Proactive by Design

GEOTECHNICAL
ENVIRONMENTAL
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CONSTRUCTION MANAGEMENT

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June 28, 2017
GZA Project No.: 12.0076567.00

Ms. Carole Gordon
The Bridge, Inc.
290 Lenox Avenue
New York, NY 10027

Re: Geotechnical Engineering Report
3500 Park Avenue, Bronx, New York

Dear Ms. Gordon:

GZA GeoEnvironmental of New York (GZA) is pleased to submit this geotechnical report for the proposed development at 3500 Park Avenue in Bronx, New York. Our scope of services consisted of the observation and documentation of five test borings and two test pits performed by GZA's subcontractor, geotechnical analyses, and preparation of this report summarizing our observations and geotechnical recommendations.

Our services were performed in accordance with our proposal number 12.P000035.18 R1, executed on April 23, 2017, and Change Order 1 dated June 1, 2017 and executed on June 2, 2017, and are subject to the terms of our proposal and the limitations presented in Appendix A.

PROJECT UNDERSTANDING

Our understanding of the project is based on the Request for Proposal (RFP) entitled "Test Pit and Borings, Geotechnical Engineering, Support of Excavation," dated March 27, 2017 (includes the Test Boring Location Plan), the Architectural Survey prepared by Leonard J. Strandberg and Associates Consulting Engineers and Land Surveyors, P.C. and dated March 16, 2017, Architectural Drawings A-010, A-200, A-201, A-202, A-203, A-400, A-401, and A-410, prepared by Edelman Sultan Knox Wood/Architects LLP (Edelman), dated February 22, 2017, our exploration program, and ongoing phone and email correspondences with the project team.

Unless otherwise noted, elevations in this report are referenced to the North American Vertical Datum of 1988 (NAVD88).

Existing Conditions

The site is located at 3500 Park Avenue, Bronx, NY. The site covers an area of approximately 15,173 square feet (sf). It consists of a paved parking lot located to the southeast of the Park Avenue and East 168th Street intersection. The ground surface elevation (El.) at the site ranges between approximately 35 and 41 feet, gradually sloping downward from northeast to southwest. A stone and concrete retaining wall is located along the northern and eastern sides of the site. The retaining wall is approximately 2.5 to 7.5 feet in height. A one-story and two-story brick building is located adjacent to the site to the south. A three-story brick building and residential yards are located adjacent to the site to the east. The two-story structure to the south and the three-story structure to the east include cellars.

Proposed Development

Based on information provided by you, we understand that a seven-story residential building with a cellar beneath a portion of the building is proposed at the site, covering a footprint area of approximately 11,000 sf. The partial cellar, which would occupy roughly the northwest quadrant of the site, will have a footprint of approximately 4,200 sf and a finished floor El. of approximately 27.5 feet or 10 feet below the current ground surface elevation. The first floor and rear yard will have a finished floor El. of around 37.5 feet.

SUBSURFACE EXPLORATION

Our subsurface exploration program was performed in general accordance with the executed proposal and the 2014 New York City Building Code (NYCBC). The subsurface exploration program included five geotechnical soil borings, two test pits, and laboratory testing of selected soil samples. The soil borings were performed between May 22 and May 24, 2017 and the test pits were performed between June 5 and June 6, 2017.

Borings

Five test borings, B-01 to B-05, were drilled by Craig Geotechnical Drilling Co., Inc. (Craig) of Mays Landing, New Jersey under subcontract to GZA. Test borings B-01 and B-02 were performed within the approximate footprint of the proposed partial cellar. The borings were drilled using cased, wash-rotary, drilling techniques with bentonite additives as needed to stabilize the boreholes. The test borings were performed using a truck mounted drill rig to depths ranging from approximately 30 to 45 feet. The as-drilled locations were tape-measured from existing site features during the exploration program. Refer to Figure 2 for the as-measured test boring locations.

Standard Penetration Tests (SPT) were performed and split spoon samples were collected in general accordance with ASTM D-1586. Continuous sampling (2-feet intervals) was performed to a depth of 12 feet and then at about 5-foot intervals thereafter until refusal was encountered. A 140-pound automatic hammer falling a distance of 30 inches was used to drive the split spoon sampler 24 inches into the soil for each SPT sample. In some cases, the sampler was driven less than 24 inches due to refusal[1] from soil or rock. The number of blows required to drive the split spoon sampler from 6 to 18 inches is the SPT N-value, a commonly used indicator of soil density and consistency.

The test borings were logged by a GZA field observer. Soil samples collected from the split spoons were described in accordance with a modified Burmister soil classification system. The description of each soil sample was based on visual identification. The NYCBC Class of Materials was also provided for each stratum. The descriptions of the soil samples and the SPT N-values at various depths are recorded on the boring logs. The test boring logs are included in Appendix B. Refer to the Log Key in Appendix B for definitions of symbols and terms used in our test boring logs.

Rock coring was performed in three test borings, B-02, B-03, and B-04, using a NX-sized core barrel. Recovered rock cores were described using a modified International Society for Rock Mechanics (ISRM) system. The rock description and the core recovery (REC) and the Rock Quality Designations (RQD) for each core run are recorded on the test boring logs. The REC values and RQD values provide a qualitative understanding of the physical and engineering properties of the rock. Material classes were provided for rock in accordance with the NYCBC.

Upon completion of boring B-01, a 2-inch diameter groundwater observation well was installed to a depth of 40 feet. The remaining four test borings were backfilled with soil cuttings and grout, and the ground surface was patched with cold patch asphalt upon completion.

[1] Refusal is generally defined when it takes 50 blows or more of the 140-pound hammer to advance the split spoon sampler less than 6-inches.

Test Pits

Two Test Pits, TP-1 and TP-2, were excavated by D.K. Drilling of NY from the parking lot. Test Pit TP-1 was excavated to about 12.5 feet using an electric jack hammer, chisels and shovels, and manual labor. This test pit was shored using timber sheeting. Test pit TP-2 was excavated to about 8 feet using a mini-excavator. Groundwater was not encountered in the test pits.

The test pits were logged and photographed by the GZA field observer. Upon completion, the test pits were backfilled with excavated soil, tamped with a hand tamper, and the surface was patched with concrete. The test pit locations and depths were tape-measured from existing site features.

Please refer to Figure 2 for approximate test pit locations and Appendix C for sketches and selected photographs of our test pit observations.

Laboratory Testing

Five selected soil samples were sent to Thielsch Engineering, LLC of Cranston, Rhode Island for grain size distribution testing (ASTM D-422). One sample was tested for Plastic and Liquid Limits (ASTM D 4318). Laboratory test results are included in Appendix D and incorporated in the logs.

SUBSURFACE CONDITIONS

Generalized Soil Stratigraphy

The following is our interpreted summary of the information obtained from our subsurface explorations in order of increasing depth. Refer to the boring logs in Appendix B and the test pit sketches and photographs in Appendix C for additional information. Refer to Figure 2 for the boring and test pit locations.

- SURFACE COVER – Surface cover at the exploration locations generally consisted of 2 to 4-inch-thick asphalt.

- FILL (NYCBC Class 7) – The Fill generally consisted of brown, fine to medium sand, with varying amounts of silt, gravel, and miscellaneous debris including wood, brick, and concrete fragments. The Fill stratum was encountered in all test borings and test pits extending to depths ranging from approximately 4 feet to 12 feet, corresponding elevations range between El.24 and El. 35.3 feet. The Fill had a loose to medium dense relative density as evidenced by uncorrected SPT N-values ranging between 5 blows per foot (bpf) and 30 bpf. The NYCBC Class of Materials for the Fill is Class 7.

- SAND (NYCBC Class 3a/3b/6) – Below the Fill, a stratum of Sand was encountered, consisting of red-brown and brown fine to coarse sand with varying amounts of silt and fine to coarse gravel-sized marble and schist rock fragments. The Sand stratum extended to depths ranging between 23 and 32 feet, corresponding to El. ranging between 4.4 feet and 17.6 feet. The Sand thickness ranged between 17 and 26 feet. Uncorrected SPT N-values ranged between 1 bpf and refusal, with an average of 26 bpf (using a value of 100 bpf for the refusal zones) indicating primarily a medium dense condition. Loose zones were encountered in boring B-02 and B-04 at a depth of 15 to 17 feet. The NYCBC Class of Materials for the Sand stratum is Class 3a, 3b, and 6.

  Five select samples from the Sand stratum were sent to the laboratory for grain size distribution tests. Laboratory tests indicated a sand content ranging from approximately 57 to 88 percent, a fines content ranging from 8 to 37 percent, a gravel content of up to 13 percent, and a water content ranging from 8 to 31 percent. Atterberg limit testing on one sample indicated a liquid limit of 25 and a plastic limit of 17.

- DECOMPOSED ROCK (NYCBC Class 1d/2a/3a) – A Decomposed Rock stratum was encountered beneath the Sand stratum in each test boring. The decomposed rock stratum ranged from 4 to 17 feet thick extending to depths of between 27 to 40.5 feet,

corresponding to elevations ranging between approximately 13.6 feet and -4.0 feet. The stratum generally consisted of fine to coarse sand with varying amounts of silt and gravel, with rock fabric and fragments of decomposed Mica Schist or Marble Bedrock. The Decomposed Rock stratum had a medium dense to very dense relative density as evidenced by uncorrected SPT N-vales ranging from 18 bpf to refusal. The average uncorrected SPT N-value in the stratum was approximately 64 bpf (using a value of 100 bpf for refusal zones), indicating a very dense condition. A rock core was attempted in the Decomposed Rock stratum in B-02 between a depth of 35 and 40 feet bgs (El. 1.3 to -3.7 feet). An 18-inch recovery was extracted from the 60-inch rock core run between 30 and 35 feet, having a measured REC of 30 percent and a RQD of 0 percent. The NYCBC Class of Materials for the Decomposed Rock is Class 1d, 2a, 3a.

- BEDROCK (NYCBC Class 1b/1c) – Medium Hard Bedrock was encountered and cored in three test borings: B-02, B-03, and B-04. The Bedrock was encountered at 40 feet in B-02, corresponding to El. -3.7 feet, at 39 feet in B-03, corresponding to El. -4.0 feet, and at 27 feet in B-04 corresponding to El. 13.6 feet. Although bedrock was not cored in the remaining two test borings, apparent bedrock was encountered at the refusal depth of those borings based on observations of drill rig performance, split spoon bouncing during SPT attempts, bedrock fragments and chips observed during drilling in the drill return water, and visual observations of recovered samples in the split spoon tip. Based on our observations, apparent bedrock was encountered in B-01 and B-05 at depths of 40.5 and 30 feet respectively, corresponding to El. -4.1 and 9.3 feet.

  The Bedrock was described as medium hard, slightly to moderately weathered, fine to coarse grained, gray-brown, Schist, with close to moderately close, horizontal to moderately dipping fractures in B-02 and B-03. The measured RECs were 88 and 98 percent, respectively, and the measured RQDs were 52 and 95 percent, respectively. The Bedrock in B-04 was described as medium hard, fresh, fine to medium grained, whitish gray Marble, with moderate to wide horizontal fractures. The measured REC and RQD in B-04 were both 100 percent. The NYCBC Class of Materials for the Bedrock is Class 1b/1c.

Groundwater

Groundwater was measured at a depth of 19.1 feet in the observation well installed at test boring B-01 after 28 days, corresponding to elevation approximate El. 17.3 feet. It should be noted that changes in groundwater depths will occur due to variations in seasonal influences, precipitation amounts, local pumping, utility leakage, and other factors different from those existing at the time the observations were made.

Test Pit Observations

Test Pit TP-1 was excavated in the southwest portion of the site from the asphalt paved parking lot, adjacent to the north wall of the adjacent two-story building at the physical address 3494 Park Avenue. Surface cover consisted of approximately 2 inches of asphalt underlain by about 5 inches of gravel base coarse. The gravel base coarse was underlain by fill material described as brown, fine to coarse sand and gravel, some bricks, concrete fragments, and miscellaneous debris, and trace to little silt. The test pit was excavated to a depth of approximately 12.5 feet below the top of asphalt. The bottom of the 3494 Park Avenue building foundation wall extended to a depth of approximately 12 feet, corresponding to approximate elevation El. 23.5 feet. The adjacent foundation wall was mainly brick, except for the bottom 2 feet which was concrete. A brick wall was also encountered in the test pit, approximately 20 inches north of the 3494 Park Avenue building foundation wall. The brick wall began about 2 feet below the ground surface and extended to about 12 feet below the ground surface.

