5 4 4 7	Take S7 Advance casing to 15-ft bgs. Rollerbit to 15-ft bgs.

HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

LOG OF BORING B-2

SHEET 2 OF 5

PROJECT 340 Myrtle Avenue
DATE 5/17/2021
HARTLAND PROJECT NO. 1003210301
HARTLAND REP. Tommy M.

SAMPLE DESCRIPTION	2014 NYCBC CLASS	DEPTH (ft)	SAMPLE INFO. Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	REMARKS
S8: Brown SILT, tr f sand [ML]	6	16	S8	SS	22	3 3 5 7	[ ] = USCS Classification bgs = below ground surface Take S8
		17 18 19					Rollerbit to 20-ft bgs; smooth drilling, brown wash.
S9: Brown SILT, tr f sand [ML]		20 21	S9	SS	24	1 2 3 3	Take S9
		22 23 24					Rollerbit to 25-ft bgs; brown wash, some rig chatter from 24.5 to 25-ft bgs.
S10: Brown m-f SAND, some c-f gravel, tr silt [SP]	3a	25 26	S10	SS	8	11 22 50/3"	Take S10
		27 28 29					Rollerbit to 30-ft bgs; some rig chatter, brown wash.
S11:Brown m-f SAND, some c-f gravel, tr silt [SP]		30 31	S11	SS	11	21 46 38 50/2"	Take S11
		32 33 34					Rollerbit to 35-ft bgs; some rig chatter, brown wash.

HARTLAND

GEOTECHNICAL + SITE/CIVIL ENGINEERING

LOG OF BORING B-2

SHEET 3 OF 5

PROJECT	340 Myrtle Avenue	DATE	5/17/2021
HARTLAND PROJECT NO.	1003210301	HARTLAND REP.	Tommy M.

SAMPLE DESCRIPTION	2014 NYCBC CLASS	DEPTH (ft)	SAMPLE INFO.				REMARKS
			Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	
							[ ] = USCS Classification bgs = below ground surface
		35				50/5"	Take S12
S12:Mottled c-f GRAVEL, tr f sand, tr silt (1-inch cobble stuck in tip) [GP]		36	S12	SS	4		
		37					
		38					Rollerbit to 37-ft bgs. Core through boulder 37-ft to 39-ft bgs. Rollerbit to 40-ft bgs; some rig chatter, brown wash.
	2a	39					
		40				45	Take S13
S13:Mottled c-f GRAVEL, tr f sand, tr silt [GP]		41	S13	SS	4	50/2"	
		42					
		43					Rollerbit to 45-ft bgs; some rig chatter, brown wash.
		44					
		45				18	Take S14
S14: Redbrown m-f SAND, some c-f gravel, tr silt [SP]	3a	46	S14	SS	10	35 44	
		47				50/1"	
		48					Rollerbit to 50-ft bgs; some rig chatter, brown wash.
		49					
		50				50/2"	Take S15
S15: Grey-brown c GRAVEL, some m-f sand, tr silt [GP](wet)	2a	51	S15	SS	4		
		52					
		53					

HARTLAND

GEOTECHNICAL + SITE/CIVIL ENGINEERING

LOG OF BORING B-2

SHEET 4 OF 5

PROJECT	340 Myrtle Avenue	DATE	5/17/21-5/18/21
HARTLAND PROJECT NO.	1003210301	HARTLAND REP.	Tommy M. /Dan O'Donnell

