SESI CONSULTING ENGINEERS

GEOTECHNICAL INVESTIGATION REPORT

FOR

Liberty Towers-Site A and Site B
Richmond Terrace
Staten Island, Richmond County, New York

PREPARED FOR:

Truisi SUK Design Group
254 West 31st Street
New York, NY 10001

PREPARED BY

SESI Consulting Engineers, PC
12A Maple Avenue
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Job No.: P-7317

DATE:

April 7, 2008

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Table of Contents

List of Figures

List of Appendixes

1.0 INTRODUCTION

We have completed our geotechnical investigation of the subsurface conditions as they pertain to establishing site preparation procedures and foundation design criteria for the proposed construction to be located at along Richmond Terrace and Stuyvesant Place in Staten Island, NY. Survey drawings indicate that the site comprises two parcels, both less than 1 acre in size. An approximate 50' wide utility right of way bisects the two parcels. Our investigation incorporated both of the parcels into one site, bordered by Stuyvesant Place and Richmond Terrace to the East, Richmond Terrace and residential structures to the north, two approximately 20-story residential building towers to the west, and Hamilton Avenue to the south. The majority of the site slopes from the southwest at elevation 84' (msl) to the northeast at elevation 40' (msl). Figure 1 presents a topographic map depicting the site.

Site observations revealed that the site is mainly undeveloped, heavily vegetated, and contains aged concrete walls and possible former walkways and stairways along the northeastern parts of the site; new concrete foundations in the northernmost part of the site, and several piles of debris, including construction debris. Some portions of the site could not be accessed by the drill rig due to excessive grades. It appears that the site was formerly occupied by previously demolished structures.

The design plans indicate that proposed construction will consist of two residential towers, Tower A and Tower B, each approximately 20 stories high, additional mid-rise building areas and 2 to 3 levels of below grade parking throughout the entire building footprint. It appears that an excavation support system will be required to reach the proposed subgrade elevation for the entire perimeter of the proposed buildings. Some underpinning of adjacent structures may also be required during construction. We are currently designing a shoring and bracing and underpinning system for this project; the design will be submitted under a separate cover. The design plans also indicate that the footing elevations for the tower portions of the buildings will be approximately 27.5' msl in Tower A, and approximately 20' msl in Tower B, footing elevation for the remaining area in Tower A will be approximately 32.5' msl, and footing elevation in the remaining portion of Tower B will be approximately 34' msl.

It is our understanding that column loads will be as high as approximately 2,000 kips at some of the column locations. Rock cores collected at the site indicate rock with an end bearing capacity of either 20 tons per foot (tsf) or 8 tsf, depending on the condition of the rock. The footing schedule should be dependent on the condition of rock; and identification of the weaker rock areas can be made at the time of excavation.

Bedrock underlying the site has been identified as Serpentinite rock. Serpentinite is known to contain naturally occurring asbestiform minerals, to which occupational exposure is regulated by OSHA.

2.0 FIELD AND LABORATORY INVESTIGATIONS

Our engineering study included a site reconnaissance, a review of published geological information of the area, a review of geotechnical investigations completed by Santoro, P. E. in October 2006 and January 2007, a review of the preliminary design drawings, and a field investigation consisting of the drilling of nine (9) drilled borings; four (4) of which included rock cores.

SESI borings were completed to depths of 18.0 to 48.5 feet below existing grade, using a track mounted drill rig at the locations shown on Figure 2. All borings were backfilled upon completion. Individual boring logs, which describe the materials encountered, are presented in Appendix A. A key to soil terminology is also included in Appendix A. The locations of the borings completed by Santoro are also included on Figure 2, and the boring logs of borings completed by Santoro are included in Appendix B.

Soil samples suitable for identification purposes were extracted from the borings at various intervals in accordance with the procedures of the Standard Penetration Test (SPT) (ASTM D1586). For this test, a standard split spoon (2-inches outside diameter, 1 and three eighths inches inside diameter) is driven into the soil by a 140-pound weight falling 30 inches. The number of blows required for driving the sampler through four 6-inch intervals is recorded. After discounting the initial six inches of penetration due to possible disturbance of the material resulting from the drilling operation, the number of blows required to drive the sampler the second and third 6-inch intervals is recorded and referred to as the standard penetration number or N-value. It is also commonly called the blow count.

All fieldwork was performed under the full-time direct technical observation of a geotechnical engineer/technician from SESI Consulting Engineers, PC. Our representative maintained continuous logs of the explorations as work proceeded and supervised the soil sampling operations so as to develop the required subsurface information.

All soil samples extracted in the field were brought to our office where they were further examined in our soil mechanics laboratory.

Laboratory classification testing consisted of two (2) unconfined compression tests on specimens from two rock cores. The results of the compression tests are presented on the individual boring logs and in the text below.

3.0 GENERALIZED SUBSURFACE CONDITIONS

3.1 Geology

Geologically, the site soils are mapped as younger glacial ground moraine; or glacial till. This soil is chiefly an unsorted mixture of clay, silt, sand, gravel and boulders. Soils at the site were found to contain predominately sand sized particles, with silt, occasional bounders, and little gravel. Underlying the soils is Serpentinite bedrock, which is classified as massive or schistose, thoroughly sheared and broken by innumerable intersection zones of weak, friable and slippery material of low strength. Rock joints are common and closely spaced, and generally exhibit random orientation and little structural significance. This type of rock is said to have very low compressive strength.

In addition, Serpentinite is known to contain naturally occurring asbestiform minerals, to which occupational exposure is regulated by OSHA.

3.2 General Subsurface Conditions

All SESI and Santoro borings were completed in the proposed building area footprints. Fill was encountered at each boring location, and all SESI borings were terminated at the depth of bedrock, or in the bedrock. Generally, three soil Strata were encountered, as described below:

Stratum 1: FILL: A fill layer consisting primarily of brown silty sand, little gravel, little silt and widely varying amounts of boulders, brick, wood and other small amounts of debris was encountered over the site. Our borings indicate the depth of the fill varies from approximately 5' to approximately 15' below grade, at the locations investigated.

The fill is in a medium to medium dense condition; however, it is not suitable for support of building foundations in its current condition. Uncontrolled fill has no allowable bearing capacity because of its unknown overall quality and density.

In addition to the fill encountered in the borings, there were several piles of existing fill on the site that were not investigated.

Stratum 2: SAND: Beneath the fill layer, a red-brown to olive brown silty sand with little gravel layer was encountered. Some cobbles and fractured weathered rock were also evident in this layer, in particular, the occurrence of fractured rock increased with depth. The depth of this stratum ranges from 5 feet to greater than 45 feet below grade. This stratum is in a dense to very dense condition, with an allowable bearing capacity of approximately 3.0 tons/per square foot (tsf).

Stratum 3: Weathered rock and Serpentinite bedrock was encountered between approximately 17 feet and 45 feet below grade. A weathered rock layer was located

above the bedrock elevation, the thickness the weathered zone ranged from 1' to 5' thick. Bedrock elevations, based on the topographic information on the plans range from approximately 35' msl near the intersection of Hamilton Avenue and Stuyvesant Place to approximately 14' msl near the northeastern boundary of Tower A. Bedrock elevations are indicated next to the corresponding boring location on Figure 2, "Boring Location Plan".

Cores were collected in approximately 5-foot runs, using a double barrel NX core sampler drilled with a track mounted drill rig. Recovery rates and Rock Quality Designations (RQD) were established for each rock core obtained. The Rock Quality Designation, which is an indication of the soundness of the rock, is determined by the cumulative length of rock core pieces in excess of 4 inches divided by the total length of rock cored. In general, the RQD values ranged from 0% to 88%. A complete rock description is included on the boring logs including recovery and RQD values. The chart below shows the relationship between RQD values and rock quality. Unconfined compression testing was completed on two rock pieces from the cores, the results of which were 5,580 psi and 5,770 psi. The unconfined compression test results are included in Appendix C.

RELATIONSHIP OF RQD AND ROCK QUALITY	
ROCK QUALITY DESIGNATION (RQD)	DESCRIPTION OF ROCK QUALITY
0-25	VERY POOR
25-50	POOR
50-75	FAIR
75-90	GOOD
90-100	EXCELLENT

The rock is medium to fine grained, greenish gray Serpentinite. The condition and RQD and therefore the quality of the rock, varied across the site. Cores were collected in borings SB-1, SB-2, SB-5, and SB-7.

Cores collected from borings SB-1, SB-5 and SB-7 contain rock that is very strong to strong, hard, unweathered to slightly weathered, and moderately fractured. SB-1 was located towards the rear of Tower B, SB-7 was located towards the rear of Tower A and SB-5 was located towards the front of Tower A.

Cores collected from SB-2 contain rock that is very weak, soft, highly weathered and extremely fractured. The rock quality did not increase with depth. SB-2 was located towards the front of Tower B.

A summary of the rock core characteristics and rock bearing capacity is presented below:

Boring Number	Average Recovery %	Average RQD %	Rock Quality	Unconfined Compressive Test Result (psi)	Bearing Capacity (Tsf)
SB-1	98	73	Fair – Good		20
SB-2	50	8.5	Very Poor	5,580	8
SB-5	100	59	Fair	5,770	20
SB-7	92.5	49.5	Fair		20

Groundwater: Groundwater was encountered only in boring SB-5 at 28' below grade at the time of boring. Groundwater can sometimes be slow to infiltrate borings and can be highly seasonally variable; therefore, some groundwater infiltration should be expected during construction, especially during periods of wet weather. In addition, groundwater on the site may be tidally influenced, due to the proximity of The Narrows.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General

Fill was encountered at all boring locations, and as stated above, uncontrolled fill has no allowable bearing capacity. Based on the topographic information, it appears that the proposed building footing elevations are below the maximum depth of the fill; however, it is possible that there are areas on the site where the fill extends below the proposed footing depth. Footings and other structural building elements should not be allowed to bear on the fill in its present state of compaction.

The mainly sand soil layer beneath the fill has an allowable bearing capacity of 3.0 tsf, and the rock layer beneath the fill has allowable bearing capacities of 8 tsf or 20 tsf, depending on the condition of the rock. Based on the topographic information provided, some of the proposed building footing elevations are above the top of rock and some are at or below the top of rock.

4.2 Site and Building Area Preparation Procedures

In general, the building area preparation procedures should consist of installing the perimeter excavation support system in order to support the surrounding streets, existing structures and existing utilities, and overburden soils. Once the perimeter

excavation support system is in place, the mass excavation of the site may commence. This operation will involve excavation of the existing fill and sand soils and loading this material into trucks for removal from the site.

The plans indicate that the majority of the soil within the building footprints will need to be excavated to the elevation of bedrock to reach foundation subgrade elevation; however, for any foundation footings that will be placed on soil, the footing subgrade should be proof-rolled with a large vibratory roller prior to the placement of concrete. The proofrolling operation should consist of making 4 complete coverages of the area. Any soft areas disclosed should be excavated to stable material and backfilled in compacted lifts to achieve 95 percent of Modified Proctor Density (ASTM D 1557).

Any fill required should be placed in maximum 12-inch thick lifts, with each layer compacted to the required density using a large vibratory roller (minimum 10-ton static drum weight). Building area fills should be compacted to a minimum of 92 percent and an average of 95 percent of the maximum Modified Proctor Density (ASTM D 1557).

Areas that will not have any foundations or other structural loads may be compacted to a minimum of 90 percent of the maximum Modified Proctor Density (ASTM D 1557).

Offsite borrow material, if required, should have a maximum particle size of 6 inches and the maximum amount of fines (percentage passing a No. 200 mesh sieve) should be 15% to help facilitate construction during wet weather. The "fines" should be non-plastic. The granular fill should be compacted using a heavy vibratory roller (Dynapac CA-15 or equivalent) to achieve the same density requirements as above.