Test Pit TP-2 was excavated in the northeast portion of the site to a depth of approximately 7.5 feet, adjacent to the concrete and masonry block retaining wall. Surface cover consisted of approximately 2 inches of asphalt underlain by fill material described as brown, fine to coarse, sand and gravel, some brick fragments, trace to little silt, extending to a depth of approximately 5.3 feet. An approximate 3-inch thick unreinforced concrete slab was encountered at this depth. The concrete slab was underlain by the Sand stratum described as light brown, fine to coarse sand, some gravel, trace silt. The Sand extended to the bottom of the test pit excavation. The bottom of the retaining wall was observed at about 7.3 feet, corresponding to El. 33.2 feet. An approximate 4-feet by 4-feet (in plan) by 5 feet deep, brick structure was encountered within Test Pit TP-2 at a depth of less than 6 feet. No evidence of

a continuous footing for the retaining wall footing was observed. The top of the retaining wall was approximately 7.5 feet above the ground surface. The exterior face of the adjacent three story building was approximately 22 inches from the back of the retaining wall.

GEOTECHNICAL RECOMMENDATIONS

Key Geotechnical Issues

Based on our understanding of subsurface conditions and the proposed development, we have identified the following key geotechnical issues for design and construction of the proposed development:

- The design team has indicated a preference to reduce the volume of soil excavated from the site due to costs associated with reported subsurface environmental concerns.
- A structural mat foundation can be used to support the proposed building on the Sand stratum, however, this will require excavation beneath the entire building footprint to a depth of up to 12 feet. Spread foundations are not recommended due to the observed variability in density within the Sand stratum, which would cause excessive differential settlement between spread footings.
- Drilled caisson piles socketed into bedrock are recommended to support the proposed building.
- The retaining wall at the site perimeter should be removed, and where necessary, replaced with a new retaining wall.

Foundation Recommendations

GZA recommends support of the proposed building on either a structural mat foundation or drilled, rock socketed, caisson piles. Foundations must be designed in accordance with the NYCBC utilizing the design soil parameters recommended below and provided that the subgrade preparation and/or pile installation are in accordance with our recommendations in this report. We recommend a design groundwater elevation of 20.5 feet.

Soil/Bedrock Parameters

The following properties of subsurface materials are recommended for design purposes:

Stratum (NYCBC Material Class)	Total Unit Weight (pcf)*	Friction Angle (deg)	Allowable Bearing Pressure (tsf)
Fill (7)	105	30	0
Silt/Silty Sand (3a/3b/6)	110	32	2
Decomposed Bedrock (1d/2a/3a)	140	38	6
Bedrock (1b/1c)	170	-	20
New Structural Fill	125	33	2

pcf = pounds per cubic foot
tsf = tons per square foot

Structural Mat Foundation

The proposed structure can be supported on a structural mat foundation designed and constructed in accordance with the NYCBC. The structural mat should bear on the Sand stratum or on controlled, compacted, fill placed over the Sand stratum. The structural mat can be designed using the allowable bearing pressures provided in the table above. Fill and remnant foundations would need to be removed. Support of excavation will be required along all four sides of the Site and underpinning of the building to the east may be required. We do not anticipate that underpinning of the adjacent southern building will be required.

New foundations should be designed and constructed at an elevation such that they do not impose additional loads on foundations or walls of buildings or subsurface utilities. The bearing zone of new footings, described as the volume within lines extending from the footing edge and down and outward on a 1H:1V plane, should not include any foundations, walls, or utilities.

The foundation must bear a minimum of 4 feet below the lowest adjacent exposed grade for frost protection.

We recommend that lateral loads be resisted by sliding friction between the foundation and Sand stratum or structural fill. We recommend a friction factor of 0.4 between concrete and Sand or structural fill. The passive pressure of the adjacent soil should be neglected for sliding analyses.

Caisson Piles

In order to reduce the volume of soil to be removed to provide foundation support for the proposed building, we recommend drilled caisson piles. Drilled caissons would also eliminate lateral structural surcharge pressures on the cellar walls of neighboring structures. Driven piles are not recommended due to anticipated vibrations associated with installation.

Drilled caisson piles are constructed by rotating a steel casing through the soil and decomposed rock and several inches into bedrock (NYCBC Class 1b/1c). The soil and decomposed rock is removed from within the casing and a rock socket is advanced beyond the casing, typically using an air hammer. The socket is cleaned of pulverized rock, soil and any accumulated debris using air and/or water. If possible, water is removed from within the socket and casing. Steel reinforcement is placed centrally into the casing and socket, extending upward to connect with the pile cap. If no water is present in the socket, cementitious grout or concrete may be poured by free-fall through a trunk. If water is present, cementitious grout or concrete is placed using a tremie method. No load testing will be required for rock-socketed caissons.

We recommend an allowable axial capacity of 120 tons for a 12.75-inch outside diameter caisson with 0.5-inch wall thickness, extra strong steel casing and with a seven-foot-long, 10-inch diameter rock socket filled with 5,000-psi cement grout. Each caisson should be reinforced with a single centralized No. 18 Grade 75 threaded steel bar throughout its length. To construct the caisson piles with a 7-foot rock socket, we anticipate caissons piles will extend to depths ranging between 34 and 47 feet bgs.

Uplift loads transmitted to the foundation would be resisted by the caissons bearing in the rock and the weight of rock and soil mobilized. An allowable uplift capacity of 75 tons per caisson is anticipated.

Lateral loads on caissons will be resisted by the interaction of the caissons and the surrounding soil and rock. LPile V2012 computer software was used to estimate lateral capacities for a single pile in the free head condition and fixed head condition for a given lateral displacement. The allowable lateral load capacity of the recommended caisson was estimated to be 6 tons for free pile head condition and 16 tons for a fixed head condition. For the free head, the estimated lateral capacity is one-half the load that produced a gross lateral movement of 1 inch at the top of the caisson. For the fixed head condition, the estimated lateral capacity is the load that provided a gross lateral movement of 3/8 inch at the top of the pile. Passive resistance on caisson caps are not included in this estimate.

A structural analysis would need to be performed to evaluate bending stresses and any possible additional reinforcement that may be required to resist lateral loads. For fixed head conditions, the connection between the caisson head and caisson cap should be designed to resist a bending movement of 1,800 kip-inch.

Lateral load capacity greater than one ton requires a lateral load test per the NYCBC. The load test must be performed in accordance with ASTM D3966.

It should be noted that caissons in groups will behave differently under lateral loading than single caissons as their zones of stress influence will "shadow" each other when grouped. Recommendations for caisson groups can be provided when caisson layout has been developed.

Caisson caps should extend a minimum of 4 feet below the lowest adjacent permanent exposed grade and grade beams should extend a minimum of 1.5 feet below the lowest adjacent permanent exposed grade.

The caisson and foundation contractor should be aware that obstructions are found within the overburden soils including concrete/stone in fill materials, till, boulders, or cobbles over the bedrock. Internal flush with water is required for the drilling of the caissons through soil.

Foundation Settlement

For foundations designed and constructed in accordance with the recommendations presented in this report, the estimated settlement is approximately ½ in for caisson piles and 1 inch for a structural mat foundation. Most of the settlement is expected to occur during the initial loading of the foundation during construction. Differential settlement is estimated to be approximately half the estimated settlement provided above.

Slab Recommendations

If deep foundations are implemented, slabs on-grade can be used for this project if Fill or Sand strata are removed to at least two feet below the bottom of the proposed slab and replaced with Structural Fill per the recommendations provided later in this report.

We recommend an initial soil modulus of subgrade reaction of 120 pounds per cubic inch (pci) for slabs bearing on Structural Fill over Fill or Sand. The modulus of subgrade reaction values provided herein are for a loading applied over a 1-foot by 1-foot square area and must be adjusted for the actual size of the slab.

A base course consisting of at least 12-inches of compacted Sand-Gravel Fill should be provided below the slab on grade. Asphalt, utilities, foundations, must be removed from slab areas. Subgrade preparation recommendations are provided in the construction section of this report.

Seismic Design Parameters

Based on the subsurface conditions encountered in the borings and in accordance with the NYCBC, we recommend Seismic Site Class D for calculation of seismic loading and the corresponding response spectrum as described in Section 1613.5.2 of the NYCBC.

We plotted SPT N-values normalized to an energy efficiency of 60 percent versus depth to assess whether evaluation of liquefaction was required, pursuant to Section 1813 of the NYCBC. The data indicated that a liquefaction evaluation was required. Thus, we evaluated liquefaction potential of the soils at the site using the Idriss and Boulanger (2008) methodology. Based on this evaluation, the soil at the Site between the depth to groundwater and top of bedrock is not susceptible to liquefaction.

Lateral Pressures

Foundation walls or retaining walls with unbalanced loading should be designed to resist lateral earth pressures due to soil weight, neighboring foundation loads, and other surcharges. To calculate earth pressures above groundwater level, an equivalent fluid pressure of 60 pcf should be used for the design of all permanent (rigid, fixed) walls and 40 pcf for temporary (flexible, cantilever) walls where exposed to soil. This assumes that behind the walls will be backfilled with free draining material and drains will be installed so that no hydrostatic pressures will be allowed to accumulate behind the walls. An additional uniform horizontal pressure should be used where surcharges are anticipated due to, for example, pedestrian or vehicular traffic and foundations loads from nearby buildings. Such additional uniform horizontal pressure should be equal to one-half of the anticipated vertical surcharge load and as defined in the NYCBC. Walls should also be designed to resist seismic loads as required by the NYCBC.

Permanent Groundwater Control

We recommend waterproofing the cellar portion of the proposed building to protect against groundwater infiltration from utility breaks, extreme weather events, and other unforeseen circumstances.

Retaining Wall

Removal and reconstruction of the retaining wall is recommended by GZA due to questionable stability of the wall and the planned lowering of the ground surface elevation in front of the wall, resulting in increased height of the wall and decrease in stability. Removing the wall will require installation of support of excavation on the neighboring property and possibly underpinning of the adjacent building. Alternatively, the retaining wall may be left in place with a new retaining wall constructed in front of it.

The proposed retaining wall should be constructed as a cantilever gravity-type wall or using a pre-cast reinforced concrete modular wall system. If a pre-manufactured retaining wall is used, the design of the wall is typically performed by the manufacturer. Typically, manufacturers only guarantee the "internal stability" of their wall systems and do not consider the "global" system to which it is applied. Therefore, we request that we be retained to further review the design of any pre-manufactured wall, should they be considered.

We recommend that the foundation of the new retaining wall should bear on the Sand stratum using an allowable bearing pressure of 2 tsf. The foundation should have a minimum width of 3 feet. A minimum footing subgrade depth of 4 feet below the nearest exposed ground surface is required for frost protection. The recommended coefficient of friction for sliding resistance between the retaining wall footings and soil is 0.4. The retaining wall should be designed so that the resultant bearing pressure is within the middle third of the footing.

The retaining wall should be designed to resist lateral earth pressures and surcharge pressures and in accordance with the applicable provisions of the New York City Building Code. We recommend using the lateral pressures provided above. These recommendations are for a horizontal backfill surface and assume that the wall is backfilled with free-draining soils (meeting the gradation requirements of the attached Table 1) within at least 3 feet of the wall and is drained in a manner that will not allow water pressure to develop behind the wall. If the calculated horizontal earth pressure is less than 250 psf, it should be increased to 250 psf for retaining wall design, to account for temporary stresses during construction and backfill compaction.

We recommend that the safety factors against sliding and overturning or the retaining wall shall be at least 1.5 and 2.0, respectively.

CONSTRUCTION RECOMMENDATIONS

Excavation and Subgrade Preparation

Prior to placement of Structural Fill or foundations, surface material (existing pavement, fill, utilities, and remnant foundations) should be removed and replaced with controlled, compacted, granular fill as described below. For the structural mat foundation, these should be completely removed. For deep foundations support and slab on grade, surface material should be removed to a minimum depth of 2 feet below final slab elevation and the excavated volume backfilled with compacted granular fill.

Where practical, final foundation excavation should be performed using a smooth-edged bucket to limit subgrade disturbance. Existing soil subgrades and areas disturbed by the excavator bucket should be removed and replaced with compacted Granular Fill, Sand-Gravel Fill, or Crushed Stone wrapped in filter fabric.