SAMPLE DESCRIPTION	2014 NYCBC CLASS	DEPTH (ft)	SAMPLE INFO.				REMARKS
			Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	
		54					[ ] = USCS Classification bgs = below ground surface Rollerbit to 50-ft bgs; some rig chatter, brown wash. End of Day.
		55					5/18/2021 Drill out to 55-ft bgs; obstruction (possible boulder) from 53-ft to 54-ft bgs, swap to core barrel until 55-ft bgs
S16: Gray c-f GRAVEL, some sand, trace silt [GP](wet)		56	S16	SS	3	50/3"	
		57					Rollerbit to 55-ft bgs; some chatter Take S16 at 55-ft bgs; sampler refusal
		58					
		59					Rollerbit to 60-ft bgs; some chatter, gray wash
		60					Take S17 at 60-ft bgs
S17: Gray fine GRAVEL, some sand, trace silt [GP](wet)	2a	61	S17	SS	1	50/3"	
		62					
		63					Rollerbit to 65-ft bgs; drill refusal, swap to 5-ft core barrel to advance to 65-ft bgs. Rollerbit to 65-ft bgs after core barrel removed (boulder fragments in barrel)
		64					
		65					Take S18 at 65-ft bgs
S18: Gray c-f GRAVEL, some sand, trace silt [GP](wet)		66	S18	SS	8	2 29 56 47	
		67					
		68					
		69					
		70					Rollerbit to 70-ft bgs; light chatter, gray wash
S19: Gray c-f SAND, some gravel, trace silt [SP](wet)	3a	71	S19	SS	10	21 37 26 32	Take S17 at 60-ft bgs
		72					

HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

LOG OF BORING B-2

SHEET 5 OF 5

PROJECT	340 Myrtle Avenue	DATE	5/18/2021
HARTLAND PROJECT NO.	1003210301	HARTLAND REP.	Dan O'Donnel

SAMPLE DESCRIPTION	2014 NYCBC CLASS	DEPTH (ft)	SAMPLE INFO.				REMARKS
			Sample No.	Sample Type	Recovery (in)	Penetration Resistance (Blows/6")	
							[ ] = USCS Classification
		73					bgs = below ground surface Rollerbit to 75-ft bgs; heavy chatter, gray wash
		74					
	3a						Take S20 at 75-ft bgs
		75				23	Partially backfill hole and install observation well, 10-ft screen set at 50-ft bgs with solid riser to surface
S20: Gray c-f SAND, some gravel [SP](wet)		76	S20	SS	8	43 22 22	
End of Boring at 77-ft bgs		77					End of Boring at 77-ft bgs
		78					
		79					
		80					
		81					
		82					
		83					
		84					
		85					
		86					
		87					
		88					
		89					
		90					
		91					

Appendix B – Observation Well Log

HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

OBSERVATION WELL CONSTRUCTION LOG FOR BORING B-2

PROJECT 340 Myrtle Avenue	**PROJECT NO.** 1003210301
LOCATION Brookyln, New York	**ELEVATION AND DATUM** 59 NAVD88
DRILLING AGENCY Municipal Testing Laboratory, Inc.	**DATE STARTED** 5/17/2021 **DATE FINISHED** 5/18/2021
DRILLING EQUIPMENT Geoprobe 3126GT track rig	**DRILLER** Adnan
SIZE AND TYPE OF BIT 3-7/8-inch Tricone	**INSPECTOR** Tommy M./Daniel O.

METHOD OF INSTALLATION

The boring was advanced through the overburden material using a 3-7/8 inch tricone drill bit and steel casing. Upon termination of the boring, the borehole was backfilled to about 50 feet below grade. Ten feet of two-inch-diameter PVC screen was installed followed by fourty feet of two-inch-diameter PVC riser pipe to bring the observation to grade. Filter sand was packed to about two foot above the screen at which point bentonite pellets were installed creating a seal. Existing soil cuttings were used to backfill the remainder of the well. A flushmount well cover was installed at the ground surface.

METHOD OF WELL DEVELOPMENT

This observation well was developed using by inserting a small diameter pump and pumping out the well until clean water flow was observed. The well was allowed to recharge and was purged twice more.