Backfill in confined areas such as utility trenches and foundations within load bearing or paved areas should be placed in maximum 8-inch thick layers and compacted to a minimum of 92 percent and average of 95 percent density as described above.

It appears that the majority of the onsite soils will be satisfactory for use as structural fill. Wetting or drying of the fill material should be accomplished as necessary to achieve the required density. The subgrade should be graded to drain and tight-rolled at the end of the day, if wet weather is anticipated.

If stormwater seepage is encountered during construction, gravel filled sumps with pumps should be installed below the subgrade elevation to allow for dewatering of the excavation. We recommend that the building be constructed with drainage sumps placed at the lowest levels to allow for permanent dewatering. The need for an underslab drainage system should be evaluated during construction.

4.3 Foundation Design Criteria

Footings may be placed on the natural inorganic soil, bedrock, or the controlled compacted fill. As stated above, footings and other structural building elements should not be allowed to bear on the fill in its present state of compaction. Footings bearing on the natural inorganic soil or controlled compacted fill shall be designed for a maximum net allowable bearing pressure of 3.0 tsf (6,000 psf). Footings bearing on the bedrock shall be designed for a maximum net allowable bearing pressure of 8 tsf (16,000 psf) for highly weathered rock or 20 tsf (40,000 psf) for slightly to unweathered rock. The condition of the rock will need to be determined in the field by a geotechnical engineer during the controlled inspections required by the NYCDOB.

Regardless of the loads, the minimum plan dimension of isolated footings should be 36 inches and the minimum width of continuous footings should be 20 inches. Exterior footings and those footings potentially exposed to frost action should be founded a minimum of 3.0 feet below adjacent exterior grade.

All other temporary excavations greater than 4 feet in depth should have the sides sloped back to a maximum slope of 1.5 horizontal to 1 vertical or be appropriately sheeted and braced in accordance with all applicable codes. Flatter side slopes will be required if the excavation extends below groundwater.

Because groundwater seepage will likely be encountered in some of the footing excavations, over-excavation may be required along with placement of a minimum of 6 to 12 inches of ¾ inch clean crushed stone. Any groundwater seepage should be directed to a sump for pumping.

The floor slab should be designed using a subgrade modulus of 175 pci, assuming that 6 inches of dense graded aggregate is placed beneath the slab.

All retaining walls, including foundation walls, should be provided with positive drainage behind the walls to preclude hydrostatic pressures from developing.

After satisfactory completion of the outlined building area preparation procedures, footings and floor slabs founded on the compacted structural fill/natural soils should have post-construction total settlements of less than 1-inch and maximum differential settlements in a 30 foot span of less than ½ inch.

A summary of recommended soil design parameters is included in Table 1.

Seismic Design

The site soils and highly weathered bedrock have been classified as Site Class S_1 for seismic design purposes in accordance with the Building Code of the City of New

York, 2008 (NYC Code). The unweathered to slightly weathered bedrock on the site has been classified as Site Class S_0 for seismic design purposes.
The Reference Standards, (RS-9-6) of the NYC Code require that the soil profile be evaluated for the potential for liquefaction in the event of a seismic occurrence. The Reference Standard identifies liquefaction potential relating to the blow counts obtained during the sampling operation. The blow counts obtained during the sampling operation indicated that the soils would be classified as "liquefaction unlikely", or Category C.

4.4 Footings on Rock

Because of the variation in the condition of the rock encountered on site, the footing schedule will have to vary to compensate for the rock that is highly weathered. Footings on sound unweathered to slightly weathered rock may be designed for a maximum net allowable bearing pressure of 20 tsf (40,000 psf). For the building columns with large loads, ie 2,000 kip, conventional shallow footings should prove to be the most economical. Footings on highly weathered rock may be designed for a maximum net allowable bearing pressure of 8 tsf (16,000 psf). Column footings with large loads over the highly weathered rock can be designed as a mat foundation, or alternatively, drilled shafts can be used.

A mat foundation over the highly weathered rock should be designed for a maximum allowable net bearing pressure of 8 tsf with an allowance for localized bearing overstress of 25% due to static, live and dead loads. Additional bearing stress resulting from wind and seismic loads should not be included with the static analysis. In addition, a modulus of subgrade reaction of 160 tons/c.f. may be used for design of the mat foundation.

Drilled shafts may consist of multiple smaller diameter shafts with a cap, or one large drilled element. The following design parameters can be used for the highly weathered rock.

End Bearing Capacity: 8 tsf.

Ultimate bond stress-Rock/concrete bond-50 psi.

Exposed surfaces of highly weathered rock may rapidly degrade, leading to a further reduction in allowable bearing capacity. To avoid this, it is advisable to install a thin concrete mud mat over exposed surfaces of the highly weathered rock after the overburden soils are excavated.

Bedrock Footings: ***The load capacity of the bedrock is dependent on the quality of rock. The occurrence of weathered and unweathered rock will likely be somewhat variable across the site. It is necessary that a geotechnical engineer from our office be on site during excavation to make the determination of the***

condition of the rock and the required footing schedule at most of the column footing locations.

4.5 Environmental Consideration of Serpentinite Rock

As stated above, bedrock underlying the site has been identified as Serpentinite rock. Serpentinite is known to contain naturally occurring asbestiform minerals, to which occupational exposure is regulated by OSHA.

Asbestos becomes hazardous when it is physically disturbed and released into the air as a potential airborne contaminant. Physical disturbance of naturally occurring asbestos minerals can be generated by natural weathering and erosion of steep serpentinite rock slopes or by excavation, drilling, blasting, chipping, or crushing of asbestos containing rock.

To confirm the presence of asbestos in the rock at the site, laboratory analyses on rock samples should be performed by a certified asbestos laboratory following applicable USEPA methodologies. If the rock is found to contain asbestos, special handling procedures should be developed in a written site specific Health and Safety Plan, and/or Material Handling Plan.

Mitigation procedures for construction sites with known asbestos minerals generally consist of wetting the excavated rock for dust control, personal and community air monitoring, and controlled disposal of asbestos containing rock.

4.6 Temporary Earth Support

In order to attain the elevation of the proposed lower parking level, an earth retention system will be required to support the soils surrounding the excavation. A retention system consisting of soldier beams with timber lagging is the most common form of earth retention and generally the least expensive. Timber lagging is installed to the soldier beam through direct bearing of the timber on the beam or attached mechanically to the piles as the mass excavation proceeds. Over-excavation for the installation of the lagging should be limited to four feet and all excavated areas should have all lagging installed at the completion of each work shift. Additional bracing to the system in the form of tiebacks or raker beams will be required due to the depth of the proposed excavations. The tiebacks are installed by rotary or auger-drilling techniques, drilled through the earth retention wall line into the retained soil behind the wall at specified elevations as the mass excavation proceeds. A steel tendon is then inserted into the drilled hole and injected with grout under pressure. After allowing the grout to harden, the steel tendon is stressed to a specific tension and locked into the soldier beam to restrain it from moving. Temporary easements for the tiebacks that encroach on the neighbors' property will be required

The raker beam support provides the necessary support with steel beams supported at the base of the excavation and propped along the sidewalls of the system. In this

system the raker beams are left in place until the walls are backfilled and the structure is self-supporting. Penetrations through the building walls and floors will require closure once the rakers are removed.

Alternately, the mass excavation may be supported through the use of a soil nail system. This system involves drilling steel rods into the slope to be supported, in a predescribed pattern to a design length based on the height of the excavation. These steel rods are grouted in place and covered with a reinforced shotcrete face.

The final selection of the type of support to be employed on this project is beyond the scope of the investigation; however, we are currently designing a system for shoring and bracing and underpinning for the project, and will submit the design under a separate cover.

4.7 Lateral Earth Pressures

It is recommended that walls subject to unbalanced earth pressures be designed for the following minimum lateral soil pressures (calculated on the basis of an equivalent fluid pressure in pounds per foot)

Active Case =	36 pcf
At-Rest Case =	56 pcf

The active case would apply to wing walls such as in loading docks where deflection of the wall would be permissible. The at-rest condition exists for those walls that are restrained at both the top and bottom of the wall such as the pit walls within an elevator pit or basement/foundation walls. Walls subject to surcharge loads must be designed for an additional uniform lateral pressure over the entire height of the wall equal to 0.3 times the surcharge loading. All retaining walls, including foundation walls, should be provided with positive drainage behind the walls to preclude hydrostatic pressures from developing.

5.0 TESTING REQUIREMENTS

During the placement of all structural fill, visual observations and density tests should be performed to determine the adequacy of the fill. Density testing should be done in accordance with the following minimum frequency requirements:

Building Areas: Minimum of 4 tests per 12-inch lift; spacing not to exceed 100 feet between test locations.
Parking/Roadway Areas: Minimum of 3 tests per 12-inch lift; spacing not to exceed 100 feet between test locations.
Retaining Wall(s): Minimum of 4 tests per 12-inch lift; spacing not to exceed 50 feet between test locations.

Minimum density requirements are outlined in the previous sections of this report.

6.0 UTILITY LINES

The site soils will provide suitable support for utility lines. Cobbles greater than 4 inches in diameter should be removed from the utility line subgrade or a minimum 4-inch thick sand layer placed beneath the utility lines.

Backfill material placed around utility lines to 6 inches above the utility lines should have a maximum particle size of 1.5 inches. Backfill of utility trenches that fall within load-bearing areas should be placed in maximum 8-inch thick lifts and compacted to a minimum of 92 percent and average of 95 percent of Modified Proctor Density (ASTM D-1557).

7.0 PAVEMENT AREAS

The cut soils may be used as fill in paved areas; however, as previously discussed, if these soils possess a high percentage of silt/clay, they cannot be worked or compacted when wet. In order to reuse these soils, they may need to be spread out to let dry or treated with lime/cement to reduce the moisture content and make them workable.

The compaction criteria for fills in parking and roadway areas may consist of 92 percent (ASTM D-1557), except in the uppermost 2 feet where 95 percent should be achieved to provide for good pavement support. Visual observations and in-place field density tests should be made to determine the adequacy of the compaction.

8.0 INSPECTION

The recommendations presented in the previous sections of this report are based on the assumption that the site preparation procedures will be done under engineering inspection by a representative of this office. SESI should inspect the proofrolling operations, the placement of the compacted fill and the bottom of the footing excavations prior to the placement of concrete and/or stone, and prior to form or steel reinforcement for column footings. Visual observations and in-place density testing should be done throughout fill construction and column footing excavations to determine that the work is done in accordance with our recommendations.

We should review the grading plan and foundation plan, when completed, to determine if any revisions to our recommendations are necessary.

9.0 LIMITATIONS

The subsurface investigation performed identifies the subsurface conditions only at the locations of the test holes and at the depths where the samples were taken. SESI Consulting Engineers, PC, reviews the published geologic data and the field and laboratory data and uses their professional judgment and experience to render an

opinion on the subsurface conditions throughout the site. Since the actual subsurface conditions may differ, we recommend that SESI be retained to provide construction inspection in order to minimize the risks associated with unanticipated conditions.

10.0 DISCLAIMER

This Report was prepared by SESI for the sole and exclusive use of Truisi Suk Design. Nothing under the Professional Services Agreement between SESI and its client, Truisi Suk Design shall be constructed to give any rights or benefits to anyone other than Client and SESI, and all duties and responsibilities undertaken pursuant to the Agreement will be for the sole and exclusive benefit of Client and SESI and not for the benefit of any other party. This Report has been prepared and issued subject to the express condition that same is not to be disseminated to anyone other than Client, without the advance written consent of SESI (which SESI, in its sole discretion, is free to grant or withhold). Use of the Report by any other person is unauthorized and such use is at the sole risk of the user.