Fill subgrades or subgrades for foundation or slab support should be proof-rolled to a stable and firm consistency, with a minimum of six passes of a double drum roller with a minimum static drum weight of 10,000 pounds capable of at least 15,000 pounds of dynamic force, to the satisfaction of the onsite geotechnical engineer. Areas of unstable ground (weak or soft spots) observed during proof-rolling should be scarified, dried and recompacted, or over-excavated until the exposed ground is stable and firm. Over-excavated soils should be replaced with new compacted granular fill, nominally compacted crushed stone wrapped in filter fabric, or lean concrete (concrete with f'c < 2,000 psi). Compaction methods should be performed in accordance with Table 2.

Subgrades should be kept free of standing water, debris, and ice. Subgrades should be protected from frost and fill should be not be placed over frozen soil. If frozen soils are present at design subgrade levels, they should be removed and replaced with new compacted granular fill.

Structural mat subgrades should be protected in their as-approved condition until concrete is poured. The contractor may choose to protect the subgrade from disturbance with either 6-inches of Sand-gravel; 4-inches of ¾-inch Crushed Stone, or 2-inches of lean concrete.

As required by the NYCBC, a qualified geotechnical engineer should evaluate the subgrade for suitability for foundation support and observe proof-compaction and subsequent fill placement and compaction.

Excavated soils must be handled and disposed in accordance with the requirements of the environmental engineer and local, city, and state regulations. GZA can provide environmental services, if needed.

Temporary Excavation Support

Temporary excavation support will be required along portions of the site perimeter to facilitate excavation and removal of the retaining wall at the Site. Drilled soldier piles and lagging would be an appropriate method to provide temporary support during excavation. Internal bracing may be required to support the soldier piles.

We would anticipate excavation support will be installed in the sidewalk along the northern and western boundaries. Along the eastern boundaries, access to neighboring properties will be required to construct excavation support and/or to install underpinning.

The design of the temporary shoring and/or underpinning must be performed by a Professional Engineer. We recommend that you retain GZA to provide these design services for temporary excavation support design. We would be happy to provide you with a proposal upon your request.

The Owner and Contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information solely as a service to our Client. Under no circumstances should the information provided herein be interpreted to mean that GZA is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and shall not be inferred.

The Contractor should be aware that slope height, slope inclination, or excavation depth should in no case exceed those specified in local, state, or federal safety regulations, e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties. Per OSHA requirements, if any excavation is extended to a depth of more than 20 feet, it will be necessary to have the side slopes and shoring designed by a Professional Engineer.

As a safety measure, it is recommended that all vehicles and soil piles be kept a minimum lateral distance from the crest of slopes equal to no less than the slope height. Exposed slope faces should also be protected against the elements.

Fill Material and Compaction

Compacted structural fill placed below the structural mat or slab on-grade should consist of Granular or Sand-Gravel fill meeting the gradations outlined in Table 1. The fill should be compacted to at least 95 percent of its maximum dry density, as measured by the Modified Proctor Test (ASTM D-1557). The recommended maximum loose lift thickness of fill and minimum number of passes of compaction equipment are given in Table 2. We recommend performing at least one gradation and one moisture-density test per each 100 cubic yards of fill placed.

Temporary Groundwater Control

Excavations are not expected to extend below the groundwater level. Therefore, sustained temporary construction dewatering is not anticipated. However, the Contractor should be prepared to evacuate accumulated rainwater and runoff from local excavations during construction.

Documentation and Monitoring of Adjacent Structures

The NYCBC requires the documentation of the conditions of adjacent structures prior to excavation and foundation construction, and monitoring of structures during excavation and foundation construction. The pre-construction conditions of adjacent buildings should be documented prior to the start of any excavation work at the project site. This includes photographing and measuring existing conditions and defects to provide a quantifiable baseline record prior to construction. Crack gages, vibration monitors and/or survey points should be installed at applicable locations, and baseline values recorded. Crack readings, vibration measurements, and deflections should be measured throughout excavation and construction as noted in the monitoring plan to be developed for the site. This work must be performed on behalf of the owner, not the contractor.

SPECIAL INSPECTION REQUIREMENTS

The following Special Inspections will be required for the work discussed herein, as noted in the TR1 form:

- Excavations- Sheeting, Shoring, and Bracing (1704.20.2)
- Deep Foundation Elements (1704.8)
- Subgrade Inspection (BC 1704.7.1)
- Subsurface Conditions – Fill Placement & In-Place Density (1704.7.2, 1704.7.3)

The required "Subsurface Investigation (Borings)" special inspection was completed as a part of our subsurface exploration program. Special Inspections must be performed by a Special Inspection Agency retained by the owner. We recommend that you retain GZA to perform these services and to review plans prior to bidding. Due to our project familiarity, we believe that our services will reduce unexpected circumstances throughout the bidding and construction process and should expedite resolution if unanticipated conditions are encountered.

RECOMMENDED ADDITIONAL SERVICES

Because of our familiarity with the proposed construction and the subsurface conditions at the project site, we recommend that we should be retained to perform the following additional services:

- Excavation support and/or underpinning design
- Preparation of caisson specifications
- Pre-construction condition documentation
- Monitoring of adjacent structures
- Special inspection of foundation construction and excavation support

We appreciate the opportunity to work with you on this project. Should you have any questions, please contact us.

Very truly yours,
GZA GEOENVIRONMENTAL OF NEW YORK

Andrew Rizk, P.E.
Senior Project Manager

Patrick D. Mahon, P.E.
Vice President

Ernest R. Hanna, P.E.
Consultant Reviewer

Attachments:
Table 1 – Recommended Use and Gradation Criteria for Fill Materials
Table 2 –Compaction Methods
Figure 1 – Site Location Plan
Figure 2 – Exploration Location Plan
Appendix A – Geotechnical Limitations
Appendix B – Boring Logs with Log Key
Appendix C – Test Pit Sketches and Photographs
Appendix D – Laboratory Testing Results

TABLES

Table 1: Recommended Use and Gradation Criteria For Fill Materials

USE OF FILL MATERIAL

Granular Fill:	Below footings and slab base course, and 3 feet laterally behind walls provided that amount passing Sieve No. 200 is less than 8 percent.
Sand-Gravel:	Slab base course and 3 feet laterally behind walls
Crushed Stone:	Drain line backfill and foundation protective layer. Crushed stone should be wrapped in non-woven filter fabric.

GRADATION REQUIREMENTS

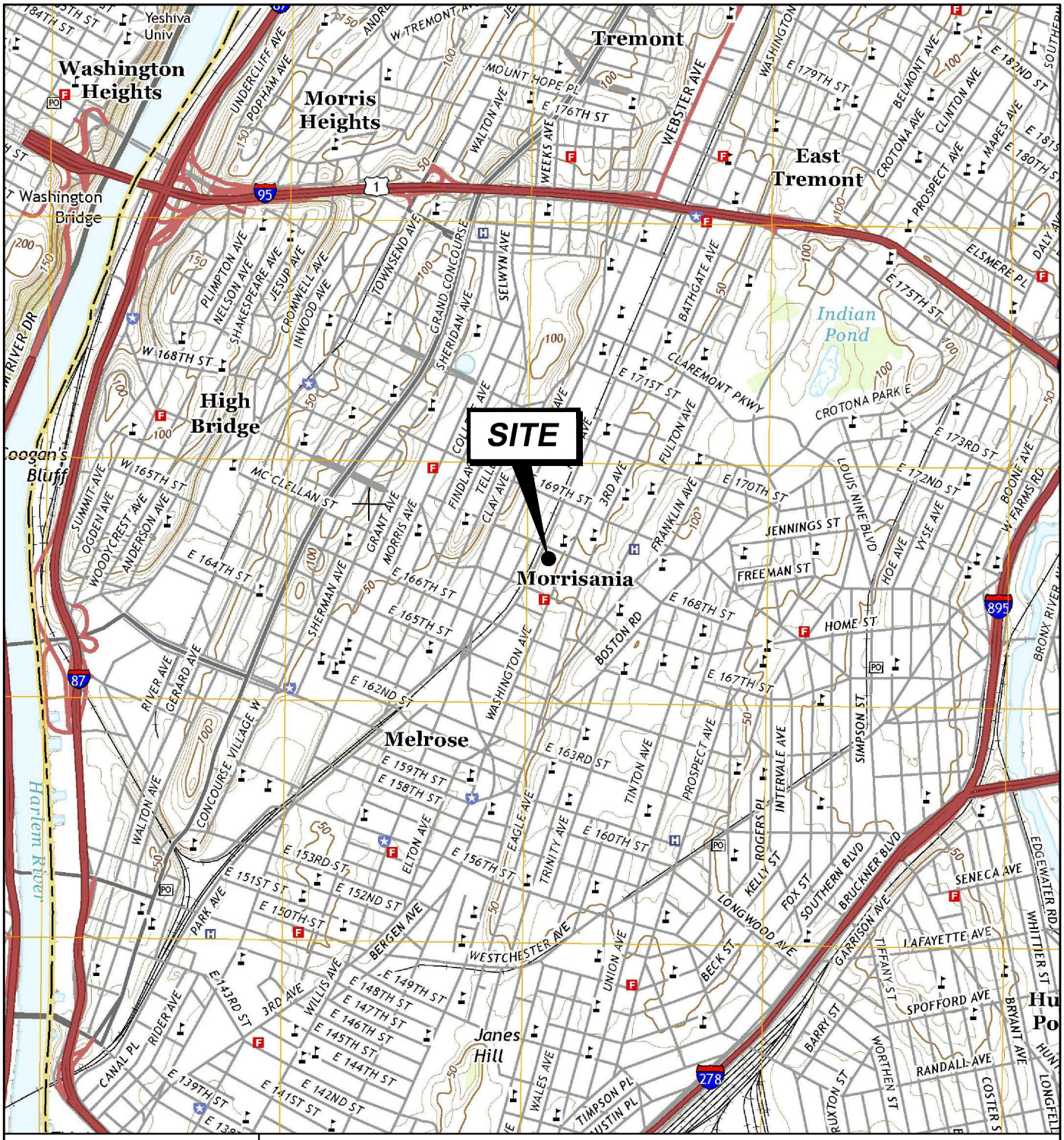
Sieve Size	Percent Finer by Weight
Granular Fill — Shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic matter. Granular Fill shall conform to the following gradation requirements:	
2/3 of the loose lift thickness	100
No. 10	30 – 95
No. 40	10 – 70
No. 200	*0 – 15 *0 – 8 where used behind walls
Sand-Gravel — Shall consist of durable sand and gravel and shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic matter. Sand-Gravel shall conform to the following gradation requirements:	
3 inch	100
½ inch	50 – 85
No. 4	40 – 75
No. 40	10 – 35
No. 200	0 – 8
Crushed Stone — Shall consist of durable crushed rock or durable crushed gravel stone and shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic matter or material. Crushed Stone shall conform to the following gradation requirements:	
1 inch	100
¾ inch	90 – 100
½ inch	10 – 50
3/8 inch	0 – 20
No. 4	0 – 5
No. 200	0 – 1

Table 2: Compaction Methods

Compaction Method	Max. Stone Size*	Maximum Loose Lift Thickness		Minimum Number of Passes	
		Below Structures and Pavement	Less Critical Area	Below Structures and Pavement	Less Critical Area
GRANULAR FILL, SAND-GRAVEL FILL, CRUSHED STONE					
Hand-operated vibratory plate or light roller in confined areas	4″	6″	8″	4	4
Hand-operated vibratory drum rollers weighing at least 1,000# in confined areas	6″	10″	12″	4	4
Light vibratory drum roller Min. weight at drum 3000# Min dynamic force 10,000#	8″	12″	18″	4	4
Medium vibratory drum roller Min. weight at drum 10,000# Min dynamic force 20,000#	8″	18″	24″	6	6

* Indicates not to exceed more than 2/3 the lift thickness

FIGURES



NEW YORK

QUADRANGLE LOCATION

SOURCE:
USGS TOPOGRAPHIC MAP: CENTRAL PARK, NY-NJ (2016).
CONTOUR INTERVAL 10 FT., NAVD-1988, ORIGINAL
SCALE 1:24,000 (1" = 2,000 FT.).

