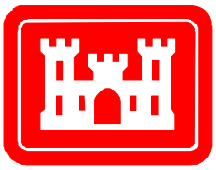
Westchester County Streams,
Byram River Basin
Flood Risk Management
Fairfield County, Connecticut and
Westchester County, New York

Draft Integrated Feasibility Report &
Environmental Impact Statement



Appendix B5 –Geotechnical Engineering

1.0 Introduction

The Byram River watershed is approximately 12,000 acres, with 5,360 acres located within the Town of Greenwich (Town) boundaries. The area has been identified by the Town as a high priority area with immediate needs for drainage improvements to alleviate flooding. A previous study was performed by the United States Army Corps of Engineers (USACE) in 1977, and recommended flood control measures were prepared to mitigate flooding within the Town boundaries during a storm event. The study team reviewed previous documents, compared the results of previous analyses with recent analyses, and made recommendations relative to those presented by USACE previously.

The purpose of this appendix is to present the available existing geotechnical and geologic information at the Byram River Basin, provide an evaluation of soil parameters based on available existing information, and provide recommendations for obtaining additional geotechnical data.

Elevations noted herein are in feet and are referenced to the Mean Sea Level (MSL) datum.

2.0 Existing and Proposed Conditions

2.1 Existing Conditions

The Byram River is approximately 13.5 miles long with an approximately 30-square-mile watershed. The river flows from north to south through five towns in both Connecticut (Town of Greenwich) and New York (Towns of Rye, North Castle, New Castle, and Bedford). The segment of the river for this project area extends approximately 0.75 miles north of and approximately 700 feet south of West Putnam Avenue (Route 1) at the Greenwich, Connecticut-Port Chester, NY border. The site locus is included in **Figure 1.**

2.2 Proposed Construction

Five proposed alternatives are considered for implementing flood control measures at the Byram River. The first alternative is a "no action" alternative. The second alternative includes non-structural flood control measures for the properties adjacent to the river including raising structures, ring-walling structures (i.e. constructing small flood water barriers around structures), wet and dry flood proofing, and/or purchasing structures. The third and fourth alternatives include structural modification to the river channel and surrounding areas. Both the third and fourth alternatives include dredging, channel modification, floodwalls, levees, and slope protection. The fourth alternative also includes removal and replacement of the Route 1 bridges to increase conveyance below the bridges. The fifth alternative considers the removal and replacement of the Route 1 bridges by itself and in conjunction with nonstructural measures.

3.0 Purpose and Scope

The purpose of this study was to review available existing subsurface data and evaluate the subsurface conditions within the Byram River basin and the area immediately surrounding the Byram River, and provide recommendations for obtaining additional data where existing data gaps are present. Specifically, the scope of work included the following:

- Conducting a geotechnical literature survey to characterize soils in the affected area for flood risk management measures;

- Contacting public and private sources, including the NRCS, to determine the availability of existing subsurface data;
- Performing a soil analysis evaluation of the existing geologic and geotechnical data;
- Providing soil parameters evaluated based on the available existing subsurface data;
- Providing recommendations for additional subsurface data required to perform evaluations of the proposed alternatives; and

4.0 Geotechnical Literature Review

During the geotechnical literature review, the study team contacted the following sources for available existing subsurface data at the Byram River project area:

- United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS);
- United States Geological Survey (USGS);
- United States Army Corps of Engineers (USACE);
- New York State Department of Transportation (NYSDOT) Geotechnical Engineering Bureau (GEB);
- Connecticut Department of Energy and Environmental Protection (CT DEEP);
- Town of Greenwich (Town) Planning and Zoning Department and Engineering Department; and
- Previous studies by CDM Smith.

Limited available existing subsurface data was obtained for review of the Byram River Basin. Record boring logs from the construction of the Route 1 bridges in Port Chester, New York were requested from NYSDOT directly with GEB personnel at the Main Office in Albany, New York as well as through a Freedom of Information Law (FOIL) Request (FMO-14-010455). No record borings were available as the bridges were constructed in 1888 and 1926. Record boring logs from recent commercial construction adjacent to the Byram River were requested from the Town, however, no information was available. Additionally, no record boring logs were available from CT DEEP in the vicinity of the project area. Additional records recovered in the vicinity of the project area from these sources and others at the time of revision of this document (February 2018) are included herein.