TABLE 1
SUMMARY OF SOIL DESIGN PARAMETERS

	PARAMETER	VALUE
1.	Allowable Bearing Capacity (net)	
	Natural Soil/Compacted Fill	6,000 psf
	Rock – sound, un-weathered to slightly weathered	20 tsf
	Rock – highly weathered	8 tsf
2.	Total Unit Weight (Onsite/Imported Soil)	125 pcf
3.	Angle of Internal Friction - Backfill against Structures	32 degrees
4.	Earth Pressure Coefficient (See Note 1)	
	Active Earth Pressure (Ka)	0.31
	Earth Pressure @ Rest (Ko)	0.50
	Passive Earth Pressure (Kp)	3.25
5.	Coefficient of Sliding (concrete over soil)	0.40
6.	Subgrade Modulus for Floor Slab Design (Granular Fill)	175pci
7.	Slopes (Above Groundwater)	
	Maximum Cut Slope in Soil	2.5H:1V
	Maximum Fill Slope in Soil	2.5H:1V
8.	Footing Depth for Frost Protection	3.0 ft
9.	Seismic Design Criteria- Site Class	S_1

Notes:

A drainage medium should be installed along all retaining walls to avoid hydrostatic pressures from developing.

Compaction equipment used within 5± feet permanent walls should not weigh more than 5,000 pounds.

FIGURES

REFERENCE:
INFORMATION TAKEN FROM JERSEY CITY, N.J. QUADRANGLE, 1981

LIBERTY TOWERS
RICHMOND TERRACE
STATEN ISLAND, NY

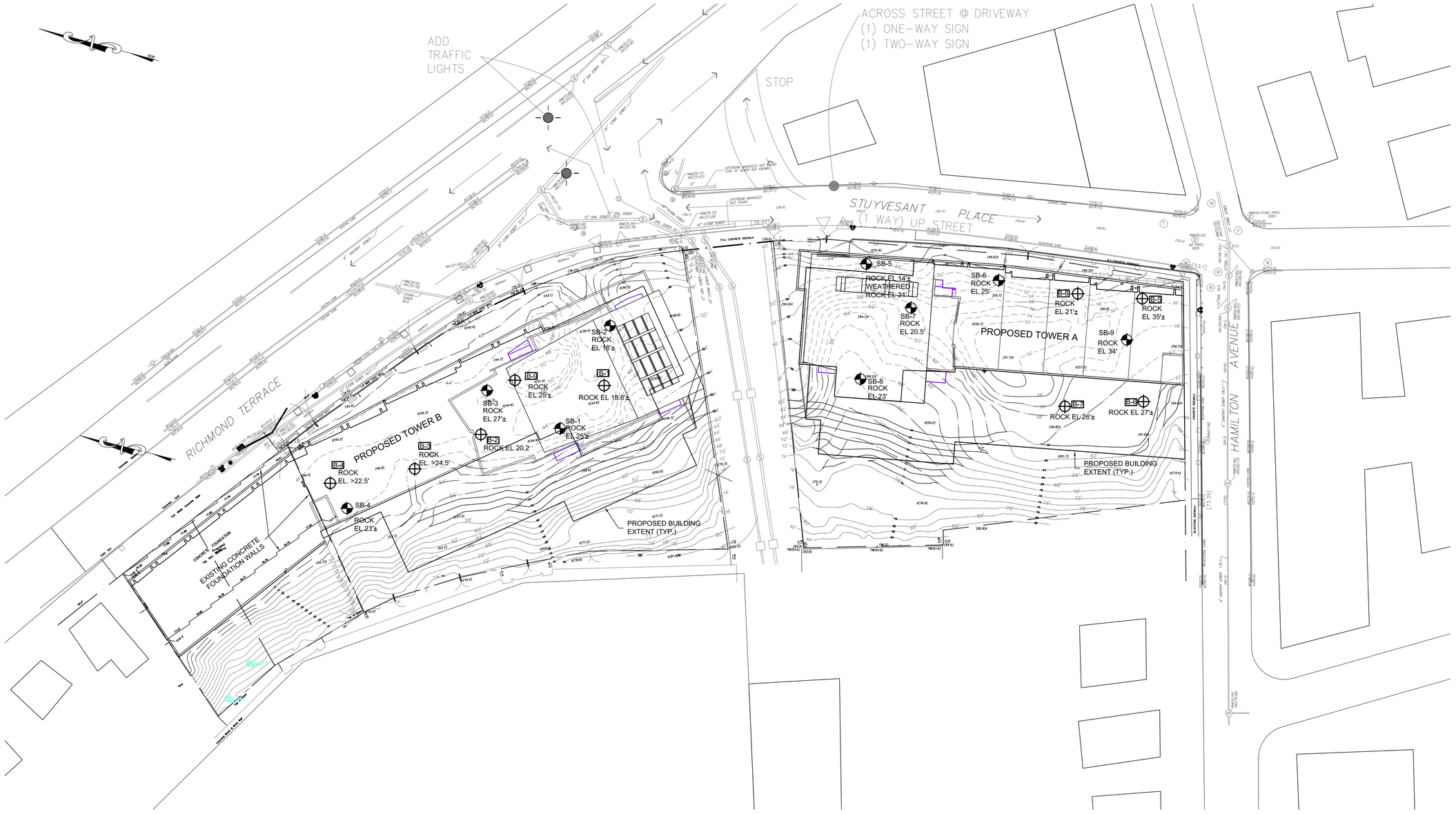
SITE LOCATION MAP

SESI CONSULTING ENGINEERS
CERT. OF AUTH. # 24GA27934700
SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

FIGURE 1

DRAWN BY:	YY
CHECKED BY:	DG
SCALE:	1"=2000±
DATE:	04/3/08
JOB NO.:	7317

N:\ACAD\7317 Liberty Towers\7317 USGS MAPS.dwg, 4/3/2008 5:15:06 PM, \\ 2007\Xerox Phaser 8550DP PS, 1:1



LEGEND

SB-1 — BORING NO. & APPROXIMATE LOCATION, COMPLETED BY SESI, MARCH 2008.

B-1 — BORING NO. & APPROXIMATE LOCATION, COMPLETED BY SANTORO, OCTOBER 2006 AND JANUARY 2007, MARCH 2008.

ROCK EL. = 26'± — APPROXIMATE BEDROCK ELEVATION (MSL)

NOTE:

1. SESI BORING LOCATIONS WERE OBTAINED BY TAPING FROM FIXED OBJECTS AT THE SITE. THE LOCATIONS INDICATED ON THIS PLAN ARE ESTIMATES. NO ACTUAL SITE SURVEY WAS PERFORMED.
2. THE LOCATIONS OF THE BORINGS COMPLETED BY SANTORO ARE ESTIMATED BASED ON SANTORO'S BORING LOCATION PLANS. THE LOCATIONS INDICATED ON THIS PLAN ARE ESTIMATED.

REFERENCE:

1. ALL BOUNDARY, SITE & TOPOGRAPHIC INFORMATION TAKEN FROM PLANS PROVIDED BY TRUISI SUK DESIGN GROUP, NY, NY. DATED MARCH 2008.

NOTE:

THIS PLAN IS FOR LOCATING BORINGS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

30 0 30 60 90

Scale 1" = 30'

rev	date	description

drawn by: YY
checked by: DG
scale: 1"=30'
date: 3/04/08

SESI CONSULTING ENGINEERS, P.C.
SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
12A MAPLE AVE., PINE BROOK, N.J. 07058 PH: 973-808-9050

project: LIBERTY TOWERS
RICHMOND TERRACE
STATEN ISLAND, NY

drawing title: BORING LOCATION PLAN

job no. 7317
drawing no.

FIG-2

APPENDIX A

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-1
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	45.0' ±
BORING BY: General Borings	DATE STARTED: 3/6/2008	GROUNDWATER TABLE DEPTH:	NE
INSPECTOR: GP	DATE COMPLETED: 3/6/2008	0 Hr. NE Date N/A	24 Hr. N/A Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0	SS	S-1	0	2	12	24	50/2		12	FILL: Dark gray brown fine SAND, some Silt, Gravel (11-65)	
5	SS	S-2	5	7	4	6	11	12	15	FILL: Brown fine SAND, trace of Gravel, trace of Silt, Boulders (11-65)	
10	SS	S-3	10	12	28	27	29	30	12	Brown fine SAND, some Silt, trace of Gravel, Boulders (7-65)	
15	SS	S-4	15	17	24	23	85/3		6	Brown fine SAND, some Silt, some Gravel (7-65)	
20										Weathered Rock (4-65)	
25		Run-1	20	25	3	min				**Core Run-1, 20' - 25'; REC = 100%; RQD = 88%** Serpentinite, gray, massive, very strong, hard, medium to fine grained, unweathered, slightly fractured, randomly oriented joints, some highly angled (3-65)	
					5	min					
					5	min					
					4	min					
					5	min					
30		Run-2	25	30	3	min				**Core Run-2, 25'-30', REC = 100%; RQD = 61%** Serpentinite, gray, massive, very strong, hard, medium to fine grained, unweathered, slightly fractured, randomly oriented joints, some highly angled (3-65)	
					5	min					
					4	min					
					4	min					
					4	min					
35		Run-3	30	35	4	min				**Core Run-3, 30'-35'; REC = 93 %; RQD = 70%** Serpentinite, gray, massive, very strong, hard, medium to fine grained, unweathered, slightly fractured, randomly oriented joints, some highly angled (3-65)	
					6	min					
					5	min					
					5	min					
					7	min					
40										Boring Complete @ 35'	

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 3

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-2
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	43.0' ±
BORING BY: General Borings	DATE STARTED: 3/7/2008	GROUNDWATER TABLE DEPTH :	NE
INSPECTOR: GP	DATE COMPLETED: 3/10/2008	0 Hr. NE / Date N/A	24 Hr. N/A / Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0	SS	S-1	0	2	24	29	31	34	10	FILL: Brown SILT, some fine Sand, trace Gravel, Asphalt (11-65)	
5	SS	S-2	5	7	9	12	16	16	15	FILL: Yellow brown fine SAND, some Silt, trace Gravel (11-65)	
10	SS	S-3	10	12	17	25	35	24	18	Gray brown coarse to fine SAND, some Silt, trace Gravel, Boulders (7-65)	
15	SS	S-4	15	17	80/4				12	Brown medium to fine SAND, some Silt, trace Gravel, Boulders (7-65)	
20	SS	S-5	20	22	32	33	36	33	10	Gray brown medium to fine SAND, some Gravel, some Silt with fractured Rock (7-65)	
25	SS	S-6	25	27	50/2"				2	Brown medium to fine Sand, some Gravel, some Silt with fractured Rock (7-65)	
		Run-1	25	30	3	min				**Core Run-1, 25'-30'; REC = 33%; RQD = 0%:**	
					2	min				Serpentinite, light green, massive, very weak, soft, medium to fine grained, highly weathered, extremely fractured	
					4	min				(4-65)	
30					2	min					
					4	min					
		Run-2	30	35	2	min				**Core Run-2, 30' - 35'; REC = 80.9%; RQD = 26%**	
					3	min				Serpentinite, light green, massive, very weak, soft, medium to fine grained, highly weathered, extremely fractured	
					4	min				(4-65)	
35					3	min					
					4	min					
		Run-3	35	40	2	min				**Core Run-3, 35' - 40'; REC = 41%; RQD = 8.3%**	
					2	min				Serpentinite, light green, massive, very weak, soft, medium to fine grained, highly weathered, extremely fractured	
					3	min				(4-65)	
					4	min					
40					3	min					