N
W E
S

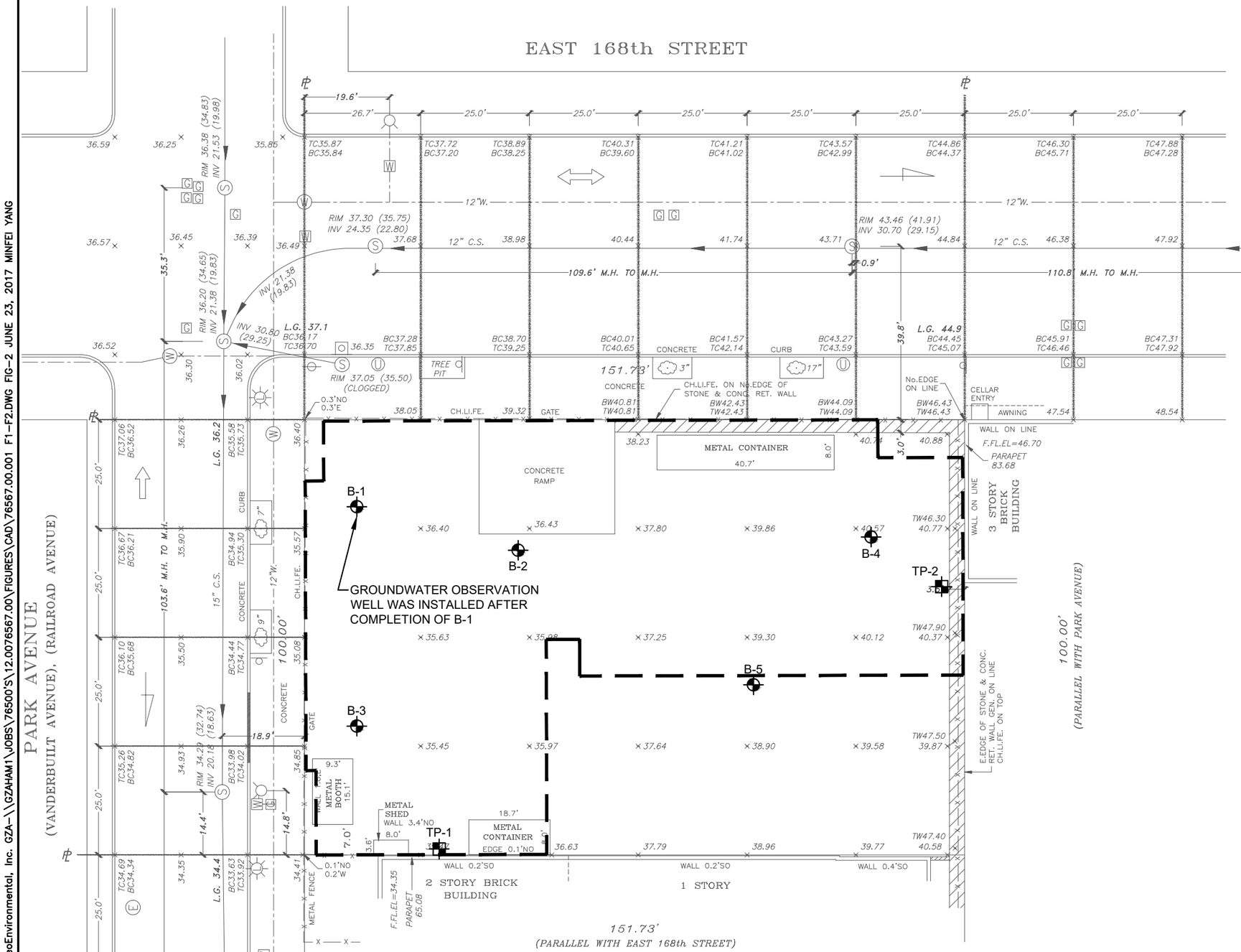
3500 PARK AVENUE
BRONX, NEW YORK

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
THE BRIDGE, INC.

SITE LOCATION PLAN

PROJ MGR: AR	REVIEWED BY: JP	CHECKED BY: PDM	FIGURE 1
DESIGNED BY: JP	DRAWN BY: MT	SCALE: 1" = 2,000'	
DATE: JUNE 2017	PROJECT NO. 12.0076567.00	REVISION NO.	SHEET NO.



LEGEND:

BORING LOCATION PERFORMED BY CRAIG GEOTECHNICAL DRILLING CO. OF MAYS LANDING, NJ BETWEEN MAY 22 AND MAY 24, 2017

TEST PIT LOCATION PERFORMED BY DK DRILLING OF NY, INC. OF BAYSIDE, NY BETWEEN JUNE 5 AND JUNE 6, 2017

APPROXIMATE OUTLINE OF PROPOSED STRUCTURE

NOTES:

1. THE BASE MAP WAS DEVELOPED FROM A PLAN PROVIDED BY LEONARD J. STRANDBERG AND ASSOCIATES, ENTITLED "ARCHITECTURAL SURVEY," DATED 2/28/17, ORIGINAL SCALE 1" = 20'.
2. BORING LOCATIONS SHOWN ARE BASED ON TAPE MEASUREMENTS FROM TOPOGRAPHIC FEATURES. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

N E S W

0 12.5' 25' 50'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

3500 PARK AVENUE
BRONX, NEW YORK

EXPLORATION LOCATION PLAN

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		THE BRIDGE, INC.	
PROJ MGR: AR	REVIEWED BY: JP	CHECKED BY: PDM	FIGURE 2
DESIGNED BY: JP	DRAWN BY: MT	SCALE: 1" = 25'	
DATE: JUNE 2017	PROJECT NO. 12.0076567.00	REVISION NO.	SHEET NO.

APPENDIX A

GEOTECHNICAL LIMITATIONS

GEOTECHNICAL LIMITATIONS

Use of Report

1. GZA prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

Standard of Care

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions .

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

Subsurface Conditions

4. The generalized subsurface conditions provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs.

5. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

6. Water level readings have been made in test holes (as described in the Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.

7. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

8. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

Compliance with Codes and Regulations

9. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Additional Services

10. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

APPENDIX B

BORING LOGS WITH LOG KEY

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-01
SHEET: 1 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 36.4
Final Boring Depth (ft.): 40.5
Date Start - Finish: 5/23/2017 - 5/23/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
5/24/17	12:00	18.5	22 hrs
6/20/17		19.1	28 days

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Depth (ft.)	Stratum Description	Elev. (ft.)
		S-1	0.0-2	24	6	6 4 8 8	12	S-1: Medium dense, brown, fine to medium SAND, trace Silt, little brick and concrete fragments.			0.3	ASPHALT	36.1
		S-2	2.0-4	24	8	4 7 7 4	14	S-2: Medium dense, brown, fine to medium SAND, little Silt, little Gravel, trace brick and concrete fragments.				FILL (7)	
5		S-3	4.0-6	24	21	3 2 3 5	5	S-3: Loose, brown, fine to medium SAND, little Silt, little brick and concrete fragments, trace Silt.			6		30.4
		S-4	6.0-8	24	12	2 1 2 3	3	S-4: Very loose, brown, fine to medium SAND and SILT.					
		S-5	8.0-10	24	8	WH 1 2 3	3	S-5: Very loose, brown, fine to medium SAND and SILT & CLAY, trace Gravel.					
10		S-6	10.0-12	24	12	9 15 16 36	31	S-6: Dense, red-brown, fine to coarse SAND, little Gravel, trace Silt.	1				
15		S-7	15.0-17	24	10	13 14 7 3	21	S-7: Medium dense, brown, fine to medium SAND, some Gravel, trace Silt.	2			SAND (3a,3b,6)	
20		S-8	20.0-21.4	17	6	6 12 50/5"	R	S-8: Very dense, brown, fine to medium SAND, some Gravel, little Silt.	3				
25		S-9	25.0-27	24	20	40 16 13 20	29	S-9: Medium dense, brown, fine to medium SAND, little Silt.					
30													

REMARKS

1 - Difficult drilling.
2 - Advance 4" casing to 15 feet bgs.
3 - Difficult drilling to 19 feet bgs.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-01

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-01
SHEET: 2 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 36.4
Final Boring Depth (ft.): 40.5
Date Start - Finish: 5/23/2017 - 5/23/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
5/24/17	12:00	18.5	22 hrs
6/20/17		19.1	28 days

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-10	30.0-31.25	15	15	57 63 50/3"	R	S-10: Very dense, brown, fine SAND, some Silt, trace Gravel.				SAND (3a,3b,6)	
											32		4.4
35		S-11	35.0-35.1	1	1	100/1"	R	S-11: Very dense, brown, fine to coarse SAND, some Silt, trace Gravel.				DECOMPOSED ROCK (2a)	
40		S-12	40.0-40.3	4	2	100/4"	R	S-12: Very dense, brown, fine to coarse SAND, some Silt, trace Gravel.	4		40.5		-4.1
								End of exploration at 40.5 feet.	5				
45													
50													
55													
60													

REMARKS

4 - SS and drill refusal.
5 - Flush mount observation well installed (10' screen, 30' riser, 2" diameter).

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-01

GZA TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/28/17 10:05 - J:\GINT PROJECT DATABASES\NON- MANHATTAN\12 - NNJ\12.0076567.00.GPJ

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-02
SHEET: 1 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 36.3
Final Boring Depth (ft.): 45
Date Start - Finish: 5/22/2017 - 5/22/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-1	0.0-2	24	12	10 8 9 6	17	S-1: Medium dense, dark brown to gray, fine to coarse SAND, little Silt, little brick fragments.			0.3	ASPHALT	36.0
		S-2	2.0-4	24	20	7 8 6 56	14	S-2: Medium dense, dark brown, fine to medium SAND, little Silt, trace Gravel, trace glass, trace brick and concrete fragments.				FILL (7)	
5		S-3	4.0-6	24	10	15 14 16 22	30	S-3: Medium dense, brown, fine to medium SAND, little Silt, trace glass, trace Gravel, trace brick and concrete fragments.			6		30.3
		S-4	6.0-8	24	10	4 5 4 4	9	S-4: Loose, brown, fine to coarse SAND, some Silt, little Gravel.					
		S-5	8.0-10	24	8	4 8 9 9	17	S-5: Medium dense, red-brown, fine to medium SAND, little Gravel, trace Silt.					
10		S-6	10.0-12	24	12	7 9 11 12	20	S-6: Medium dense, red-brown, fine to medium SAND, little Gravel, trace Silt.					
15		S-7	15.0-17	24	6	2 2 2 2	4	S-7: Loose, brown, fine to coarse SAND and SILT.				SAND (3a,3b,6)	
20		S-8	20.0-22	24	18	13 35 59 64	94	S-8: Very dense, brown, fine to coarse SAND and SILT, some Gravel.	1		23		13.3
25		S-9	25.0-27	24	12	16 20 19 22	39	S-9: Dense, tan, medium to coarse SAND, little Silt, little Gravel.				DECOMPOSED ROCK (2a,3a)	
30													

REMARKS

1 - Difficult drilling

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-02

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-02
SHEET: 2 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 36.3
Final Boring Depth (ft.): 45
Date Start - Finish: 5/22/2017 - 5/22/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-10	30.0-32	24	18	9 12 19 23	31	S-10: Dense, light brown, Clayey SILT and fine to coarse SAND, some Gravel.	2			DECOMPOSED ROCK (2a,3a)	
35	0:46 1:07 0:46 1:33 2:57	C-1	35.0-40			REC=30% RQD=0%		C-1: Soft, severely weathered, medium to coarse grained, gray-brown SCHIST, extremely close, horizontal to low angle fractures.			35		1.3
												WEATHERED ROCK (1d)	
40	0:47 0:51 0:58 0:50 0:57	C-2	40.0-45			REC=88% RQD=52%		C-2: Medium hard, moderately weathered, medium to coarse grained, gray-brown SCHIST, close, horizontal fractures.	3		40		-3.7
45												ROCK (1c)	
											45		-8.7
								End of exploration at 45 feet.					
50													
55													
60													

REMARKS

2 - Advanced 4" casing to 30 feet bgs.
3 - Backfilled borehole with soil cuttings and grout, patched asphalt surface.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-02