The Bedrock Geological Map of Connecticut (1985) and Surficial Materials Map of Connecticut (1992) were available from the USGS. The USGS reference materials provided geologic information regarding bedrock type and a general overview of the soil types in the area. The Soil Survey of Fairfield County, Connecticut was available from the USDA NRCS and provided general information of the soil types in the general project vicinity. Information from the USDA NRCS soil surveys provide useful general soil type information typically used for agricultural purposes. Similar general agricultural soil information

was obtained from the Draft Environmental Resources Inventory Report prepared by CDM Smith, dated January 29, 2014.

Record boring location plans, boring logs, and laboratory test results were available from the 1977 USACE report titled *Feasibility Report for Flood Control of the Mamaroneck and Sheldrake River Basin, New York and Byram River Basin, Connecticut* and are included in Attachments A and B. Geotechnical data including soil classifications and soil strength information was obtained from this resource and used in evaluating the soil parameters for the soils at the Byram River Basin.

5.0 Available Existing Subsurface Data

5.1 Bedrock Geology

According to the Bedrock Geological Map of Connecticut (USGS, 1985), the bedrock geology of the project area comprises types of bedrock:

- Harrison Gneiss;
- Schist and Granulite Member; and
- Hartland Formation.

The Harrison Gneiss bedrock is interlayered dark and light gray, medium grained, well-foliated gneiss, composed of andesine, quartz, homblende, and biotite. The Schist and Granulite Member bedrock is interlayered gray to silvery, medium to coarse grained schist and fine grained granofels, composed of quartz, sodic plagioclase, biotite, and muscovite. The Hartland Formation, is predominantly gray, weathered, fine to coarse textured, well-layered muscovite-quartz-biotite-plagioclase-garnet-kyanite-sillimanite schist.

5.2 Surficial Soils

According to the Surficial Materials Map of Connecticut (USGS, 1992), the surficial soils at the project area north of the Route 1 bridge consist of poorly sorted gravel deposits. Various amounts of sand are intermixed within and between the gravel beds. Gravel-sized particles, cobbles, and boulders predominate. South of the Route 1 bridge, the surficial soils consist of artificial fill and thin till strata. Thin till areas are defined as areas where the till is generally less than 10 to 15 feet thick above bedrock. The till is typically loose to moderately compact, sandy in nature, and commonly contains stone of various diameters. Bedrock outcrops were not noted in the general project area in Appendix C of the *Feasibility Report for Flood Control of the Mamaroneck and Sheldrake River Basin, New York and Byram River Basin, Connecticut* (USACE, 1977).

5.3 USACE Record Test Borings

Two subsurface exploration programs were conducted by USACE to investigate the subsurface conditions for the proposed flood control measured at the Byram River. The initial subsurface exploration program consisted of one test boring, DH-8, performed during April 1958. The second subsurface exploration program consisted of six test borings, DH-1 to DH-4, DH-6, and DH-7 performed during June 1976. The limits of the investigation are shown on **Figure 1.**

Test borings were drilled using 3-inch inside diameter (I.D.) flush-jointed casing using drive and wash drilling techniques. The test borings were drilled to depths ranging from 14 to 25 feet below ground surface (bgs).

Split spoon sampling was typically conducted in soils continuously in accordance with ASTM D1586 (using a 2-inch outside-diameter (O.D.) sampler, driven 24 inches by blows from a 300-pound automatic hammer falling freely for 14 inches). The number of blows required to drive the sampler each 6-inch increment was recorded and the Standard Penetration Test (SPT) resistance (N-value) was determined as the sum of the blows over the middle 12 inches of penetration. SPT data was not available at boring DH-8. A USACE representative visually classified the soil samples recovered in the field with general accordance with the Burmister classification system. Representative soil samples from select split spoon samples were collected and stored in jars for subsequent review and geotechnical laboratory testing.

When possible, groundwater levels at the test boring locations were estimated from the condition of the samples obtained and by the observed water levels within the borehole at the time of drilling. All other test borings were backfilled with soil cuttings to the ground surface upon completion and sealed with asphalt patch, where necessary.

The test boring locations were located in the field by taping and line of sight from existing site features. The approximate locations of the as-drilled borings are shown on the plan in Figure C9 in Attachment A. The test boring logs are also included in Attachment A.

5.3.1 Geotechnical Laboratory Testing

Laboratory tests were performed on selected split-spoon samples obtained from the test borings. Grain size analyses were performed on five soil samples (one sample from DH-1, DH-2, DH-3, DH-4, and DH-6) in accordance with ASTM D422. The laboratory test results are included in Attachment B.