TYPE OF RISER PVC	**DIAMETER** 2"	**TYPE OF BACKFILL MATERIAL** Soil Cuttings
TYPE OF SCREEN Slotted PVC	**DIAMETER** 2"	**TYPE OF SEAL MATERIAL** Bentonite Pellets
BOREHOLE DIAMETER 4"		**TYPE OF FILTER MATERIAL** Clean Sand

	ELEVATION	DEPTH (ft)
TOP OF RISER	59.0	0
TOP OF SEAL	23	36
TOP OF FILTER	21	38
TOP OF SCREEN	19	40
BOTTOM OF SCREEN	9	50

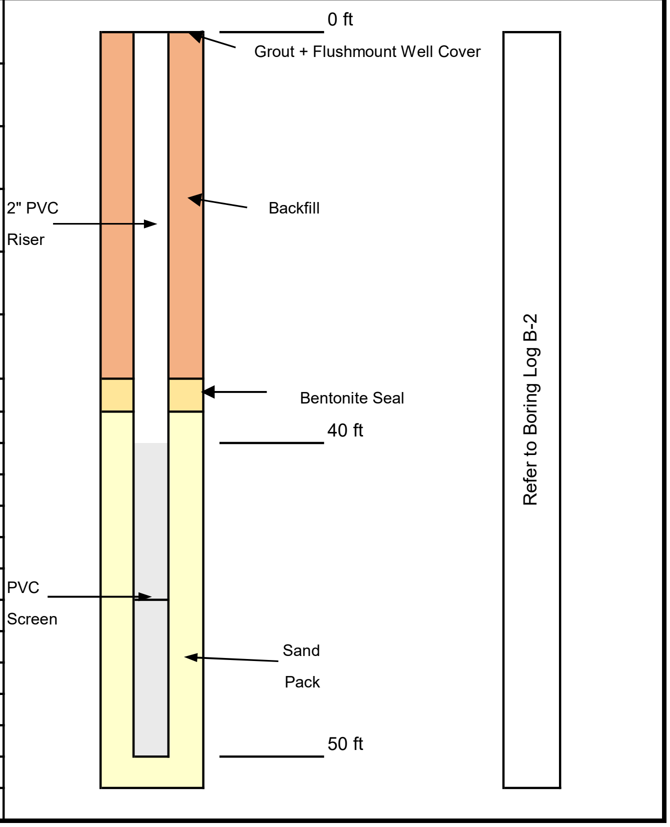
SCREEN LENGTH
10

SLOT SIZE
0.01 in

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
11.5	5/20/2021	47.5

VELL DETAIL	DEPTH (FT)	SUMMARY SOIL CLASSIFICATION

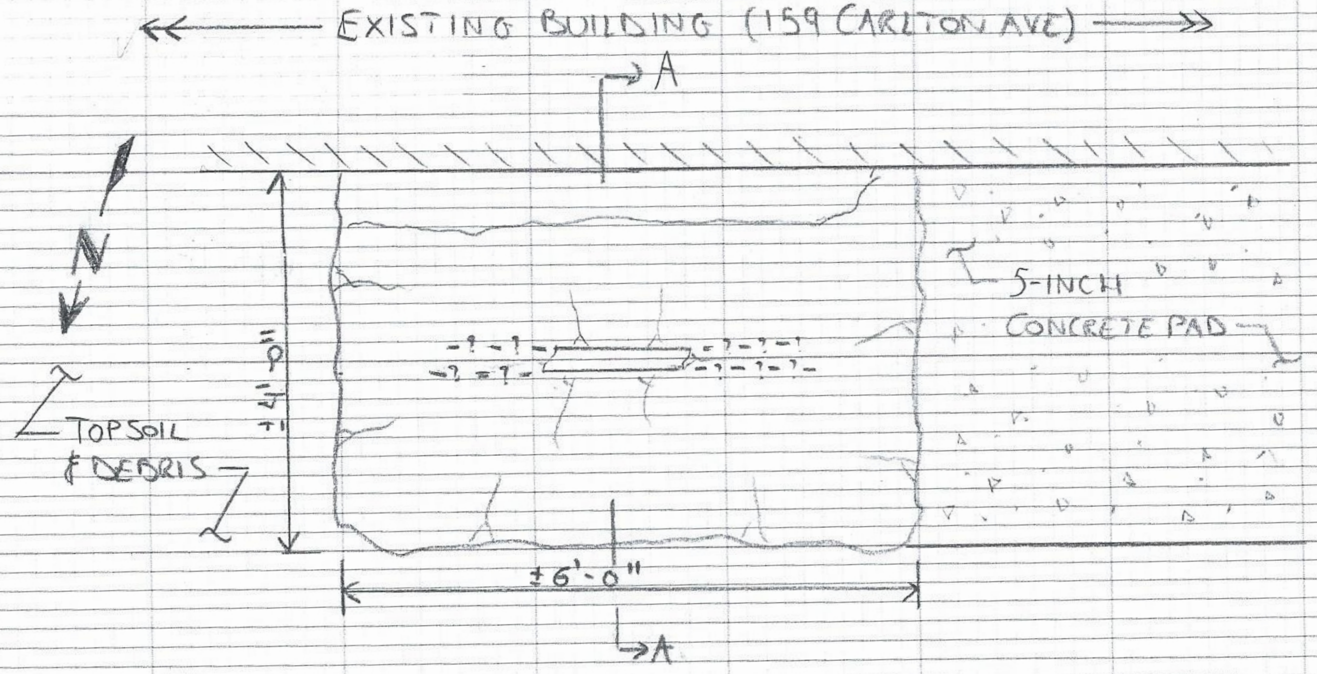


Appendix C – Test Pit Sketches

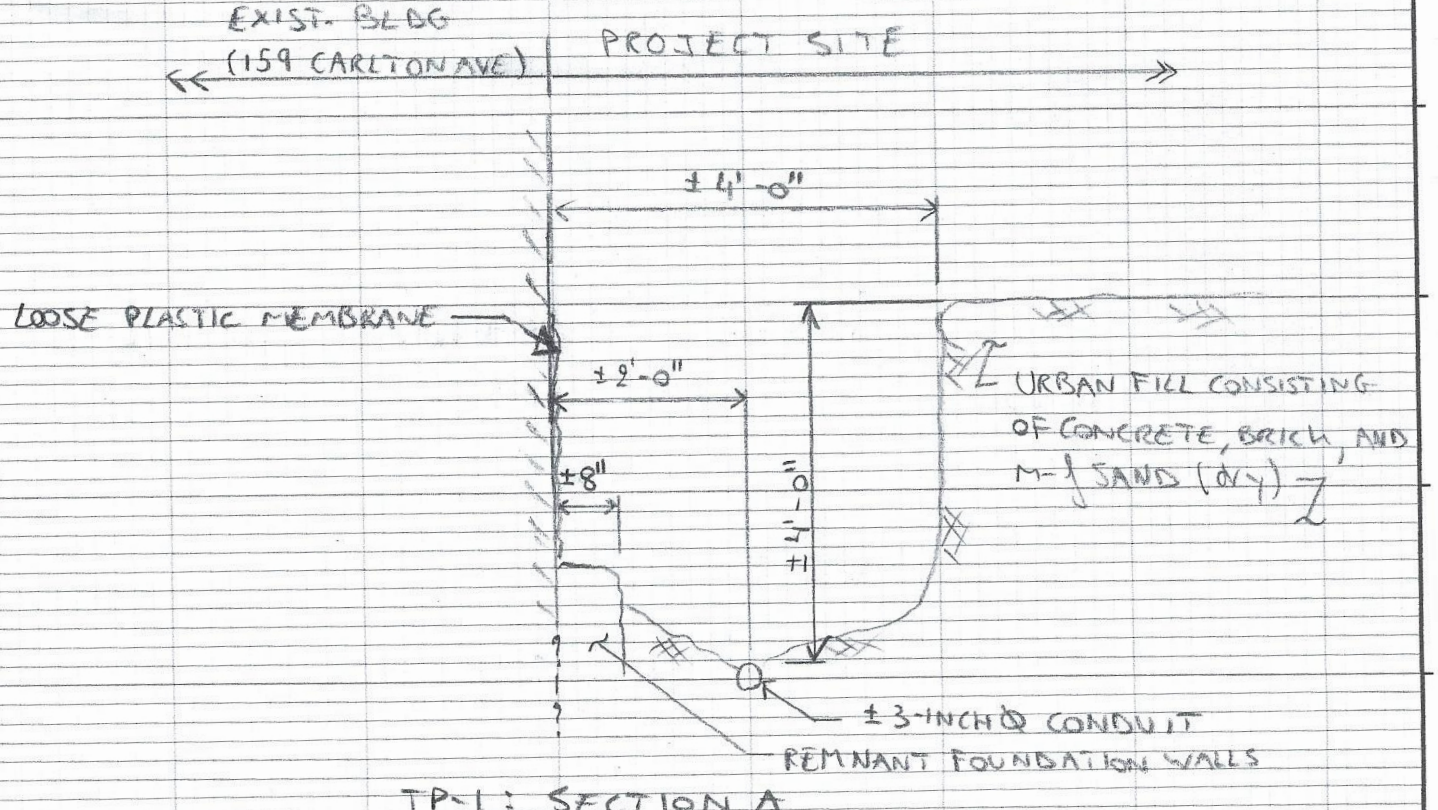
HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