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-03
SHEET: 1 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 35
Final Boring Depth (ft.): 44
Date Start - Finish: 5/23/2017 - 5/23/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Depth (ft.)	Stratum Description	Elev. (ft.)
		S-1	0.0-2	24	15	16 9 11 15	20	S-1: Medium dense, brown to gray, fine to coarse SAND, little Silt, little brick fragments.			0.3	ASPHALT	34.7
		S-2	2.0-4	24	13	4 4 3 4	7	S-2: Loose, dark-brown, fine to medium SAND and Clayey SILT, trace Gravel, trace brick and concrete fragments.				FILL (7)	
5		S-3	4.0-6	24	10	6 4 4 2	8	S-3: Loose, brown, fine to medium SAND, little Silt, little Gravel.			6		29.0
		S-4	6.0-8	24	10	1 1 1 1	2	S-4: Very loose, brown SAND and SILT.					
		S-5	8.0-10	24	18	4 5 6 9	11	S-5: Medium dense, red-brown, fine to medium SAND, trace Silt, trace Gravel.					
10		S-6	10.0-12	24	20	9 17 19 17	36	S-6: Dense, red-brown, fine to medium SAND, trace Gravel, trace Silt.					
15		S-7	15.0-17	24	13	3 6 9 23	15	S-7: Medium dense, fine to coarse SAND, some Silt, trace Gravel.	1			SAND (3a,3b,6)	
20		S-8	20.0-22	24	21	16 34 30 25	64	S-8: Very dense, brown, fine to medium SAND, little Silt, trace Gravel.					
25		S-9	25.0-27	24		17 12 22 20	34	S-9: Dense, brown, fine to medium SAND, some Silt, trace Gravel.					
30											28		7.0
												DECOMPOSED ROCK (3a,3b)	

REMARKS

1 - Advanced 4" casing to 15 feet bgs

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-03

GZA TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/28/17 10:05 - J:\GINT PROJECT DATABASES\NON- MANHATTAN\12 - NNJ\12.0076567.00.GPJ

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-03
SHEET: 2 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 35
Final Boring Depth (ft.): 44
Date Start - Finish: 5/23/2017 - 5/23/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-10	30.0-32	24	20	4 15 17 98	32	S-10: Dense, gray-brown, fine to medium SAND and SILT, little Gravel.					
35		S-11	35.0-37	24	22	5 6 11 13	17	S-11: Medium dense, gray-brown, fine to medium SAND, some Silt (trace mica).				DECOMPOSED ROCK (3a,3b)	
											39		-4.0
40	3:18 2:19 2:09 1:54 2:28	C-1	39.0-44			REC=96% RQD=95%		C-1: Moderately hard, slightly weathered, fine to medium grained, gray-brown SCHIST, close to moderate horizontal to moderately dipping fractures.	2			ROCK (1b)	
											44		-9.0
45								End of exploration at 44 feet.	3				
50													
55													
60													

REMARKS

2 - Drill refusal.
3 - Backfill borehole with soil cuttings and grout. Patched surface asphalt.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-03

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-04
SHEET: 1 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 40.6
Final Boring Depth (ft.): 32
Date Start - Finish: 5/24/2017 - 5/24/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
No	Observ.	Made	

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-1	0.0-2	24	6	3 4 6 10	10	S-1: Medium dense, brown, fine to coarse SAND, little Silt, some brick fragments, little concrete fragments.			0.2	ASPHALT	40.4
		S-2	2.0-4	24	12	13 7 7 7	14	S-2: Medium dense, dark gray to brown, fine to medium SAND, little Silt, little brick fragments.				FILL (7)	
5		S-3	4.0-6	24	10	4 4 3 6	7	S-3: Loose, black to brown, fine to medium SAND, some Silt, little wood, trace brick fragments.	1		6		34.6
		S-4	6.0-8	24	18	5 6 6 6	12	S-4: Medium dense, gray to brown, fine to medium SAND, some Silt, trace Gravel.					
		S-5	8.0-10	24	15	7 8 8 7	16	S-5: Medium dense, brown, fine to medium SAND, some Silt, trace Gravel.					
10		S-6	10.0-12	24	22	6 6 8 7	14	S-6: Medium dense, brown, fine SAND, some Silt.					
15		S-7	15.0-17	24	10	WH 1 WH 1	1	S-7: Very loose, brown, fine to medium SAND and SILT, trace Gravel.	2			SAND (3b,6)	
20		S-8	20.0-22	24	18	5 5 12 15	17	S-8: Medium dense, light brown, fine to medium SAND and SILT.	3		23		17.6
25		S-9	25.0-25.5	6	4	100/6"	R	S-9: Very dense, tan GRAVEL, trace Sand.				DECOMPOSED ROCK (2a)	
	1:03	C-1	27.0-32			REC=100%		C-1: Medium hard, fresh, fine to medium grained, whitish gray MARBLE, moderate to wide, horizontal fractures.	4		27		13.6
30	1:00 1:00					RQD=100%						ROCK (1b)	

REMARKS

1 - Petroleum-like odor.
2 - Difficult drilling from 17 to 18 feet bgs.
3 - Advanced 4" casing to 20 feet bgs.
4 - Drill refusal at 27 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-04

GZA TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/28/17 10:05 - J:\GINT PROJECT DATABASES\NON- MANHATTAN\12 - NNJ\12.0076567.00.GPJ

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-04
SHEET: 2 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 40.6
Final Boring Depth (ft.): 32
Date Start - Finish: 5/24/2017 - 5/24/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
No	Observ.	Made	

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
	1:27 1:14										32	ROCK (1b)	8.6
								End of exploration at 32 feet.					
35													
40													
45													
50													
55													
60													

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-04

GZA TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/28/17 10:05 - J:\GINT PROJECT DATABASES\NON- MANHATTAN\12 - NNJ\12.0076567.00.GPJ

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-05
SHEET: 1 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 39.3
Final Boring Depth (ft.): 30
Date Start - Finish: 5/24/2017 - 5/24/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
No	Observ.	Made	

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Depth (ft.)	Stratum Description	Elev. (ft.)
		S-1	0.0-2	24	12	24 12 6 5	18	S-1: Medium dense, brown, fine to medium SAND, trace Silt, little brick and concrete fragments.			0.3	ASPHALT	39.0
		S-2	2.0-4	24	3	4 4 12 10	16	S-2: Medium dense, gray-brown, fine to medium SAND, trace Gravel, trace Silt, some wood debris.				FILL (7)	
5		S-3	4.0-6	24	8	8 9 4 5	13	S-3: Medium dense, brown, fine to coarse SAND, little Silt, little Gravel.			4		35.3
		S-4	6.0-8	24	15	7 6 8 10	14	S-4: Medium dense, brown, fine to medium SAND, little Silt, trace Gravel.					
		S-5	8.0-10	24	6	10 10 14 15	24	S-5: Medium dense, brown, fine to medium SAND, little Silt, trace Gravel.					
10		S-6	10.0-12	24	18	8 10 7 8	17	S-6: Medium dense, brown, fine to medium SAND, little Gravel, little Silt.	1			SAND (3b)	
15		S-7	15.0-17	24	6	4 17 13 10	30	S-7: Medium dense, brown, fine to coarse SAND, little Silt.					
20		S-8	20.0-22	24	20	6 7 7 11	14	S-8: Medium dense, brown, fine to medium SAND, some Silt, trace fine Gravel.			24		15.3
25		S-9	25.0-26.7	20	6	26 60 100/2"	R	S-9: Very dense, light brown, fine to medium SAND, little Gravel, trace Silt.				DECOMPOSED ROCK (3a)	
30									2		30		9.3

REMARKS

1 - Advanced casing to 10 feet bgs.
2 - SS and drill refusal, rock fragments in spoon tip.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-05

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

The Bridge, Inc.
3500 Park Avenue
Bronx, NY

EXPLORATION NO.: B-05
SHEET: 2 of 2
PROJECT NO: 12.0076567.00
REVIEWED BY: A. Rizk

Logged By: J. Poppe
Drilling Co.: Craig Geotechnical Drilling
Foreman: D. Cooke

Type of Rig: Truck
Rig Model: CME-75
Drilling Method: MR

Boring Location: See Plan
Ground Surface Elev. (ft.): 39.3
Final Boring Depth (ft.): 30
Date Start - Finish: 5/24/2017 - 5/24/2017

H. Datum: N/A
V. Datum: NAVD 88

Hammer Type: Automatic Hammer
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
No	Observ.	Made	

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-10	30.0-30	0	0	50/0'	R	S-10: (No recovery) End of exploration at 30 feet.					
35													
40													
45													
50													
55													
60													

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: B-05

GZA TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/28/17 10:05 - J:\GINT PROJECT DATABASES\NON- MANHATTAN\12 - NNJ\12.0076567.00.GPJ

LOG KEY

GZA
Geo Environmental, Inc.
Engineers and Scientists

BURMISTER SOIL CLASSIFICATION (INORGANIC)

COMPONENT	NAME	PROPORTIONAL TERM	PERCENT BY WEIGHT
MAJOR	GRAVEL, SAND, FINES*		>50
Minor	Gravel, Sand, Fines*	and	35 - 50
		some	20-35
		little	10-20
		trace	0-10

*See identification of fines table.

IDENTIFICATION OF FINES

Material	PI	Atterberg Thread Dia.
SILT	0	Cannot Roll
Clayey SILT	1-5	1/4"
SILT & CLAY	5-10	1/8"
CLAY & SILT	10-20	1/16"
Silty CLAY	20-40	1/32"
CLAY	>40	1/64"

GRADATION DESIGNATION	PROPORTION OF COMPONENT
Fine to coarse	All fractions > 10%
Medium to coarse	<10% fine
Fine to medium	<10% coarse
Coarse	<10% fine and medium
Medium	<10% coarse and fine
Fine	<10% coarse and medium

PLASTIC SOILS

Consistency	Blows/Ft. SPT N-Value
Very Soft	< 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	>30

GRAVEL & SAND

Density	Blows/Ft. SPT N-Value
Very Loose	< 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

BURMISTER SOIL CLASSIFICATION (ORGANIC)

Fibrous PEAT (Pt) - Lightweight, spongy, mostly visible organic matter, water squeezes readily from sample. Typically near top of deposit.
Fine Grained PEAT (Pt) - Lightweight, spongy, little visible organic matter, water squeezes reqdily from sample. Typically below fibrous peat.
Organic Silt (OL) - Typically gray to dark gray, often has strong H2S odor. Typically contains shells or shell fragments. Lightweight. Usually found near coastal regions. May contain wide range of sand fractions.
Organic Clay (OH) - Typically gray to dark gray, high plasticity. Usually found near coastal regions. May contain wide range of sand fractions. Need organic content test for final identification.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) (ASTM D 2487)

MAJOR DIVISIONS			Group Symbols
Coarse Grained Soils More than 50% of material larger than No. 200 sieve.	Gravel More than 50% larger than No. 4 sieve.	Clean Gravels (Little or no fines)	GW GP
		Gravels with Fines (Appreciable amount of fines)	GM GC
	Sand More than 50% smaller than No. 4 sieve.	Clean Sands (Little or no fines)	SW SP
		Sands with Fines (Appreciable amount of fines)	SM SC
Fine Grained Soils More than 50% of material smaller than No. 200 sieve.		Silts and Clays Liquid Limit <50	ML CL
		Silts and CLays Liquid Limit >50	OL MH CH OH
		Highly Organic Soils	Pt

ABBREVIATIONS

MR = Mud Rotary
HSA = Hollow Stem Auger
SSA = Solid Stem Auger
SS = Split Spoon Sampler
U = Undisturbed Sample (Shelby Tube)
MC = Modified California Sampler
V = Vibracore
M = Macrocore

USCS = Unified Soil Classification System (ASTM D2487)
NYCBC = New York City Building Code
WOR = Weight of Rods
WOH= Weight of Hammer
SPT = Standard Penetration Test (ASTM D1586)
N-Value = Cumulative number of uncorrected blows for the middle two six-inch intervals (blows/foot).