5.3.2 Subsurface Conditions

The subsurface conditions encountered at the site typically consisted of asphalt at the ground surface underlain by silt, sand, and sand and gravel. An “organic silt” layer approximately two feet thick was noted in test boring DH-7 at a depth of 10 feet bgs. Based on the high blow count (54 blows per foot (bl/ft)) of this layer and the note of wood in the sample, it is unlikely this stratum is organic silt, which is typically very loose, fibrous material. The sample in DH-7 encountered at 10 feet bgs is likely a buried piece of wood that has begun to decompose.

Asphalt. Asphalt was encountered at two test boring locations, DH-4 and DH-6. The thickness of the asphalt ranged from three to six inches.

Silt. Silt was encountered at four test boring locations, DH-1, DH-2, DH-3, and DH-6. The thickness of this layer ranged between 2 and 4 feet at the exploration locations and typically consisted of brown and gray, loose, SILT, little fine sand, trace fine gravel. SPT N-values in this layer ranged from 4 bl/ft to 7 bl/ft at the exploration locations, with an average value of about 5 bl/ft.

Sand. Sand was encountered at five test boring locations, DH-1, DH-3, DH-6, DH-7, and DH-8. The thickness of this layer ranged between 2 and greater than 12 feet at the exploration locations and typically consisted of brown and gray, loose to dense, fine to medium SAND, trace fine gravel, trace silt. SPT N-values in this layer ranged from 2 bl/ft to 39 bl/ft at the exploration locations, with an average value of about 16 bl/ft.

Sand and Gravel. Sand and Gravel was encountered at six test boring locations, DH-1, DH-2, DH-3, DH-4, DH-6, and DH-8. The thickness of this layer ranged between 1.5 and greater than 14 feet at the exploration locations and typically consisted of brown and gray, loose to very dense, fine to coarse

SAND and fine to coarse GRAVEL, trace silt. SPT N-values in this layer ranged from 5 bl/ft to 57 bl/ft at the exploration locations, with an average value of about 19 bl/ft.

5.3.3 Groundwater Conditions

Where practical, groundwater levels were measured in the borehole at the time of drilling. The recorded groundwater levels ranged between 4.0 and 15.0 feet below ground surface (El. 4.9 to El. 4.0) at test boring locations DH-4 and DH-8, respectively. These groundwater measurements were taken within the casing at the boreholes and may not represent static groundwater conditions.

5.4 Adjacent Subsurface Investigations by Others

Sections 5.4, 5.5, and 6 present information that was collected and reported by others. The team cannot attest to the accuracy or reliability of this information and has not assessed, verified or scrutinized the information. The information is summarized herein to allow for an expedient review of the data available, but should not be considered endorsed by the team.

5.4.1 Greenwich Gate Residences – Greenwich, CT

One subsurface investigation was performed adjacent to the Byram River for construction of a residential building complex at 2 Homestead Ln, Greenwich CT 06831. The investigation consisted of eight (8) borings (B-1 through B-8) and was performed between October 13 and October 20, 2003 by Soil Testing, Inc. of Oxford, CT. The site is located approximately 400 feet east of the Byram River and approximately 200 feet north of West Putnam Avenue. The approximate site location is included in **Figure 1**. A boring location plan and boring logs are included in **Attachment C**.

Documentation indicates that test borings were drilled using 3-inch inside diameter (I.D.) flush-jointed casing using drive and wash or 3 ¾-inch I.D. hollow stem auger drilling techniques. The test borings were drilled to depths ranging from 17 to 42 feet below ground surface (bgs).

According to boring log interpretations, geotechnical split spoon sampling was typically conducted in soils at five-foot intervals. The number of blows required to drive the sampler each 6-inch increment was recorded. Soil sample classifications appear to be in general accordance with the Burmister classification system.

When possible, groundwater levels at the test boring locations were estimated from the condition of the samples obtained and by the observed water levels within the borehole at the time of drilling. Two monitoring wells were installed (B-2 and B-3) using 1" SCH 40 PVC to depths of 40 feet and 32 feet, respectively. No well records were provided; it is likely that both monitoring wells were demolished during construction.

The approximate locations of the as-drilled borings are shown on the plan in Figure C9 in Attachment C. The test boring logs are also included in Attachment C.

No geotechnical laboratory testing data was provided for the test borings performed at 2 Homestead Ln, Greenwich CT, 06831.