340 MYRTLE AVENUE
TEST PIT SKETCH
TP-1

PROJECT NO.: 1003210301
BY TM DATE 5/17/'21
CKD. VS DATE 5/18/'21
SHEET 1 OF 1



TP-1 : PLAN VIEW
SCALE: 1/2" = 1'-0"

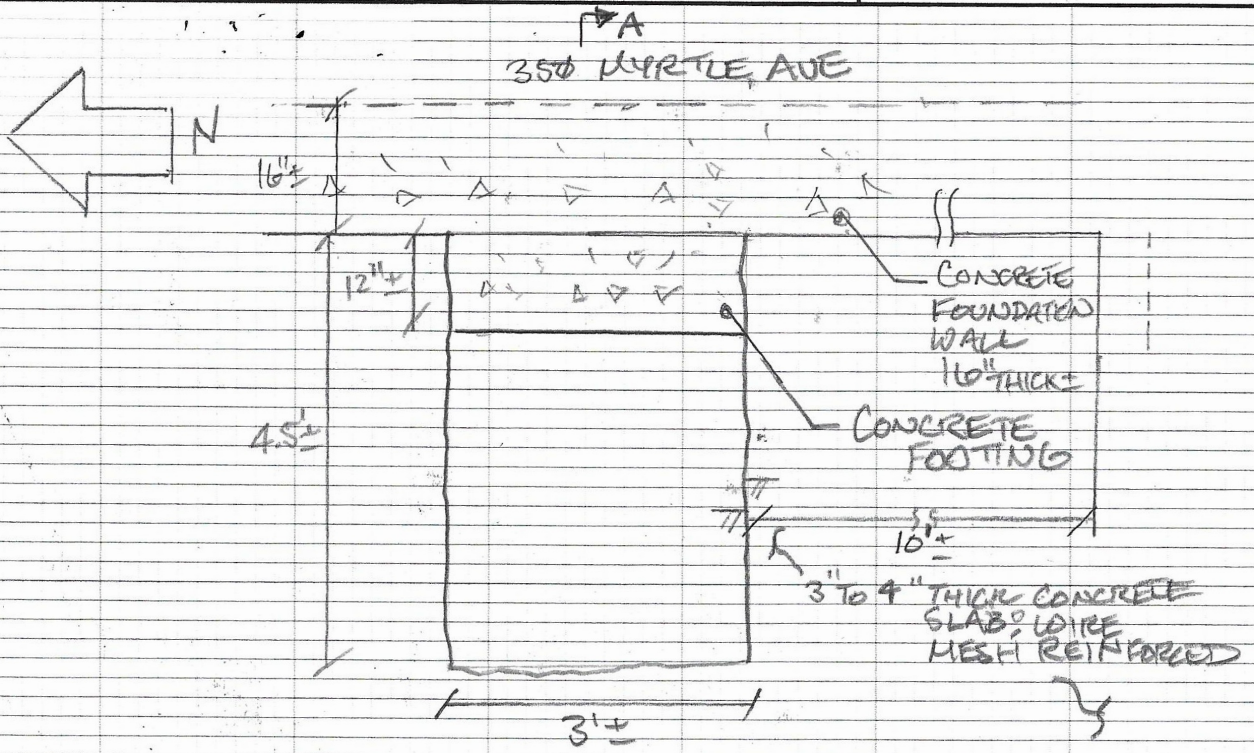


TP-1 : SECTION A
SCALE: 1/2" = 1'-0"

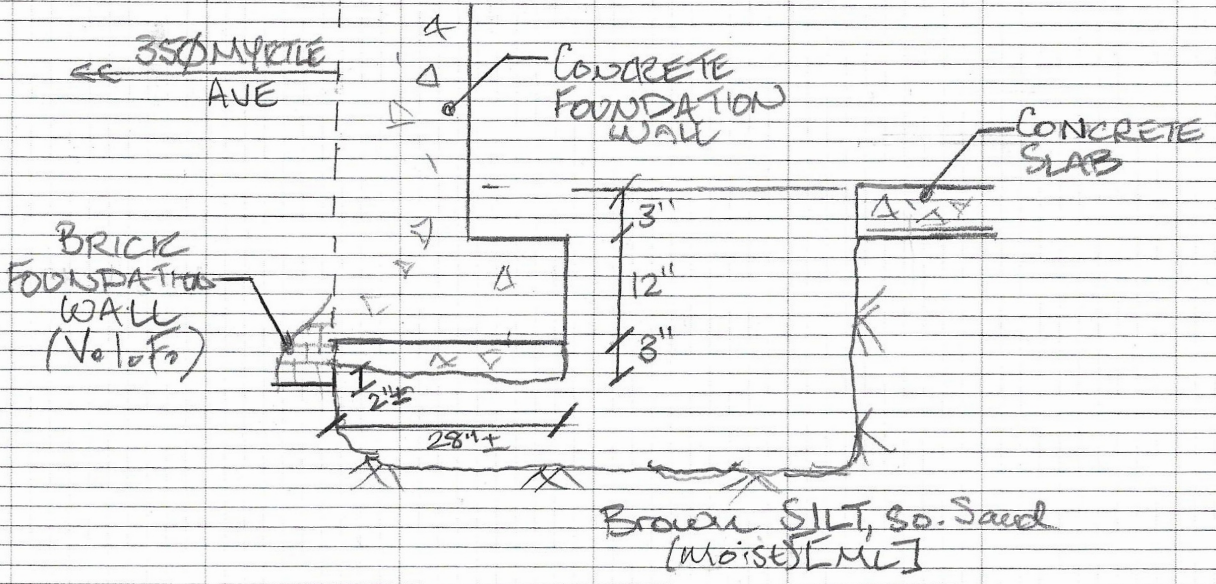
HARTLAND
GEOTECHNICAL + SITE/CIVIL ENGINEERING

340 MYRTLE AVE
BROOKLYN, NY
TEST PIT TP-2

PROJECT NO.: 1003210301
BY DPO DATE 5/24/21
CKD. DATE
SHEET 1 OF 1



PLAN
SCALE: 1"=2'-0"
0' 1' 2'



SECTION A
(LOOKING SOUTH)
SCALE 1"=2'-0"
0' 1' 2'