Tv = Field Vane Shear Test (Torvane)
PP = Pocket Penetrometer
PI = Plasticity Index
MC = Moisture Content
CO = Consolidation
UC = Unconfined Compression Test
SI = Sieve Analysis
DS = Direct Shear
PID = Photoionization Detector
ppm = Parts Per Million
REC = Recovery
RQD = Rock Quality Designation
▼ = Measured Water Level

APPENDIX C

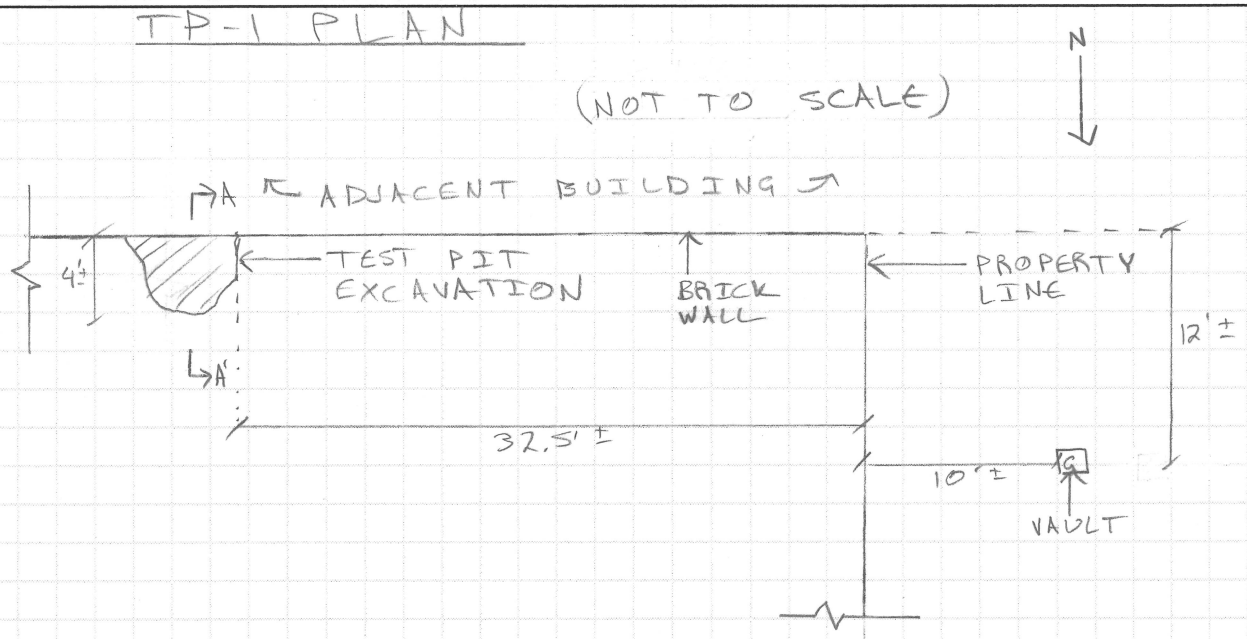
TEST PIT SKETCHES AND PHOTOGRAPHS

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

JOB 12.0076567.00 - 3500 Park Ave, Bronx NY
SHEET NO. 1 OF 2
CALCULATED BY JJ DATE
CHECKED BY AR DATE 06/21/2017
SCALE AS NOTED

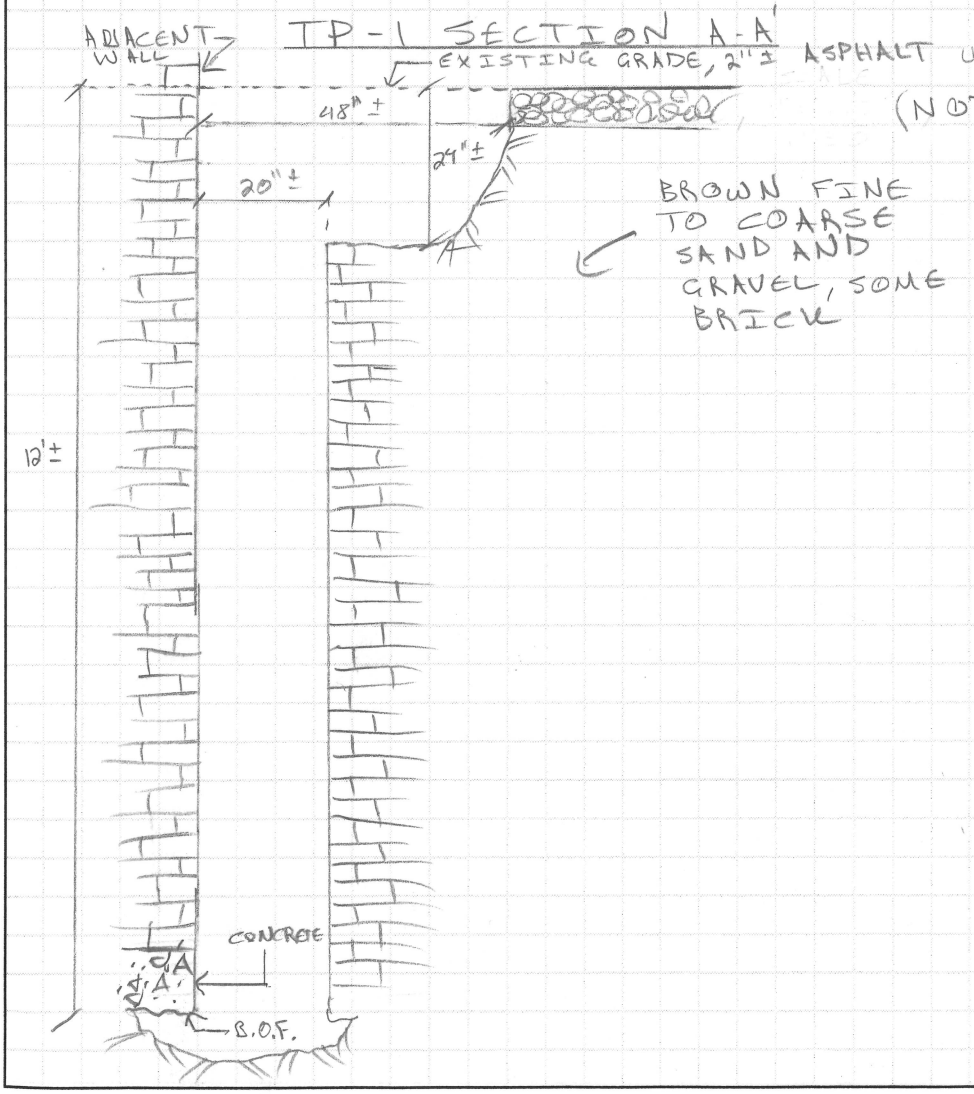
TP-1 PLAN

(NOT TO SCALE)



TP-1 SECTION A-A'

(NOT TO SCALE)

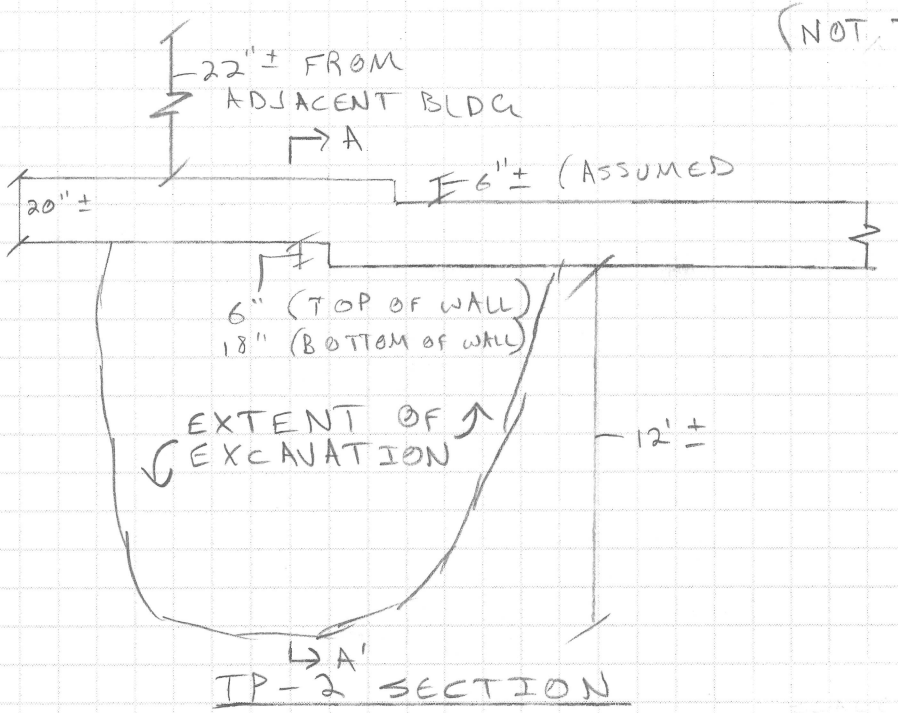


GZA
GeoEnvironmental, Inc.
Engineers and Scientists

JOB 12.0076567.00 - 3500 Park Ave, Bronx NY
SHEET NO. 2 OF 2
CALCULATED BY JJ DATE
CHECKED BY AR DATE 06/21/2017
SCALE AS NOTED

TP-2 PLAN

(NOT TO SCALE) ← N



TP-2 SECTION

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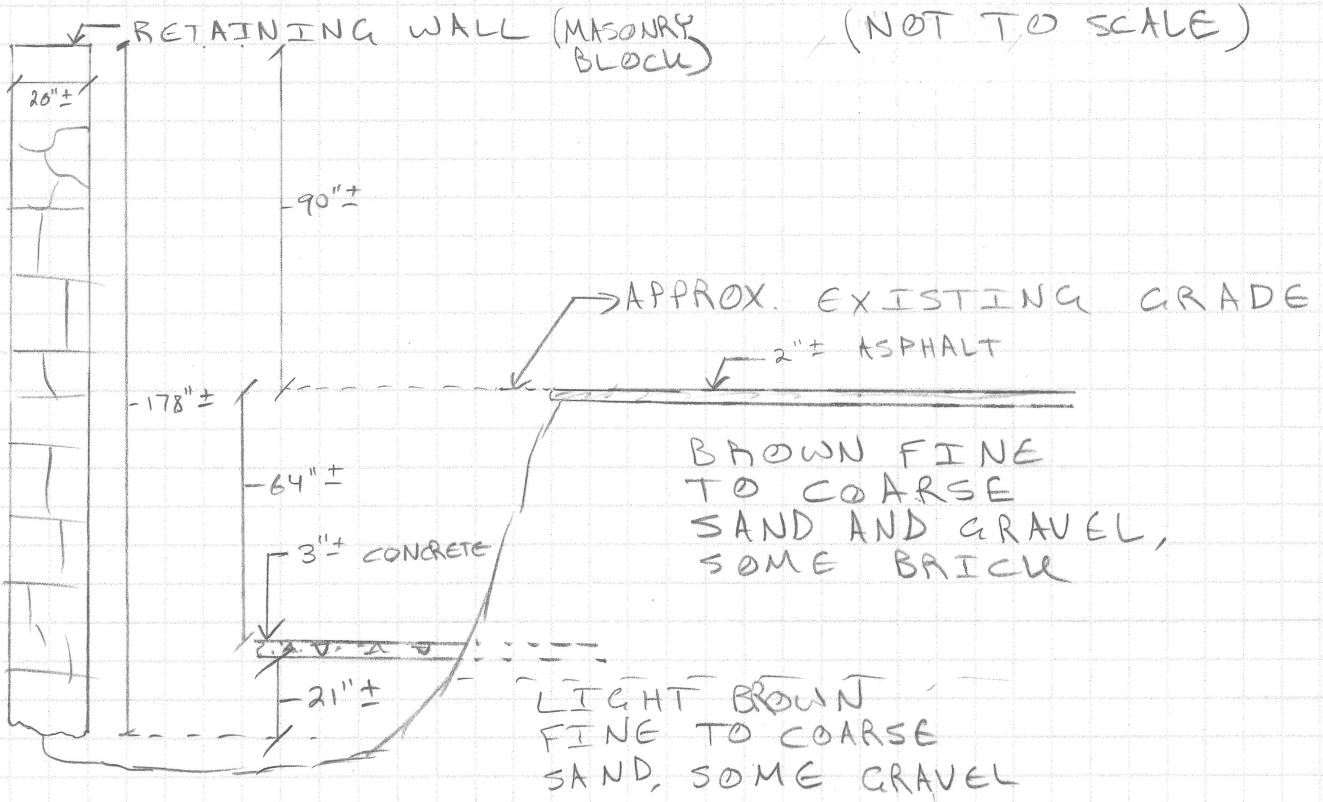


GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
The Bridge, Inc.	3500 Park Avenue, Bronx, NY	12.0076567.00