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

SESI CONSULTING ENGINEERS

PROJECT NAME:	Meadowlands Hospital Addition	BORING NO.	SB-2
LOCATION:	Secaucus, NJ	JOB NO.	7300
		GROUND ELEVATION:	43.0' ±

BORING BY: General Borings	DATE STARTED	3/7/2008	GROUNDWATER TABLE DEPTH: NE		
INSPECTOR: GP	DATE COMPLETED	3/10/2008	0 Hr. NE	Date N/A	24 Hr. N/A	Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
40		Run-4	40	45	3	min				**Core Run-4, 40' - 45'; REC = 46%; RQD =0%**	
					3	min				Serpentinite, light green, massive, very weak, soft, medium to fine grained, highly weathered, extreemly fractured (4-65)	
					2	min					
					2	min					
45					2	min					
										Boring Complete @ 45'	
50											
55											
60											
65											
70											
75											
80											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 4b

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-3
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	45.0' ±

BORING BY: General Borings	DATE STARTED:	3/2/2008	GROUNDWATER TABLE DEPTH :	NE	
INSPECTOR: GP	DATE COMPLETED:	3/2/2008	0 Hr. NE	Date N/A	24 Hr. N/A	Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0	SS	S-1	0	2	7	12	14	22	10	FILL: Olive brown SILT, some Sand, little Gravel (11-65)	
5	SS	S-2	5	7	8	12	16	21	15	FILL: Red brown fine SAND, some Silt, trace Gravel (11-65)	
10	SS	S-3	10	12	13	14	15	17	20	Olive brown fine SAND, some Silt, trace Gravel (7-65)	
15	SS	S-4	15	17	8	13	12	16	20	Red brown clayey SILT, little fine Sand (10-65)	
20										Weathered Rock @ 17' (4-65)	
25										Hollow stem auger refusal on Rock @ 18'	
30										Boring Complete @ 18'	
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 5

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-4
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	48.0' ±

BORING BY: General Borings	DATE STARTED:	3/7/2008	GROUNDWATER TABLE DEPTH :	NE	
INSPECTOR: GP	DATE COMPLETED:	3/7/2008	0 Hr. NE	Date N/A	24 Hr. N/A	Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0	SS	S-1	0	2	6	16	8	15	15	FILL: Gray fine SAND, some Silt, trace Gravel (11-65)	
5	SS	S-2	5	7	10	12	15	15	20	FILL: Brown fine SAND, some Silt, trace Gravel (11-65)	
10	SS	S-3	10	12	12	14	15	17	20	FILL: Brown fine SAND, some Silt, trace Gravel (11-65)	
15	SS	S-4	15	17	50	26	37	51	15	Olive brown coarse to fine SAND, trace Gravel, trace Silt (7-65)	
20	SS	S-5	20	22	38	100/5"				Brown fine SAND, some Silt, trace Gravel with Rock (7-65)	
25										Weathered Rock (4-65)	
30	SS	S-6	25	27	50/0"					Rock (3-65)	
35										Hollow stem auger refusal on Rock @ 26.5'	
40										Boring Complete @ 26.5'	

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 6

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-5
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	46.0' ±
BORING BY: General Borings	DATE STARTED: 3/10/2008	GROUNDWATER TABLE DEPTH: 28'	
INSPECTOR: GP	DATE COMPLETED: 3/10/2008	O Hr. 28' Date 3/10/08	24 Hr. N/A Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0	SS	S-1	0	2	1	7	16	21	10	TOP SOIL (4")	
										FILL: Gray brown fine SAND, some Silt, trace Gravel with Brick pieces	
										(11-65)	
5											
	SS	S-2	5	7	10	11	14	15	18	Gray CLAY **(9-65)**	
										Brown fine SAND, some Silt, trace Gravel	
										(7-65)	
10											
	SS	S-3	10	12	5	8	26	30	18	Red brown fine SAND, and Silt, trace Gravel with Boulders	
										(7-65)	
15											
	SS	S-4	15	17	10	25	39	38	15	Red brown fine SAND, some Silt, trace of Gravel **(7-65)**	
20											
	SS	S-5	20	22	75	45	30	51	20	Red brown fine SAND, trace Gravel, trace Silt with fractured rock	
										(7-65)	
25											
	SS	S-6	25	27	98	100				Weathered Rock	
										(4-65)	
30											
	SS	S-7	30	32	80/3"					Weathered Rock	
										(4-65)	
		RUN-1	32	37	3	min				**Core Run-1, 32' - 37'; REC = 100%; RQD = 50%**	
					7	min				Serpentinite, light green, massive, strong, hard, medium	
35					8	min				grained, slightly weathered, moderately fractured, coated rough	
					7	min				joints	
					6	min				**(3-65)**	
		RUN-2	37	42	7	min				**Core Run-2, 37' - 42'; REC = 100%; RQD = 68.3%**	
					5	min				Serpentinite, light green, massive, strong, hard, medium	
40					7	min				grained, slightly weathered, moderately fractured	

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 7

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-5
LOCATION:	Staten Island, NY	JOB NO.	7317
	0	GROUND ELEVATION:	46.0' ±
BORING BY: General Borings	DATE STARTED 3/10/2008	GROUNDWATER TABLE DEPTH:	28'
INSPECTOR: GP	DATE COMPLETED 3/10/2008	0 Hr. 28' Date 3/10/08	24 Hr. N/A Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
40		Run-2	37	42	5	min				Serpentinite, light green, massive, strong, hard, medium	
					7	min				grained, slightly weathered, moderately fractured (3-65)	
45										Boring Complete @ 42'	
50											
55											
60											
65											
70											
75											
80											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 7b

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-6
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	50.0' ±
BORING BY: General Borings	DATE STARTED: 3/11/2008	GROUNDWATER TABLE DEPTH :	NE
INSPECTOR: GP	DATE COMPLETED: 3/11/2008	0 Hr. NE Date N/A	24 Hr. N/A Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0	SS	S-1	0	2	1	6	7	8	20	6" Topsoil FILL: Brown fine SAND, some Silt, trace Gravel (11-65)	
5	SS	S-2	5	7	8	8	12	15	24	FILL: Brown fine SAND, little Silt, trace Gravel (11-65)	
10	SS	S-3	10	12	9	24	21	36	24	Brown fine SAND, some Silt, little Gravel (7-65)	
15	SS	S-4	15	17	23	50/1"			1		
20	SS	S-5	20	22	34	34	38	53	10	Gray fine SAND, some Silt, little Gravel (7-65) ... weathered rock (4-65)	
25	SS	S-6	25	27	50	50/0"				Rock (3-65) Split spoon refusal on Rock @ 25.5' Boring Complete @ 25.5'	
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 8

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-7
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	59.0' ±
BORING BY: General Borings	DATE STARTED: 3/11/2008	GROUNDWATER TABLE DEPTH: NE	
INSPECTOR: GP	DATE COMPLETED: 3/12/2008	0 Hr. NE / Date	24 Hr. N/A / Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0											
	SS	S-1	0	2	3	5	6	9	16	6" Topsoil FILL: Red/Brown fine SAND and Silt, little Gravel (11-65)	
5											
	SS	S-2	5	7	13	8	7	21	14	FILL: Gray coarse to fine SAND, some Silt, little Gravel with Wood (11-65)	
10											
	SS	S-3	10	12	10	10	10	10	10	Red brown fine SAND, some Silt, trace of Gravel (7-65)	
15											
	SS	S-4	15	17	35	44	50	28	5		
20											
	SS	S-5	20	22	64	69	44	42	10	Red brown medium to fine SAND, little Gravel, little Silt with Cobbles (7-65)	
25											
	SS	S-6	25	25.6	85	50/1			2		
30											
	SS	S-7	30	30.5	77	95			0	No Recovery	
35											
	SS	S-8	35	35.3	50/3				3	Yellow brown coarse to fine SAND, little Gravel, trace Silt with Rock (7-65)	
40		Run - 1	38.5	43.5						**Core Run-1, 38.5' - 43.5'; REC = 87%; RQD = 50%**	

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 9

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-7
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	59.0' ±
BORING BY: General Borings	DATE STARTED	3/11/2008	GROUNDWATER TABLE DEPTH: NE
INSPECTOR: GP	DATE COMPLETED	3/12/2008	Date 3/10/08 24 Hr. N/A Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
40					4	min				Serpentinite, light green, massive, very strong, hard, medium to fine grained, slightly weathered, moderately fractured (3-65)	
					6	min					
					6	min					
		Run-2	43.5	48.5	4	min					
45					6	min				**Core Run-2, 43.5' - 48.5'; REC = 98%; RQD = 48.3%**	
					9	min				Serpentinite, light green, massive, very strong, hard, medium to fine grained, slightly weathered, moderately fractured (3-65)	
					4	min					
					7	min					
50										Boring Complete @ 48.5 FEET	
55											
60											
65											
70											
75											
80											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 9b

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-8
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	70.0' ±
BORING BY: General Borings	DATE STARTED: 3/12/2008	GROUNDWATER TABLE DEPTH: NE	
INSPECTOR: GP	DATE COMPLETED: 3/12/2008	0hr NE / Date	24 Hr. N/A / Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0										6" Topsoil FILL: Gray/Brown medium to fine SAND, some Silt, with Wood, Brick (11-65)	
5											
10											
15											
20										Red brown medium to fine SAND, little Silt, little Gravel, with Cobbles, Boulders (7-65)	
25											
30											
35	SS	S-1	30	32	49	35	34	28	0	Gray/Brown SILT, little fine Sand, little Gravel with Cobbles (10-65)	
40	SS	S-2	35	37	16	21	27	27	24	Gray SILT, little fine sand, trace Gravel (10-65)	

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

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Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 10

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	SB-8
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	70.0' ±
BORING BY: General Borings	DATE STARTED	3/12/2008	GROUNDWATER TABLE DEPTH: NE
INSPECTOR: GP	DATE COMPLETED	3/12/2008	0 Hr. NE / Date / 24 Hr. N/A / Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
40	SS	S-3	40	42	23	47	54	37		Gray brown coarse to fine SAND, trace Gravel, trace Silt	
										(7-65)	
45	SS	S-4	45	45.2	75/2"					Same with Rock	
										(5-65)	
										Hollow Stem Auger Refusal on Rock @ 47 Feet	
50										Boring Complete @ 47 FEET	
55											
60											
65											
70											
75											
80											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted.

Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 10b

SESI CONSULTING ENGINEERS

PROJECT NAME:	Liberty Towers	BORING NO.	B-9
LOCATION:	Staten Island, NY	JOB NO.	7317
		GROUND ELEVATION:	57.0' ±

BORING BY: General Borings	DATE STARTED:	3/2/2008	GROUNDWATER TABLE DEPTH : NE		
INSPECTOR: GP	DATE COMPLETED:	3/2/2008	0 Hr. NE	Date N/A	24 Hr. N/A	Date N/A

DEPTH (ft)	METHOD	SAMPLE No.	DEPTH FROM (ft)	DEPTH TO (ft)	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	SYMBOL
0											
										FILL: Gray brown fine SAND, some Silt, little Gravel (11-65)	
5											
										FILL: Gray brown fine SAND, some gravel, little silt (11-65)	
10											
										Olive brown coarse to fine SAND, some Gravel, trace Silt (7-65)	
15											
20											
	SS	S-1	20	20.5	98/6"				4	Olive brown coarse to fine SAND, some Gravel, trace Silt, with Rock (7-65)	
25										Hollow stem auger refusal on Rock @ 23.0 feet Boring Complete @ 23 FEET	
30											
35											
40											

Nominal I.D. of Hole	in
Nominal I.D. of Split Barrel Sampler	1⅜ in
Weight/type of Hammer on Drive Pipe	300 lb
Weight/type of Hammer on Split Barrel	140 lb
Drop of Hammer on Drive Pipe	in
Core Size	in

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted.