5.4.1 Subsurface Conditions

The test boring logs indicate that the subsurface conditions encountered at the site typically consist of Fill underlain by Sand and Gravel or Sand. Based on the logs, these strata are further described as follows:

Fill. Fill was encountered at all test borings at ground surface and ranges between 5 ft and 26.5 ft thick at the test boring locations and typically consists of dry to moist, medium dense to very dense brown to dark brown, fine to coarse SAND, little to "and" fine to coarse gravel, little to some silt, trace brick, trace steel, trace concrete. Cobbles and boulder were encountered throughout the Fill layer. SPT N-values in this layer range from 5 blows per foot (bl/ft) to greater than 50 bl/ft, with an average of 29 bl/ft at the test boring locations.

Sand and Gravel. Sand and Gravel was encountered beneath Fill at five (5) test boring locations (B-1 through B-3, B-6, and B-7). Where encountered, this layer ranged from greater than 5.5 feet to greater than 15 feet thick. The Sand and Gravel layer typically consists of moist to wet, medium dense to dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little to some silt. SPT N-values in the Sand and Gravel layer range from 10 bl/ft to greater than 90 bl/ft, with an average of 37 bl/ft at the test boring locations.

Sand. Sand was encountered beneath Fill at three (3) test boring locations (B-4, B-5, and B-8). Where encountered, this layer ranged from greater than 17 feet to greater than 22 feet and typically consists of moist to wet, medium dense, brown, fine to medium SAND, little to some fine to coarse gravel, little silt. SPT N-values in the Sand layer range from 12 bl/ft to 56 bl/ft, with an average of 25 bl/ft at the test boring locations.

5.4.3 Groundwater Conditions

The recorded groundwater levels ranged between 8.0 and 28.0 feet below ground surface at the test boring locations. According to the 2013 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, Fairfield County, Connecticut Panel 494 of the majority of the site lies within the Special Flood Hazard Area with a 100-year flood elevation of approximately El. 17 (North American Vertical Datum 1988).

5.5 Regional Subsurface Investigations by Others

Data from three subsurface investigations within the Village of Port Chester and the Town of Greenwich were obtained for the purpose of this review of existing data. All approximate project locations are included in **Figure 1.**

5.5.1 Proposed Restaurant - Port Chester, NY

A subsurface investigation and report was performed and prepared by Melick-Tully and Associates, P.C. for a planned restaurant in the Village of Port Chester, Westchester County, NY at Abendroth Ave, approximately 350 feet north of Westchester Ave. The site is located along the Byram River approximately 0.85 miles south of the Route 1 crossing over the Byram River. The investigation included three test borings drilled using hollow stem auger methods to depths ranging from 27 to 51 feet below ground surface on August 19, 2011. Soils encountered consisted of the following:

- **Topsoil:** Topsoil ranges from four to six inches across the site.
- **Fill:** Fill ranges from 10 feet to 16 feet below ground surface and consists of silty sands with various amounts of cinders, brick, concrete, and glass.
- **Organic Silt:** Organic Silt ranges from one to seven feet in thickness at depths ranging from 17 to 20.5 feet below ground surface and consists of soft to medium clayey silt.

- **Silty Sand:** Silty Sand ranges from 27 to 46 feet below ground surface and consists of loose to very dense sand or sandy silt.

Groundwater was observed at the time of the study at depths of approximately ten feet below ground surface. Geotechnical laboratory tests were performed on four samples. The report text, boring location plan, test boring logs, and lab test results are included in **Attachment D**.

5.5.2 High Street/Boston Post Road – Port Chester, NY

A subsurface investigation and report was performed and prepared by Carlin, Simpson, and Associates at a site located in Port Chester, NY for the United Hospital site at the intersection of High Street and Boston Post Road. The investigation consisted of twenty-five (25) borings performed for a memo dated October 23, 2014. A second phase was performed at the site consisting of twelve (12) test borings between November 18 and November 19, 2015 as part of a Fugitive Dust Control Plan to reduce the impact of dust on the nearby community during construction and soil handling activities. A memorandum, boring location plan, and summary of subsurface conditions is provided for the initial project phase consisting of 25 borings. A boring location plan and test boring logs are provided for the 12 phase 2 test borings. Soil encountered generally consisted of the following:

- Asphalt/Topsoil: Asphalt or Topsoil was encountered at the surface at the test boring locations. Asphalt ranges from 2 inches to 3 inches thick and is underlain by 3 inches to 6 inches of gravel. Topsoil encountered ranges from 5 inches to 11 inches thick.