Photo No.:	Date:
1	6/5/17

Direction Photo Taken:
Southwest
Photographer:
Joe Jackson

Description:
TP-01

Photo No.:	Date:
2	6/5/17

Direction Photo Taken:
South
Photographer:
Joe Jackson

Description:
TP-01

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
The Bridge, Inc.	3500 Park Avenue, Bronx, NY	12.0076567.00

Photo No.:	Date:
3	6/5/17

Direction Photo Taken:
South
Photographer:
Joe Jackson

Description:
TP-01

Photo No.:	Date:
4	6/5/17

Direction Photo Taken:
Southeast
Photographer:
Joe Jackson

Description:
TP-01

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.:
The Bridge, Inc.	3500 Park Avenue, Bronx, NY	12.0076567.00

Photo No.:	Date:
5	6/5/17

Direction Photo Taken:
East
Photographer:
Joe Jackson

Description:
TP-02

Photo No.:	Date:
6	6/5/17

Direction Photo Taken:
Southeast
Photographer:
Joe Jackson

Description:
TP-02

Client Name:	Site Location:	Project No.:
The Bridge, Inc.	3500 Park Avenue, Bronx, NY	12.0076567.00

Photo No.: 7	Date: 6/5/17

Direction Photo Taken: Southeast
Photographer: Joe Jackson

Description: TP-02

Photo No.: 8	Date: 6/5/17

Direction Photo Taken: Southeast
Photographer: Joe Jackson

Description: TP-02

APPENDIX D

LABORATORY TESTING RESULTS

LABORATORY TESTING DATA SHEET

Project Name **3500 Park Ave** Location Bronx, NY Reviewed By

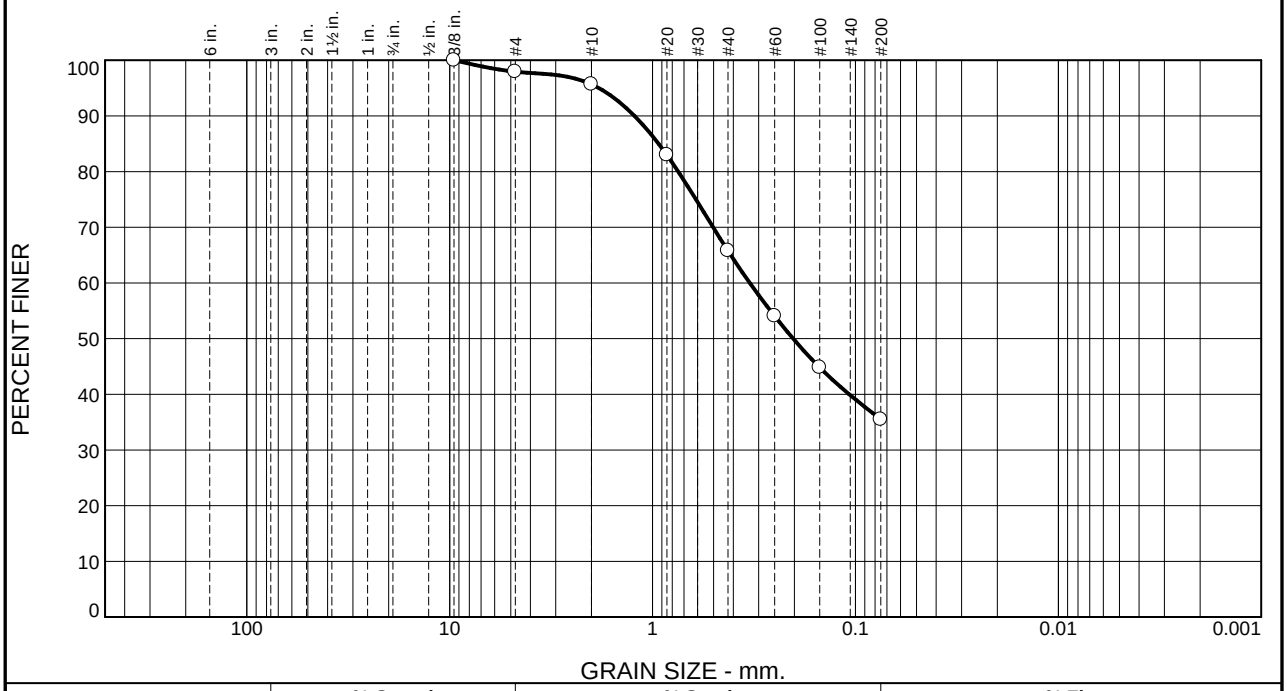
Project No. **12.0076567.00** Assigned By Andrew Rizk

Project Manager Andrew Rizk Report Date 06.13.17 Date Reviewed *06.13.17*

Boring/ Test Pit No.	Sample No.	Depth ft.	Lab No.	Identification Tests							Corrosivity				
				Water Content %	LL %	PL %	Gravel %	Sand %	Fines (<#200) %	Org. %	Sulfate (mg/kg)	Chloride (mg/kg)	Resistivity (Mohms-cm)	GTL Resist	Laboratory Log and Soil Description
B-1	S-5	8-10	1	20.6	25	17	2.1	62.4	35.5						Brown f-m SAND and SILT & CLAY, trace fine Gravel
B-2	S-4	6-8	2	23.0			13.4	57.0	29.6						Brown f-c SAND, some Silt, little fine Gravel
B-3	S-5	8-10	3	7.9			4.4	87.8	7.8						Brown f-m SAND, trace Silt, trace fine Gravel
B-4	S-7	15-17	4	17.8			0.2	63.2	36.6						Brown f-m SAND and SILT, trace fine Gravel
B-5	S-8	20-22	5	30.9			2.8	67.8	29.4						Brown f-m SAND, some Silt, trace fine Gravel

THIELSCH ENGINEERING
195 Frances Avenue
Cranston, RI 02910 401-467-6454

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	2.2	29.9	30.3	35.5	

Test Results (D6913 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	97.9		
#10	95.7		
#20	83.0		
#40	65.8		
#60	54.0		
#100	44.8		
#200	35.5		

* (no specification provided)

Material Description

Brown f-m SAND and SILT & CLAY, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= 17 **LL=** 25 **PI=** 8

Classification

USCS (D 2487)= SC **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 1.2274 D_{85}= 0.9341 D_{60}= 0.3316
D_{50}= 0.2028 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 06.09.17 **Date Tested:** 06.13.17

Tested By: SA

Checked By: Matthew Colman P.E.

Title: Laboratory Manager

Source of Sample: Borings **Depth:** 8-10' **Date Sampled:** 06.07.17

Sample Number: B-1 / S-5

Thielsch Engineering Inc.

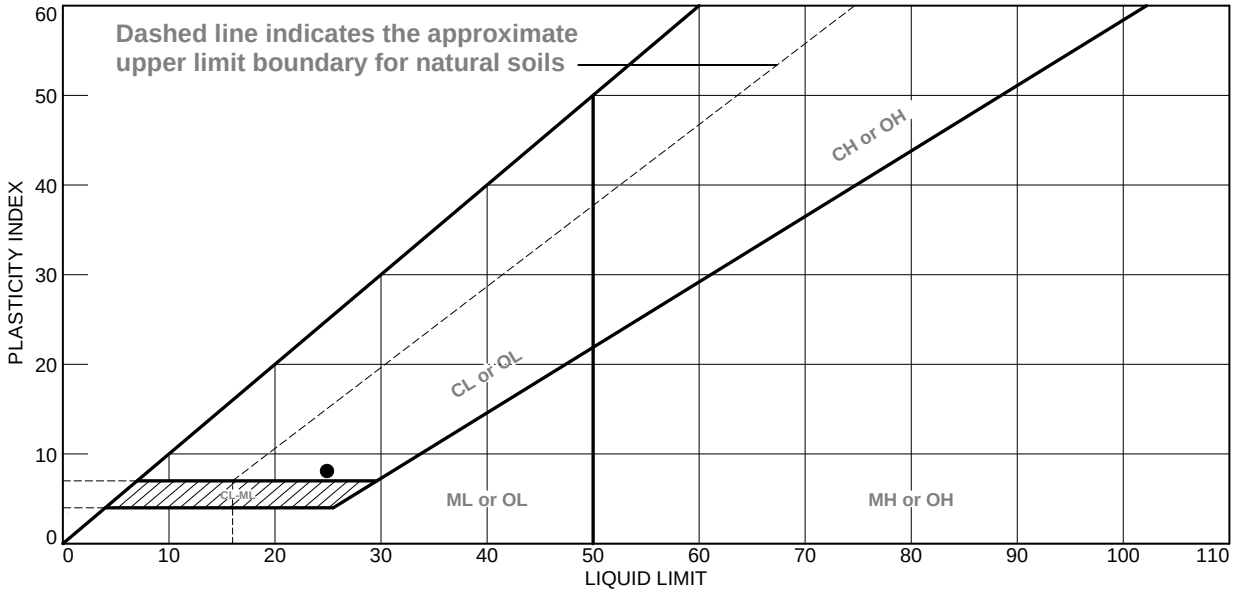
Cranston, RI

Client: GZA GeoEnvironmental

Project: 3500 Park Ave
Bronx, NY

Project No: 12.0076567.00 **Figure** S-1

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown f-m SAND and SILT & CLAY, trace fine Gravel	25	17	8	65.8	35.5	SC

Project No. 12.0076567.00 **Client:** GZA GeoEnvironmental

Project: 3500 Park Ave

Bronx, NY

Source of Sample: Borings **Depth:** 8-10'

Sample Number: B-1 / S-5

Thielsch Engineering Inc.

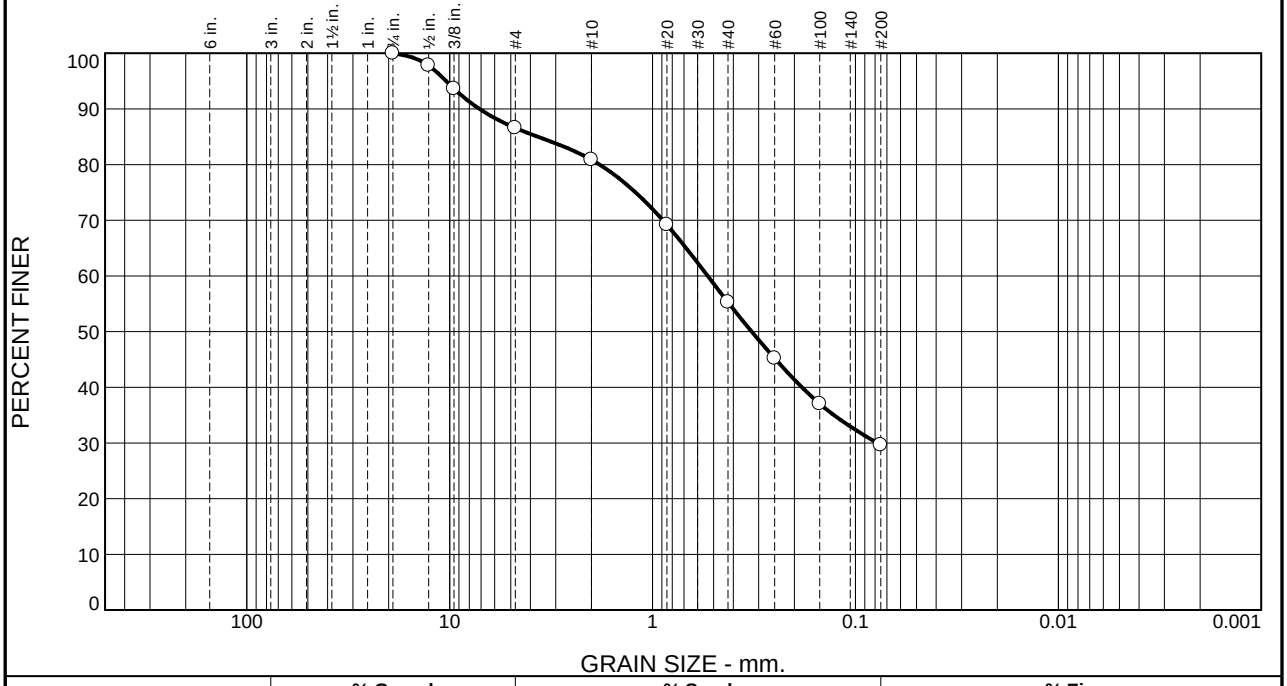
Cranston, RI

Remarks:

Figure L-1

Tested By: SA **Checked By:** MJC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.4	5.7	25.6	25.7	29.6	

Test Results (D6913 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	97.8		
0.375"	93.6		
#4	86.6		
#10	80.9		
#20	69.2		
#40	55.3		
#60	45.2		
#100	37.0		
#200	29.6		

* (no specification provided)

Material Description

Brown f-c SAND, some Silt, little fine Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 7.1361 D_{85}= 3.6759 D_{60}= 0.5348
D_{50}= 0.3246 D_{30}= 0.0781 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 06.09.17 **Date Tested:** 06.13.17

Tested By: SA

Checked By: Matthew Colman P.E.