Pp: Pocket Penetrometer; WOH: Weight of Hammer; WOR: Weight of Rod

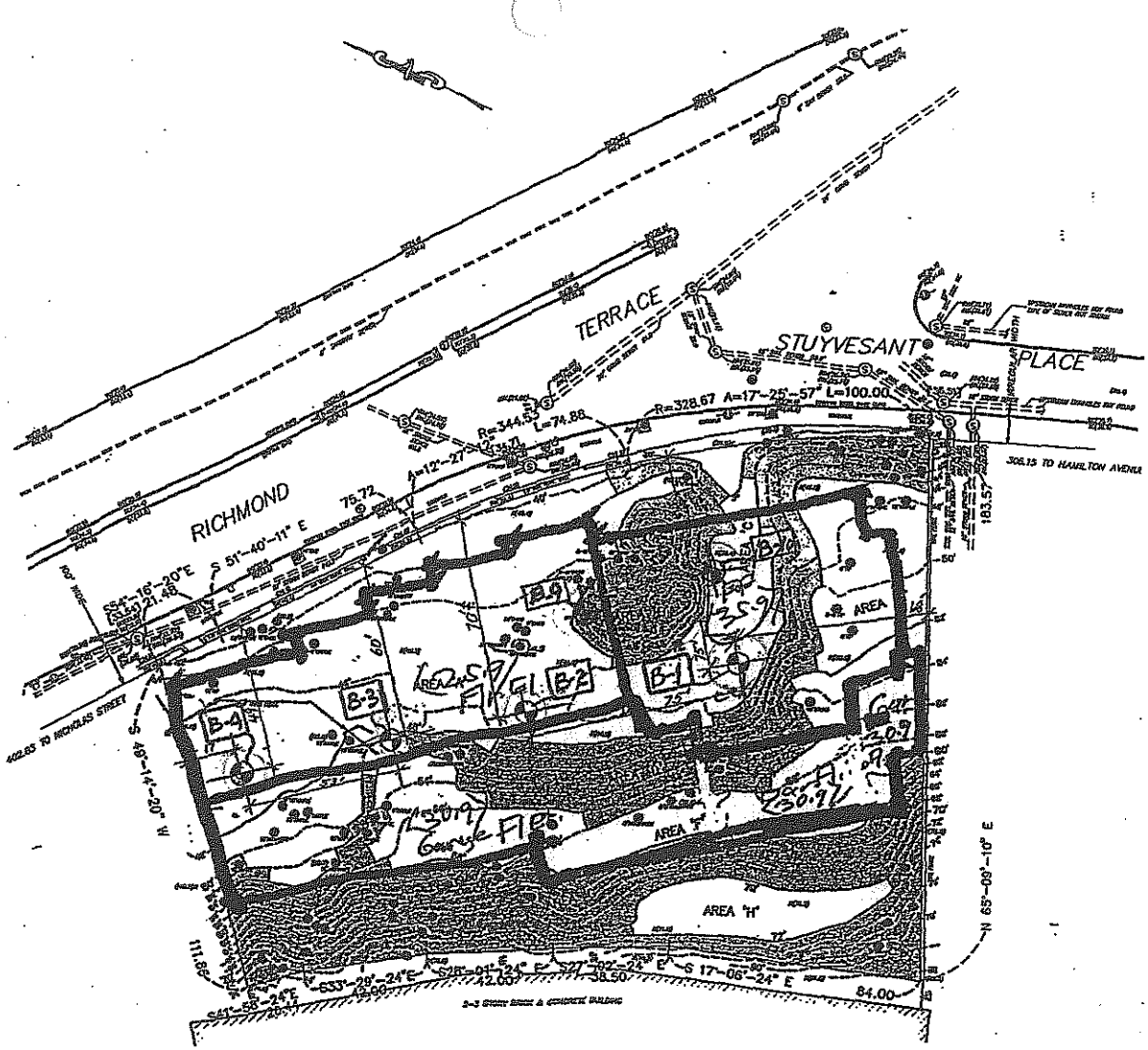
Approximate Change in Strata: _____ Inferred Change in Strata: - - - - - - - - - - - -

Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

FIGURE 11

APPENDIX B

BLOCK-



PLAN SHOWING LOCATION

OF PROPOSED Building

AND Boring FOR Building

SCALE 1" = 40 - 0"

Drawing # 1 of 12

STATE OF NEW YORK
LICENSED PROFESSIONAL ENGINEER
No. 045651

STATE OF NEW YORK
LICENSED PROFESSIONAL ENGINEER
No. 045651

S.I.N.Y.

ALL TYPES OF PLANS, ENGINEERING INSPECTIONS
REPORTS AND CERTIFICATIONS
NEW YORK AND NEW JERSEY

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.C. CERTIFIED ASBESTOS INVESTIGATOR

49 EARLEWOOD DRIVE UNIT 1
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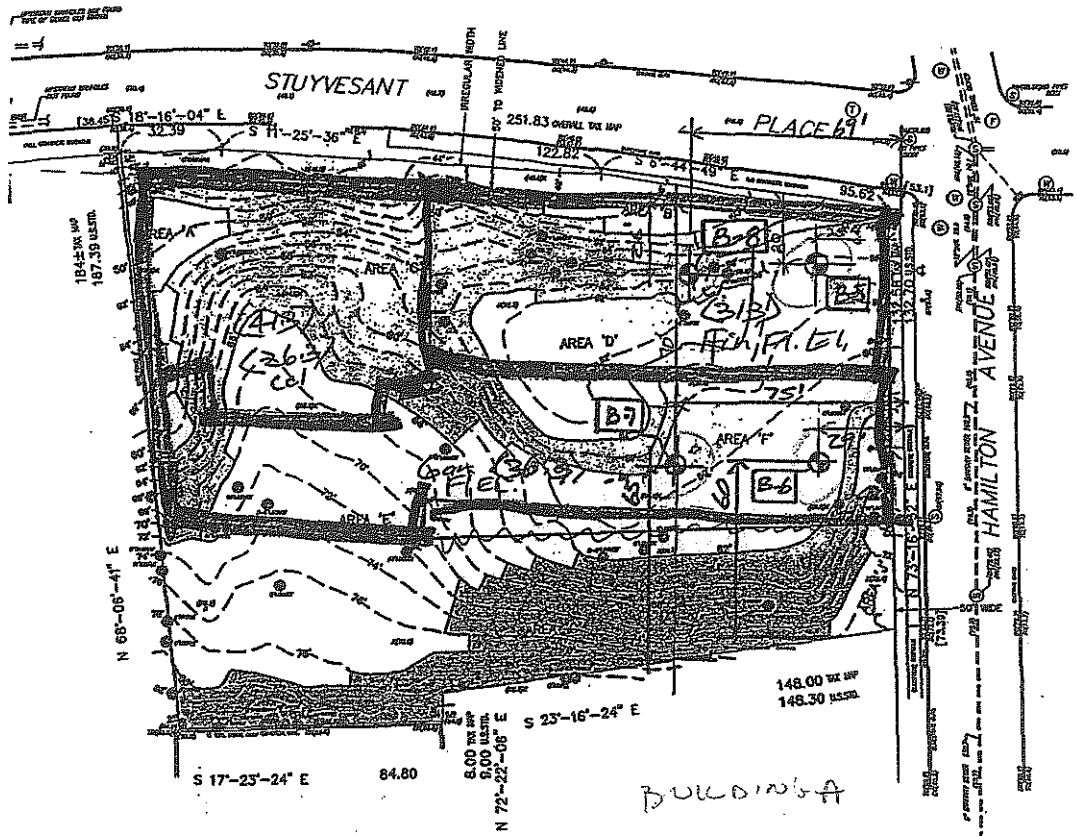
(718) 980-2307
(718) 556-3225
(718) 980-2386 FAX

ANTHONY SANTORO
B.S.E.E., ELT.
Executive Representative/Consultant

Boring B

BLOCK- 17



BUILDING A

23,000 - WORKS

9

DONE

PLAN SHOWING LOCATION

OF PROPOSED BUILDING

AND BORING FOR BUILDING

SCALE 1" = 40 - 0"

Drawing # 2 of 12

STATE OF NEW YORK
GASPARE ROSARIO SANTORO
No. 045501
LICENSED PROFESSIONAL ENGINEER

STATE OF NEW YORK
GASPARE ROSARIO SANTORO
No. 045501
LICENSED PROFESSIONAL ENGINEER

S.I.N.Y.

ALL TYPES OF PLANS, ENGINEERING INSPECTIONS
REPORTS AND CERTIFICATIONS
NEW YORK AND NEW JERSEY

GASPARE R. SANTORO
B.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.C. CERTIFIED ASBESTOS INVESTIGATOR

49 BANCKER AVENUE UNIT 2
STATEN ISLAND, N.Y. 10309
(718) 980-2387
(718) 356-3826
(718) 668-2586 FAX

ANTHONY SANTORO
B.S.E.S., E.I.T.
Executive Representative/Consultant

UNIFIED SOIL CLASSIFICATION

SOIL GROUPS	TYPICAL NAME AND SOIL SYMBOLS
GW	WELL GRADED GRAVEL, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES
(N.Y.C. BUILDING CODE C26-1968)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ.FT.
1 - 65	HARD SOUND ROCK	60
2 - 65	MEDIUM HARD ROCK	40
3 - 65	INTERMEDIATE ROCK	20
4 - 65	SOFT ROCK	8
5 - 65	HARDPAN	8 - 12
6 - 65	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 50% GRAVEL)	6 - 10
7 - 65	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 50% GRAVEL)	3 - 6
8 - 65	FINE SAND	2 - 4
9 - 65	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD MEDIUM SOFT	(5 MAX) (2 MAX) BY TEST
10 - 65	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE MEDIUM LOOSE	3 1.5 BY TEST
11 - 65	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

COMPACTION RELATED TO SPOON BLOWS/FOOT

SAND		SILT & CLAY	
LOOSE	15 OR LESS	SOFT	10 OR LESS
MEDIUM	16 TO 30	MEDIUM	11 TO 22
DENSE	40 OR MORE	HARD	30 OR MORE

"N" — STANDARD PENETRATION TEST
(2"SPOON, 140lb HAMMER, 30"FALL)

N=27 BLOWS PER FOOT

SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2'DRIVE, TO OBTAIN BLOWS PER FOOT(N). SEE 2ND & 3RD 6"INCREMENT

	RHINO CASING	X-HEAVY CASING	SPOON
SIZE, INCHES	6*		2.0
HAMMER WEIGHT, LBS.	—		140
HAMMER FALL, INCHES	—		30

CB - CASING BLOWS PER 1 FOOT DRIVE
SB - SPOON BLOWS PER 6 INCH DRIVE
P - PUSHED BY WEIGHT OF HAMMER

UD - UNDISTURBED SOIL SAMPLE
HO - SAMPLE HAMMER
FEET - DEPTH FROM GND. SUR. NOTED AT EACH 5'

* 3 1/4" ID & 6 1/2" OD Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.G.S.

NOTES:
1.- Boring location shown thus-⊕- and labeled B-1
2.- Blows on spoon must be min. 10 per 6" of penetration, "n"-for 2TSF soil
3.- Boring Log corresponds to location of boring as shown on plan above.
4.- No ground water table encountered.
5.- Drilled by G.R.S., P.E.

FOR BORING LOCATION PLAN, SEE DRAWING # 1 OF 12 DRGS.

B-1

Ground Surface Elevation (43.6)

0'	FILL		n
5'	BLACK SAND SP 7-65	11/11	
7'	FINE SILTY SAND SM 7-65	13/17	
10'		16/19	
12'	FINE SAND, TR. OF CLAY SP 7-65	23/27	
15'		30/32	
17'	FRACT. SERP. ROCK, TRACE OF SILT	25/30	
20'		43/50	
25'	END	58	
30'			
35'			
40'			

Match Line

Match Line

45' 50' 55' 60' 65' 70' 75'

BOROUGH OF STATEN ISLAND

BORINGS FOR BUILDING

APPLICATION #

LOCATION: STUYVESANT PL.

DRAWING # 3 OF 12

DATE: 10-25-06

BLOCK: 13 LOT: See Loc. Plan

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.S. CERTIFIED ASBESTOS INVESTIGATOR
1 Englewood Ave Unit 2
STATEN ISLAND, N.Y. 10314
(718) 356-3826

BORING LOG

Boring Log
Vertical Scale: 1" = 10.00'

UNIFIED SOIL CLASSIFICATION

SOIL GROUPS	TYPICAL NAMES OF SOIL SYMBOLS
GW	WELL GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES
(N.Y.C. BUILDING CODE C26-1103)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ.FT.
1 - GS	HARD SOUND ROCK	60
2 - GS	MEDIUM HARD ROCK	40
3 - GS	INTERMEDIATE ROCK	20
4 - GS	SOFT ROCK	8
5 - GS	HARDPAN	8 - 12
6 - GS	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 10% GRAVEL)	6 - 10
7 - GS	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 10% GRAVEL)	3 - 6
8 - GS	FINE SAND	2 - 4
9 - GS	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & OL) HARD (5 MAX) MEDIUM (2 MAX) SOFT BY TEST	
10 - GS	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE 3 MEDIUM 1.5 LOOSE BY TEST	
11 - GS	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

COMPACTION RELATED TO SPOON BLOWS/FOOT

SAND		SILT & CLAY	
LOOSE	15 OR LESS	SOFT	10 OR LESS
MEDIUM	16 TO 30	MEDIUM	11 TO 20
DENSE	40 OR MORE	HARD	30 OR MORE

"N" — STANDARD PENETRATION TEST
(2"SPOON, 140lb HAMMER, 30"FALL)

N=12 BLOWS PER FOOT

SPOON BLOW COUNT AS GENERALLY SHOWN IN 6" INCREMENTS FOR 2"DRIVE. TO OBTAIN BLOWS PER FOOT(N) ADD 2ND & 3RD 6" INCREMENTS

	CASING	H-HEAVY CASING	SPOON
SIZE, INCHES	5*		2.0
HAMMER WEIGHT, lb.	—		140
HAMMER FALL, INCHES	—		30

CO – CASING BLOWS PER 1 FOOT DRIVE
SO – SPOON BLOWS PER 6 INCH DRIVE
P – PUSHED BY WEIGHT OF HAMMER
UD – UNDISTURBED SOIL SAMPLE
NO – SAMPLE NUMBER
FEET – DEPTH FROM GRD.SUR. NOTED AT EACH 5'

* 3 1/4" I.D. & 6 1/2" O.D. Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.C.S.

NOTES:
1.- Boring location shown thus ⊕ and labeled B-2
2.- Blows on spoon must be min. 10 per 6" of penetration, "n" - for 2 TSF Soil
3.- Boring Log corresponds to location of boring as shown on plan above.
4.- No ground water table encountered.
5.- Drilled by G.R.S., P.E.

STATE OF NEW YORK GASPARE ROSARIO SANTORO LICENSED PROFESSIONAL ENGINEER No. 045570

FOR BORING LOCATION PLAN, SEE DRAWING # 1 OF 12 DWGS.

B-2

Ground Surface Elevation (45.2')

3'	FILL		
5'	BLACK SAND SP 7-65	10/14	
7'	SILTY SAND SM 7-65	13/16	
10'	FINE SAND, TR. OF CLAY SP 7-65	20/25	
15'	FRACTURED SERPENTINE ROCK, TR. OF SILT 7-65	27/30	
20'		34/38	
25'		42/44	
30'	FRACTURED SERPENTINE ROCK	50/56	
35'		61/67	
40'	4-65 END	83	

Match Line

Match Line

BORINGS FOR Building

APPLICATION #

LOCATION: Stuyvesant Pl.

BOROUGH OF STATEN ISLAND

DRAWING # 4 OF 12

DATE: 10-25-06

BLOCK: 13 LOT: See Loc. Plan.

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.S. CERTIFIED ASBESTOS INVESTIGATOR
4 FLAGLER AVE UNIT 2
STATEN ISLAND, N.Y. 10304
(718) 356-3826

Title: BORING LOG

Boring Log
Vertical Scale: 1" = 10.00'

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVEL, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVEL, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES
(N.Y.C. BUILDING CODE C26-1103)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ. FT.
0 - 6S	HARD SOUND ROCK	60
2 - 6S	MEDIUM HARD ROCK	40
3 - 6S	INTERMEDIATE ROCK	20
4 - 6S	SOFT ROCK	8
5 - 6S	HARDPAN	8 - 12
6 - 6S	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 10% GRAVEL)	6 - 10
7 - 6S	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 10% GRAVEL)	3 - 6
8 - 6S	FINE SAND	2 - 4
9 - 6S	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD / MEDIUM / SOFT	(5 MAX) (2 MAX) BY TEST
10 - 6S	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE / MEDIUM / LOOSE	3 / 1.5 / BY TEST
11 - 6S	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

COMPACTION RELATED TO SPOON BLOWS/FOOT			
SAND		SILT & CLAY	
LOOSE	0S OR LESS	SOFT	10 OR LESS
MEDIUM	11 TO 30	MEDIUM	11 TO 29
DENSE	40 OR MORE	HARD	30 OR MORE

"N" — 10-47 BLOWS PER FOOT

STANDARD PENETRATION TEST (2"SPOON, 140lb HAMMER, 30" FALL)

SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2" DRIVE, TO OBTAIN BLOWS PER FOOT(N) USE 2ND & 3RD 6" INCREMENT

	CASING	X-HEAVY CASING	SPOON
SIZE, INCHES	3½		2.0
HAMMER WEIGHT, lb.	—		140
HAMMER FALL, INCHES	—		30

C = CASING BLOWS PER 1 FOOT DRIVE
S = SPOON BLOWS PER 6 INCH DRIVE
P = PUSHED BY WEIGHT OF HAMMER
UD = UNDISTURBED SOIL SAMPLE
NO = SAMPLE NUMBER
FEET = DEPTH FROM GND. SUR. NOTED AT EACH 5'

* 3¼" I.D & 6½" O.D Spiral Casing

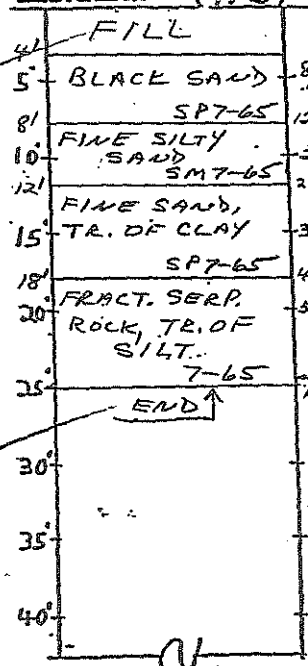
NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.G.S.

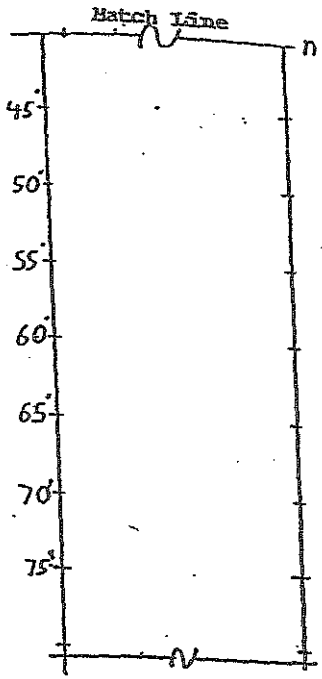
NOTES:
1. Boring location shown thus ⊕ and labeled B-3
2. Blows on spoon must be min. 10 per 6" of penetration, "n". for 2 TSF Soil
3. Boring Log corresponds to location of boring as shown on plan above.
4. No ground water table encountered.
5. Drilled by G.R.S., P.E.

FOR BORING LOCATION PLAN, SEE DRAWING # 1 OF 12 DRGS.

B-3

Ground Surface Elevation (49.5)





BORINGS FOR BUILDING

APPLICATION #

LOCATION: STUYVESANT PL.

BOROUGH OF STATEN ISLAND

DRAWING # 5 OF 12

DATE: 10-25-06

BLOCK: 13 LOT: See Loc. Plan

Title: BORING LOG

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.S. CERTIFIED ASBESTOS INVESTIGATOR
4 ENGLEWOOD AVE UNIT 2
STATEN ISLAND, N.Y. 10309
(718) 356-3826

Boring Log
Vertical Scale: 1" = 10.00'

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVEL AND GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVEL AND GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt.	PEAT AND OTHER HIGHLY ORGANIC SOILS

SOIL BEARING PRESSURES (N.Y.C. BUILDING CODE C26-1603)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ. FT.
1 - 65	HARD SOUND ROCK	60
2 - 65	MEDIUM HARD ROCK	40
3 - 65	INTERMEDIATE ROCK	20
4 - 65	SOFT ROCK	8
5 - 65	HARDPAN	8 - 12
6 - 65	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 50% GRAVEL)	4 - 10
7 - 65	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 50% GRAVEL)	3 - 6
8 - 65	FINE SAND	2 - 4
9 - 65	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD MEDIUM SOFT	(5 MAX.) (2 MAX.) BY TEST
10 - 65	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE MEDIUM LOOSE	3 1.5 BY TEST
11 - 65	GENERALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

COMPACTION RELATED TO SPOON BLOWS/FOOT

SAND		SILT & CLAY	
LOOSE	15 OR LESS	SOFT	10 OR LESS
MEDIUM	16 TO 30	MEDIUM	11 TO 21
DENSE	40 OR MORE	HARD	30 OR MORE

"N" — STANDARD PENETRATION TEST (2" SPOON, 140 lb HAMMER, 30" FALL)

N=17 BLOWS PER FOOT

SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2" DRIVE, TO OBTAIN BLOWS PER FOOT(N) USE 2ND & 3RD 6" INCREMENT

	CASING	X-HEAVY CASING	SPOON
SIZE, INCHES	3¼*		2.0
HAMMER WEIGHT, lbs.	—		140
HAMMER FALL, INCHES	—		30

CB = CASING BLOWS PER 1 FOOT DRIVE

SB = SPOON BLOWS PER 6 INCH DRIVE

P = PUSHED BY WEIGHT OF HAMMER

UD = UNDISTURBED SOIL SAMPLE

NO = SAMPLE MISSED

FEET = DEPTH FROM GND. SUR. NOTED AT EACH 5'

* 3¼" I.D. & 6½" O.D. Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.C.G.S.

NOTES:
1. Boring location shown thus ⊕ and labeled B-4
2. Blows on spoon must be min. 10 per 6" of penetration, "n". for 2TSF soil
3. Boring Log corresponds to location of boring as shown on plan above.
4. No ground water table encountered.
5. Drilled by G.R.S., P.E.