Title: Laboratory Manager

Source of Sample: Borings **Depth:** 6-8' **Date Sampled:** 06.07.17

Sample Number: B-2 / S-4

Thielsch Engineering Inc.

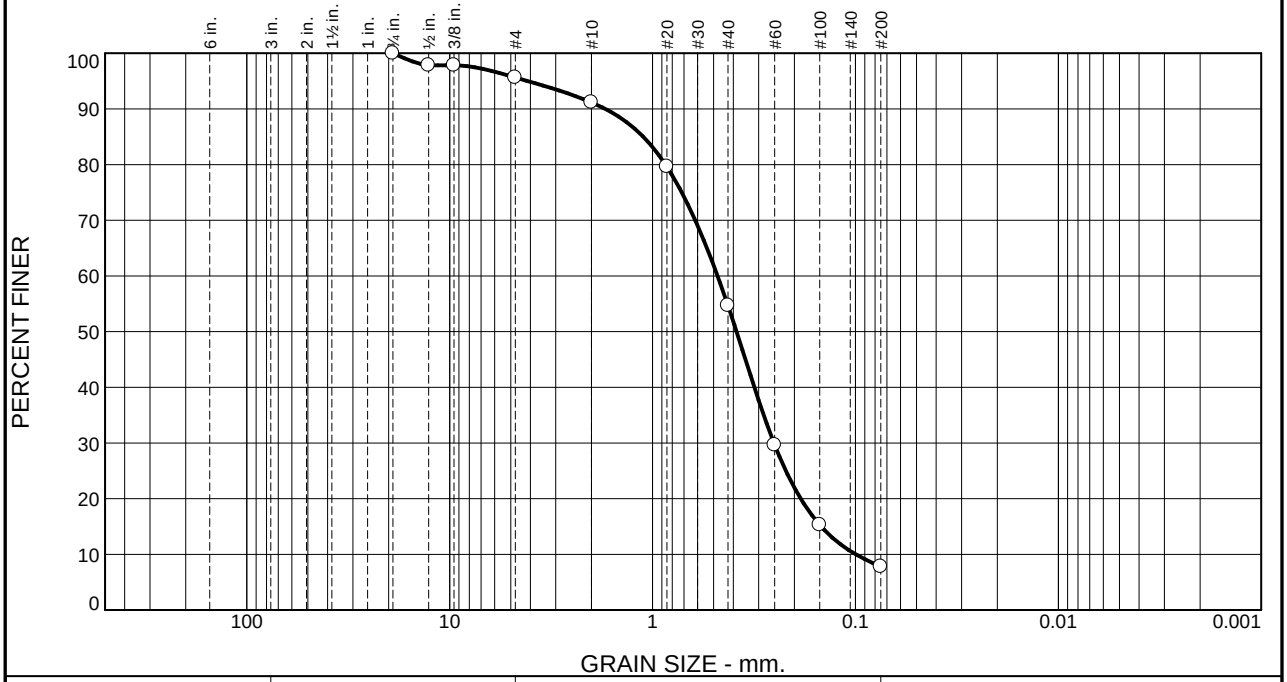
Cranston, RI

Client: GZA GeoEnvironmental

Project: 3500 Park Ave
Bronx, NY

Project No: 12.0076567.00 **Figure** S-2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	4.4	36.5	46.9	7.8	

Test Results (D6913 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	97.8		
0.375"	97.8		
#4	95.6		
#10	91.2		
#20	79.6		
#40	54.7		
#60	29.6		
#100	15.3		
#200	7.8		

* (no specification provided)

Material Description

Brown f-m SAND, trace Silt, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-3

Coefficients

D_{90}= 1.7098 D_{85}= 1.1112 D_{60}= 0.4781
D_{50}= 0.3855 D_{30}= 0.2523 D_{15}= 0.1476
D_{10}= 0.0996 C_u= 4.80 C_c= 1.34

Remarks

Date Received: 06.09.17 **Date Tested:** 06.13.17

Tested By: SA

Checked By: Matthew Colman P.E.

Title: Laboratory Manager

Source of Sample: Borings **Depth:** 8-10' **Date Sampled:** 06.07.17

Sample Number: B-3 / S-5

Thielsch Engineering Inc.

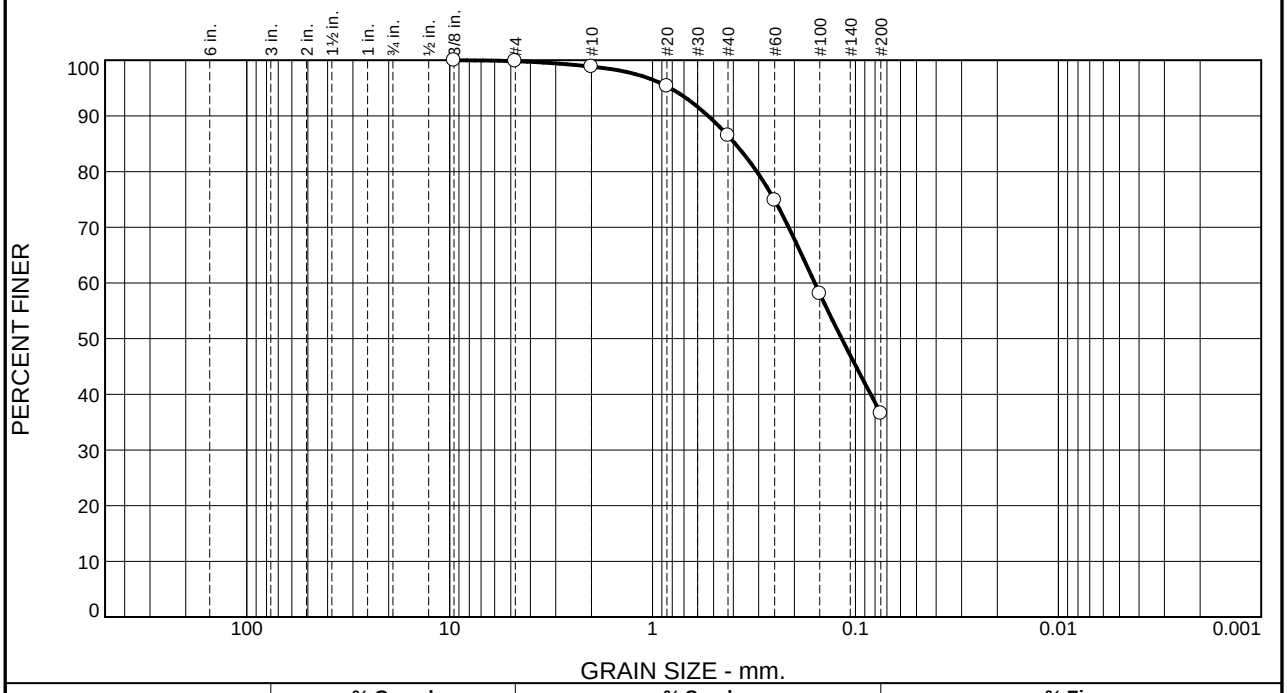
Cranston, RI

Client: GZA GeoEnvironmental

Project: 3500 Park Ave
Bronx, NY

Project No: 12.0076567.00 **Figure** S-3

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.0	12.3	49.9	36.6	

Test Results (D6913 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.375"	100.0		
#4	99.8		
#10	98.8		
#20	95.3		
#40	86.5		
#60	74.8		
#100	58.1		
#200	36.6		

* (no specification provided)

Material Description

Brown f-m SAND and SILT, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.5320 D_{85}= 0.3912 D_{60}= 0.1588
D_{50}= 0.1169 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 06.09.17 **Date Tested:** 06.13.17

Tested By: SA

Checked By: Matthew Colman P.E.

Title: Laboratory Manager

Source of Sample: Borings **Depth:** 15-17' **Date Sampled:** 06.07.17

Sample Number: B-4 / S-7

Thielsch Engineering Inc.

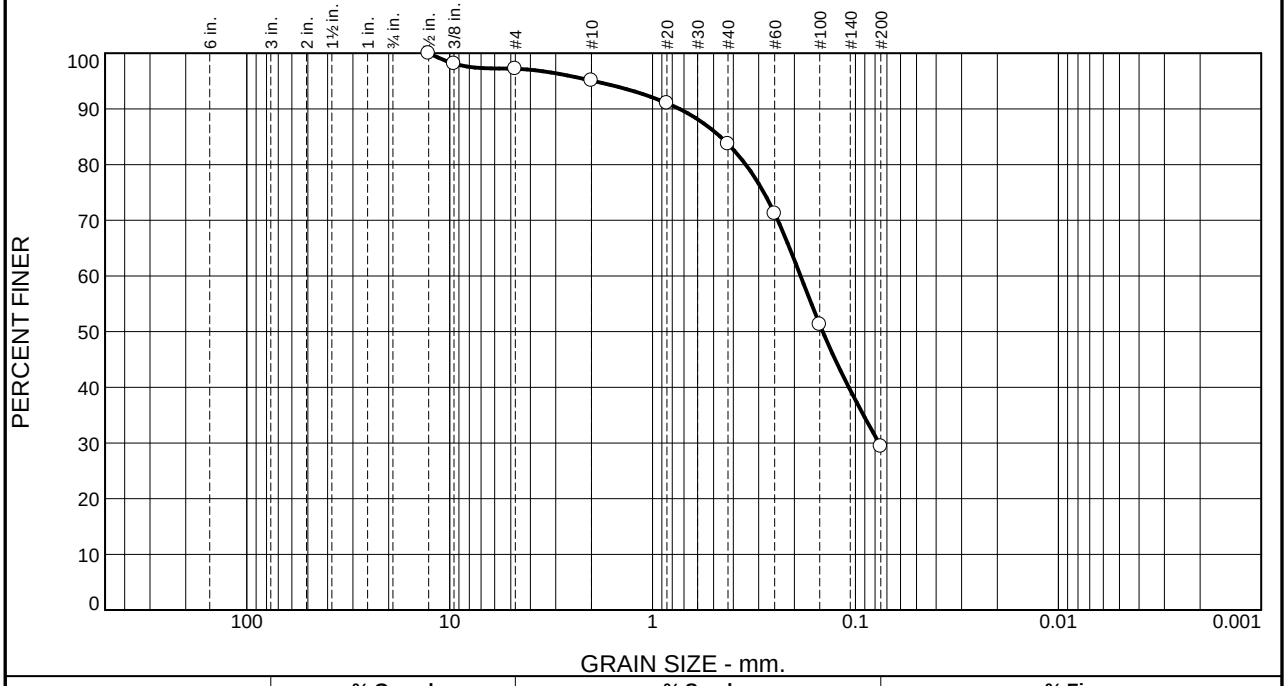
Cranston, RI

Client: GZA GeoEnvironmental

Project: 3500 Park Ave
Bronx, NY

Project No: 12.0076567.00 **Figure** S-4

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.8	2.1	11.4	54.3	29.4	

Test Results (D6913 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	98.1		
#4	97.2		
#10	95.1		
#20	91.0		
#40	83.7		
#60	71.2		
#100	51.3		
#200	29.4		

* (no specification provided)

Material Description

Brown f-m SAND, some Silt, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.7368 D_{85}= 0.4631 D_{60}= 0.1865
D_{50}= 0.1450 D_{30}= 0.0766 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 06.09.17 **Date Tested:** 06.13.17

Tested By: SA

Checked By: Matthew Colman P.E.

Title: Laboratory Manager

Source of Sample: Borings **Depth:** 20-22' **Date Sampled:** 06.07.17

Sample Number: B-5 / S-8

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental

Project: 3500 Park Ave
Bronx, NY

Project No: 12.0076567.00 **Figure** S-5