STATE OF NEW YORK — GASPARE R. SANTORO — No. 045501 — LICENSED PROFESSIONAL ENGINEER

FOR BORING LOCATION PLAN, SEE DRAWING # 1 OF 12 DRGS.

B-4

Ground Surface Elevation (47.5) n

3'	FILL	
5'	BLACK SAND SP 7-65	7/9
7'	SILTY SAND SM 7-65	11/15
10'		18/20
11'	FINE SAND, TR. OF CLAY SP 7-65	22/26
15'		30/39
16'	FRACT. SERP. ROCK, TR. OF SILT 7-65	37/40
20'		44/47
25'	END	62
30'		
35'		
40'		

Match Line n — 45' 50' 55' 60' 65' 70' 75' — Match Line

BORO OF STATEN ISLAND

BORINGS FOR BUILDING

APPLICATION #

LOCATION: STUYVESANT PL.

DRAWING # 6 OF 12

DATE: 10-25-06

BLOCK: 13 LOT: See Lot Plan

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.S. CERTIFIED ASBESTOS INVESTIGATOR
4 Heverhurst Drive Unit 2
STATEN ISLAND, N.Y. 10309
(718) 356-3826

Title: BORING LOG

Boring Log
Vertical Scale: 1" = 10.00'

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVEL, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

COMPACTION RELATED TO SPOON BLOWS/FOOT

SAND		SILT & CLAY	
LOOSE	15 OR LESS	SOFT	10 OR LESS
MEDIUM	16 TO 30	MEDIUM	11 TO 20
DENSE	40 OR MORE	HARD	30 OR MORE

	CASING	H-HEAVY CASING	SPOON
SIZE, INCHES	3¼		2.0
HAMMER WEIGHT, lbs.	—		340
HAMMER FALL, INCHES	—		30

ALLOWABLE SOIL BEARING PRESSURES
(N.Y.C. BUILDING CODE C26-1103)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ.FT.
1 - 65	HARD SOUND ROCK	60
2 - 65	MEDIUM HARD ROCK	40
3 - 65	INTERMEDIATE ROCK	20
4 - 65	SOFT ROCK	8
5 - 65	HARDPAN	8 - 12
6 - 65	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 50% GRAVEL)	6 - 10
7 - 65	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 50% GRAVEL)	3 - 6
8 - 65	FINE SAND	2 - 4
9 - 65	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD (5 MAX) MEDIUM (2 MAX) SOFT BY TEST	
10 - 65	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE 3 MEDIUM 1.5 LOOSE BY TEST	
11 - 65	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

"N" — STANDARD PENETRATION TEST (2" SPOON, 140 lb HAMMER, 30" FALL)

6-12-17 BLOWS PER FOOT — SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2" DRIVE, TO OBTAIN BLOWS PER FOOT(#) USE 2ND & 3RD 6" INCREMENT

CB – CASING BLOWS PER 1 FOOT DRIVE
SB – SPOON BLOWS PER 6 INCH DRIVE
P – PUSHED BY WEIGHT OF HAMMER
UD – UNDISTURBED SOIL SAMPLE
NO – SAMPLE NUMBER
FEET – DEPTH FROM GND. SUR. NOTED AT EACH 5'

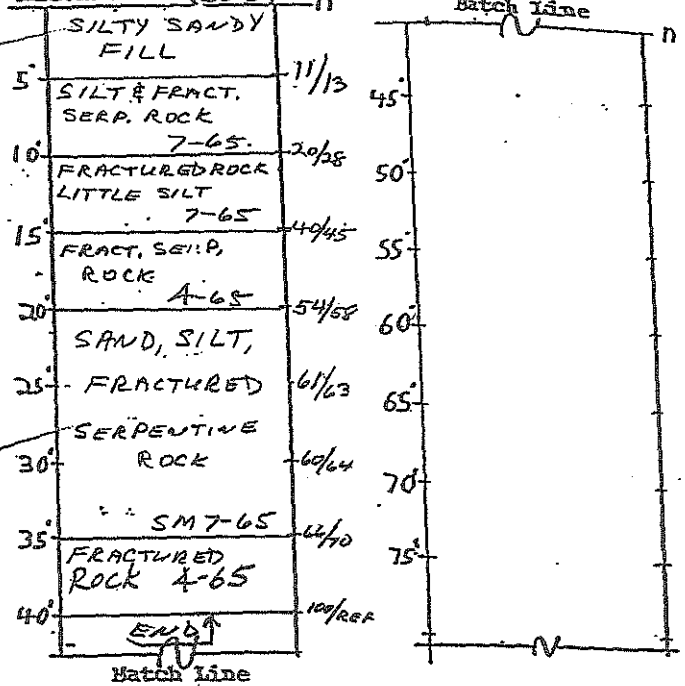
* 3¼" I.D. & 6½" O.D. Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.G.S.

FOR BORING LOCATION PLAN, SEE DRAWING # 2 OF 12 DRGS.

B-5

Ground Surface Elevation (56.3)



BORINGS FOR BUILDING

APPLICATION #

LOCATION: STUYVESANT PL.

BOROUGH OF STATEN ISLAND

DRAWING # 7 OF 12

DATE: 10/25/06

BLOCK: 13 LOT: See Loc. Plan

NOTES:
1. Boring location shown thus ⊕ and labeled B-5
2. Blows on spoon must be min. 10 per 6" of penetration, "n" for 2TSF Soil
3. Boring Log corresponds to location of boring as shown on plan above.
4. No ground water table encountered.
5. Drilled by G.R.S., P.E.

GASPARE R. SANTORO
R.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.C. CERTIFIED ASBESTOS INVESTIGATOR
4 ENGLEWOOD DRIVE UNIT 2
STATEN ISLAND, N.Y. 10309
(718) 356-3826

Title: BORING LOG

Boring Log
Vertical Scale: 1" = 10.00'

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVEL, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVEL, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

(N.J.C. BUILDING CODE 02-4.1(d))

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ. FT.
1 - 6S	HARD SOUND ROCK	60
2 - 6S	MEDIUM HARD ROCK	40
3 - 6S	INTERMEDIATE ROCK	20
4 - 6S	SOFT ROCK	8
5 - 6S	HARDPAN	8 - 12
6 - 6S	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 50% GRAVEL)	6 - 10
7 - 6S	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 50% GRAVEL)	3 - 6
8 - 6S	FINE SAND	2 - 4
9 - 6S	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD / MEDIUM / SOFT	(5 MAX) (2 MAX) BY TEST
10 - 6S	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE / MEDIUM / LOOSE	3 1.5 BY TEST
11 - 6S	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

COMPACTION RELATED TO SPOON BLOWS/FOOT			
SAND		SILT & CLAY	
LOOSE	15 OR LESS	SOFT	10 OR LESS
MEDIUM	16 TO 30	MEDIUM	11 TO 22
DENSE	40 OR MORE	HARD	30 OR MORE

	STANDARD CASING	X-HEAVY CASING	SPOON
SIZE, INCHES	*		2.0
HAMMER WEIGHT, LBS.	—		140
HAMMER FALL, INCHES	—		30

"N" — STANDARD PENETRATION TEST (2" SPOON, 140lb HAMMER, 30" FALL)

N=27 BLOWS PER FOOT

SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2' DRIVE, TO OBTAIN BLOWS PER FOOT(N) USE 2ND & 3RD 6" INCREMENT

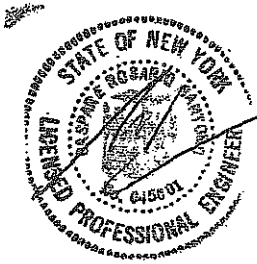
CB — CASING BLOWS PER 1 FOOT DRIVE
SB — SPOON BLOWS PER 6 INCH DRIVE
P — PUSHED BY WEIGHT OF HAMMER
UD — UNDISTURBED SOIL SAMPLE
SD — SAMPLE DAMPER
FEET — DEPTH FROM GND. SUR. NOTED AT EACH 5'

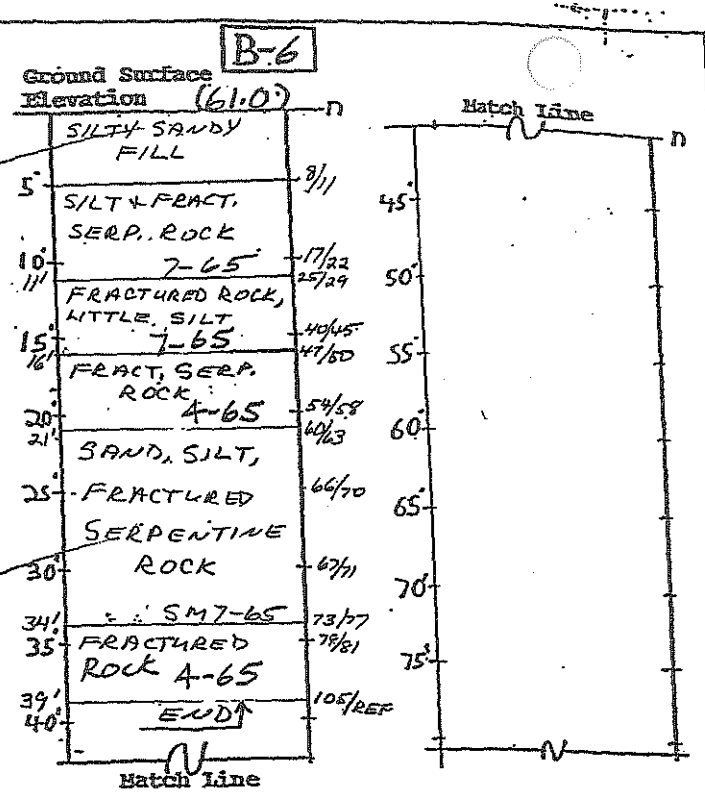
* 3 1/4" I.D. & 6 1/2" O.D. Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.G.S.

NOTES:
1. Boring location shown thus ⊕ and labeled B-6
2. Blows on spoon must be min. 10 per 6" of penetration, "n". for 2TSF Soil
3. Boring Log corresponds to location of boring as shown on plan above.
4. No ground water table encountered.
5. Drilled by G.R.S., P.E.

FOR BORING LOCATION PLAN, SEE DRAWING # 2 OF 12 DWGS.





BORINGS FOR BUILDING

APPLICATION #

LOCATION: STUYVESANT PL.

BOROUGH OF STATEN ISLAND

DRAWING # 8 OF 12

DATE: 1/05/07

BLOCK: 13 LOT: See Loc Plan

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.C. CERTIFIED ASBESTOS INVESTIGATOR
4th ENGINEERING DIST. UNIT 2
STATEN ISLAND, N.Y. 10309
(718) 356-3826

BORING LOG

Boring Log
Vertical Scale: 1" = 10.00'

UNIFIED SOIL CLASSIFICATION

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt.	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES
(N.Y.C. BUILDING CODE C26-1968)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ.FT.
1 - 65	HARD SOUND ROCK	60
2 - 65	MEDIUM HARD ROCK	40
3 - 65	INTERMEDIATE ROCK	20
4 - 65	SOFT ROCK	8
5 - 65	HARDPAN	8 - 12
6 - 65	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 50% GRAVEL)	6 - 10
7 - 65	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 50% GRAVEL)	3 - 6
8 - 65	FINE SAND	2 - 4
9 - 65	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD; MEDIUM; SOFT	(5 MAX) (2 MAX) BY TEST
10 - 65	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE; MEDIUM; LOOSE	3; 1.5; BY TEST
11 - 65	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

COMPACTION RELATED TO SPOON BLOWS/FOOT

SAND		SILT & CLAY	
LOOSE	15 OR LESS	SOFT	10 OR LESS
MEDIUM	16 TO 30	MEDIUM	11 TO 20
DENSE	40 OR MORE	HARD	30 OR MORE

	REMOVE CASING	E-HEAVY CASING	SPOON
SIZE, INCHES	✳		2.0
HAMMER WEIGHT, LBS.	—		140
HAMMER FALL, INCHES	—		30

"N" STANDARD PENETRATION TEST
(2" SPOON, 140lb HAMMER, 30" FALL)

N=27 BLOWS PER FOOT

SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2' DRIVE, TO OBTAIN BLOWS PER FOOT(N). USE 2ND & 3RD 6" INCREMENT

CB – CASING BLOWS PER 1 FOOT DRIVE

SB – SPOON BLOWS PER 6 INCH DRIVE

P – PUSHED BY WEIGHT OF HAMMER

UD – UNDISTURBED SOIL SAMPLE

NO – SAMPLE NUMBER

FEET – DEPTH FROM GRD. SUR. NOTED AT EACH 5'

✳ 3¼" I.D. & 6½" O.D. Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.G.S.

NOTES:
1. Boring location shown thus ⊕ and labeled B-7
2. Blows on spoon must be min. 10 per 6" of penetration, "n" for 2 TSF Soil
3. Boring Log corresponds to location of boring as shown on plan above.
4. No ground water table encountered.
5. Drilled by G.R.S., P.E.

STATE OF NEW YORK — GASPARE ROSARIO SANTORO — LICENSED PROFESSIONAL ENGINEER — No. 046601

FOR BORING LOCATION PLAN, SEE DRAWING # 2 OF 12 DWGS.

B-7

Ground Surface Elevation (59.0')

0'	Silty Sandy Fill	n
4'		12/12
5'	Silt & Fractured Serp. Rock 7-65	16/15
9'		23/26
10'	Fractured Rock Some Silt 7-65	31/33
15'	Fractured Serp. Rock 4-65	37/46
20'		59/68
25'	Sand, Silt & Fractured Serpentine Rock SM 7-65	72/77
30'		80/82
33'		80/92
35'	Fractured Rock 4-65	80/90
38'		110+ Ref.
40'	End	

Match Line — n — 45 — 50 — 55 — 60 — 65 — 70 — 75 — Match Line

BORINGS FOR Boilding

APPLICATION #

LOCATION: Stuyvesant Place

BOROUGH OF STATEN ISLAND

DRAWING # 9 OF 12

DATE: 1/05/07

BLOCK: 13 LOT: See Loc. Plan

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.C. CERTIFIED ASBESTOS INVESTIGATOR
STATEN ISLAND, N.Y. 10307
(718) 356-3826

BORING LOG

Boring Log
Vertical Scale: 1" = 10.00'

UNIFIED SOIL CLASSIFICATION

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES
(N.Y.C. BUILDING CODE C26-1103)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ.FT.
1 - 6S	HARD SOUND ROCK	60
2 - 6S	MEDIUM HARD ROCK	40
3 - 6S	INTERMEDIATE ROCK	20
4 - 6S	SOFT ROCK	8
5 - 6S	HARDPAN	8 - 12
6 - 6S	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GM & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 50% GRAVEL)	6 - 10
7 - 6S	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 50% GRAVEL)	3 - 6
8 - 6S	FINE SAND	2 - 4
9 - 6S	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD / MEDIUM / SOFT	(S BASIC) (2 BASIC) BY TEST
10 - 6S	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE / MEDIUM / LOOSE	3 / 1.5 / BY TEST
11 - 6S	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

COMPACTION RELATED TO SPOON BLOWS/FOOT

SAND		SILT & CLAY	
LOOSE	15 OR LESS	SOFT	10 OR LESS
MEDIUM	16 TO 30	MEDIUM	11 TO 20
DENSE	40 OR MORE	HARD	30 OR MORE

"N" — STANDARD PENETRATION TEST (2"SPOON, 140lb HAMMER, 30" FALL)

N=12 BLOWS PER FOOT — SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2" DRIVE TO OBTAIN BLOWS PER FOOT(N). USE 2ND & 3RD 6" INCREMENT

	CASING	H-HEAVY CASING	SPOON
SIZE, INCHES	*		2.0
HAMMER WEIGHT, LBS.	—		140
HAMMER FALL, INCHES	—		30

CR — CASING BLOWS PER 1 FOOT DRIVE
SR — SPOON BLOWS PER 6 INCH DRIVE
P — PUSHED BY WEIGHT OF HAMMER
UD — UNDISTURBED SOIL SAMPLE
NR — SAMPLE NUMBER
FEET — DEPTH FROM GND. SUR. NOTED AT EACH 5'

* 3 1/4" I.D. & 6 1/2" O.D. Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.G.S.

NOTES:
1. Boring location shown thus ⊕ and labeled B-8
2. Blows on spoon must be min. 10 per 6" of penetration, "n". for 2 ts F Soil
3. Boring Log corresponds to location of boring as shown on plan above.
4. No ground water table encountered.
5. Drilled by G.R.S., P.E.

STATE OF NEW YORK — GASPARE R. SANTORO — LICENSED PROFESSIONAL ENGINEER — No. 045901

FOR BORING LOCATION PLAN, SEE DRAWING # 2 OF 12 DWGS.

B-8

Ground Surface Elevation (55.0')

0'	Silty Sand Fill		
5' 6'		10/12 15/17	45
10' 11'	Silt & Fract. Serpentine Rock 7-65	21/25 30/33	50
15'	Fractured Rock Lt. Silt 7-65	30/38	55
20' 21'	Fractured Serp. Rock 4-65	46/50 55/54	60
25'	Sandy Silt & Fractured Serpentine Rock SM 7-65	59/60	65
30'		70/72	70
34' 35'	Fractured Rock 4-65	75/75 80/79	75
40'	End	100+ Refusal	

Match Line — Match Line

BORINGS FOR Building

APPLICATION #

LOCATION: Stuyvesant Place

BOROUGH OF STATEN ISLAND

DRAWING # 10 OF 12

DATE: 1/05/07

BLOCK: 13 LOT: See Loc Plan

GASPARE R. SANTORO
N.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.S. CERTIFIED ASBESTOS INVESTIGATOR
49 ENGLEWOOD AVE UNIT 2
STATEN ISLAND, N.Y. 10314
(718) 356-3826

Title: BORING LOG

Boring Log Vertical Scale: 1" = 10.00'

UNIFIED SOIL CLASSIFICATION

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND-SILT MIXTURES
SC	CLAYEY SANDS, SAND-CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES
(N.Y.C. BUILDING CODE C26-1103)

CLASS OF MATERIAL	DESCRIPTION	ALLOWABLE BEARING TONS/SQ.FT.
1 - GS	HARD SOUND ROCK	60
2 - GS	MEDIUM HARD ROCK	40
3 - GS	INTERMEDIATE ROCK	20
4 - GS	SOFT ROCK	8
5 - GS	HARDPAN	8 - 12
6 - GS	GRAVEL AND GRAVEL SOILS (SOIL GROUPS GW, GP, GU & GC AND GROUPS SW, SP & SM CONTAINING MORE THAN 50% GRAVEL)	4 - 10
7 - GS	SANDS (OTHER THAN FINE SANDS) (SOIL GROUPS SW, SP & SM BUT CONTAINING NOT MORE THAN 50% GRAVEL)	3 - 6
8 - GS	FINE SAND	2 - 4
9 - GS	CLAYS AND CLAY SOILS (SOIL GROUPS SC, CL & CH) HARD MEDIUM SOFT	(5 MAX) (2 MAX) BY TEST
10 - GS	SILTS AND SILT SOILS (SOIL GROUPS ML & MH) DENSE MEDIUM LOOSE	3 1.5 BY TEST
11 - GS	NORMALLY UNSATISFACTORY BEARING MATERIALS	BY TEST

PACTION RELATED TO SPOON BLOWS/FOOT

SAND		SILT & CLAY	
SE	15 OR LESS	SOFT	10 OR LESS
SUM	16 TO 30	MEDIUM	11 TO 20
SE	40 OR MORE	HARD	30 OR MORE

"N" — STANDARD PENETRATION TEST (2"SPOON, 140lb HAMMER, 30" FALL)

N-27 BLOWS PER FOOT — SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2" DRIVE. TO OBTAIN BLOWS PER FOOT(N) USE 2ND & 3RD 6" INCREMENT

	HEAVY CASING	X-HEAVY CASING	SPOON
DIA. INCHES	4		2.0
DR WEIGHT, LBS.	140		140
DR FALL, INCHES	30		30

CR - CASING BLOWS PER 1 FOOT DRIVE
SB - SPOON BLOWS PER 6 INCH DRIVE
P - PUSHED BY WEIGHT OF HAMMER
UD - UNDISTURBED SOIL SAMPLE
NO - SAMPLE NUMBER
FEET - DEPTH FROM GND. SUR. NOTED AT EACH 5'

X 3 1/4" I.D. & 6 1/2" O.D. Spiral Casing

NOTE: Elevations refer to Borough of Staten Island datum, which is 3.19' above MSL at Sandy Hook, N.J. as established by U.S.G.S.

NOTES:
Boring location shown thus-⊕-and labeled B-9
Blows on spoon must be min. 10 per 6" of penetration, "n".
Boring Log corresponds to location of boring as shown on plan above.
No ground water table encountered.
Drilled by G.R.S., P.E.

STATE OF NEW YORK — GASPARE ROSARIO SANTORO — No. 045601 — LICENSED PROFESSIONAL ENGINEER

FOR BORING LOCATION PLAN, SEE DRAWING # 1 OF 12 DWGS.

B-9

Ground Surface Elevation (50.0)

0		Fill	
3'			
5'		Black Sand SP 7-65	12/14
6'		Sand, Silt & Trace of Clay SM, SC 7-65	12/15
10'			18/22
		Sand, Trace of Clay SP 7-65	
15'			29/36
16'			40/42
		Sand, fn Clay & Fractured Rock 7-65	
20'			60/63
25'		End	69
30'			
35'			
40'			

Match Line

Match Line

BOROUGH OF STATEN ISLAND

BORINGS FOR Building

APPLICATION #

LOCATION: Stuyvesant Place

DRAWING # 11 OF 12

DATE: 1/19/07

BLOCK: 13 LOT: See Loc. Plan

GASPARE R. SANTORO
M.S.C.E., P.E., P.P.
CONSULTING ENGINEER / PLANNER
N.Y.S. CERTIFIED ASBESTOS INVESTIGATOR
4 FENELAND DRIVE UNIT 2
STATEN ISLAND, N.Y. 10314
(718) 356-3826

Title: BORING LOG

Boring Log
Vertical Scale: 1" = 10.00'

APPENDIX C

Porcello Engineering, Inc.
PO Box 728, Pine Brook, New Jersey 07058 Phone: (973) 882-8377 Fax: (973) 882-8478

UNCONFINED COMPRESSION TEST OF ROCK CORE SAMPLE

CLIENT: SESI Consulting Engineers
12A Maple Avenue
Pine Brook, NJ 07058-9742

DATE: 3/13/2008

PROJECT: Liberty Towers
Staten Island, N.Y.

LOCATION of PLACEMENT: Test #1a, SB-2, R-2 30-35 (2"x4")
Test #2a, SB-5, R-1 385 -435 (2"x4")

Rock Core Samples drilled by client and delivered to laboraty

Cylinder ID	Condition of Sample	Cylinder Size (in. x in.)	Area of Cylinder (sq. in.)	Total Load (lbs.)	Compressive Strength (psi)
1a	good	2" x 4"	3.14	17,500	5,580
1b	good	2" x 4"	3.14	18,100	5,770

Report to: 1client; 1file; 1bill