- Fill: The Fill material beneath the Asphalt of Topsoil concludes at depths ranging from 2 feet to 8 feet below ground surface and consists of loose to medium dense, brown, fine to coarse SAND, little silt, trace to some fine to coarse gravel.

- Sand with Silt and Gravel or Sandy Silt with Gravel: Underlying Fill are natural materials consisting of medium dense to dense, brown, fine to coarse SAND, little to some silt, trace to some fine to coarse gravel or SILT and fine to coarse SAND, little fine to coarse gravel. This layer transitions to completely weathered or decomposed rock at depths ranging from 2 feet to 15.5 feet below ground surface

- Bedrock: Gneiss bedrock or auger refusal was encountered at twenty-eight test boring locations at depths ranging from 4 feet to 28 feet below ground surface. Rock cores were taken at thirteen test boring locations. Rock quality designation (RQD) of the cores ranged from 0 percent to 70 percent.

Groundwater was encountered at six test boring locations at the time of drilling at depths ranging from 8 feet to 12 feet below ground surface. The subsurface investigation memo, boring location plans, and available boring logs are included in **Attachment D**.

5.5.3 Armstrong Court Residential Development – Greenwich, CT

A subsurface and environmental sampling investigation was conducted at Armstrong Court in Greenwich CT for residential development in two phases. The phase 1 investigation was conducted by Melick-Tully and Associates, PC on October 24, 2014 and included four test pits. Phase 1

environmental sample was collected for each test pit. Each sample was screened for volatile organic compounds using a photoionization detector (PID), and submitted to a Connecticut DPH certified laboratory for target analyte testing. Soils encountered consisted of 12 to 15 inches of topsoil of 7 feet of silty sand or clayey silt fill. Underlying fill materials were natural sands, clayey silts, and organic silt/peat. A summary of the investigation, phase 2 report, test pit location plan, test pit logs, and summary of laboratory test results are included in **Attachment D**.

5.6 Earthquake Considerations

For the purpose of determining the earthquake forces for the proposed flood improvement structures in accordance with Section 1615.2 of the 2003 International Building Code (Code), the site class should be considered as Site Class "D". Therefore, the spectral accelerations shall be modified for Site Class D when determining the design earthquake response accelerations and seismic design category for the seismic analysis at the site.

The corresponding peak ground acceleration (PGA) was evaluated at the site to be 0.142g in accordance with Section 1802.2.7 of the Code. Based on the available existing subsurface data, the soils at the site are no considered susceptible to liquefaction.

5.7 Evaluation of Available Existing Subsurface Data

As presented, the availability of the existing subsurface data is limited to bedrock and surficial soils maps and seven relatively shallow borings performed on the banks of the Byram River. The existing test borings are spaced, on average, approximately 500 feet or more apart and were not drilled into impervious strata or bedrock. It was noted in the 1977 USACE study that additional borings would be needed to evaluate the presence of an impervious strata for underseepage control and the presence and depth to the top of bedrock. Additionally, no test borings were performed in the Byram River channel to evaluate the soil types and thicknesses at the channel bottom. Subsurface data within the channel is critical for dredging operations and construction of channel modifications. The laboratory test data from the existing test borings is limited as well.

The infrequent spacing of the existing test borings along the Byram River bank, insufficient subsurface data indicating the location and thicknesses of impervious strata and bedrock, lack of subsurface data from within the river channel, and limited laboratory test data from the project area indicates multiple data gaps. Additional data should be obtained to fill the data gaps to effectively evaluate the proposed flood control alternatives.

6.0 Evaluation of Soil Parameters Based on Available Existing Subsurface Data

Soil parameters were evaluated based on the results of the limited Standard Penetration Tests (SPT) and geotechnical laboratory tests. The Bowles (1996), Schmertmann (1977), and Peck, Hanson and Thornburn (1974) correlations between blow count and friction angle, and correlations from the Naval Facilities Engineering Command Design Manual 7.01 were used in conjunction with the SPT N-values to evaluate each soil layer's friction angle, ϕ. The cohesion term was estimated to be zero due to the granular nature of the soils described in the available existing subsurface data. Dry unit weight of the soil, γ, was evaluated using the saturated water content of the soil, the grain-size distribution and the N-values. The thickness of each soil layer was evaluated using the subsurface information from the June 1976 test borings. The evaluated soil parameters for the strata encountered in the record test borings are present in Table 1.

Table 1. Summary of Evaluated Soil Parameters

Strata	γ (pcf)	ϕ (degrees)	c (psf)
Silt	115	29	0
Sand	115	31	0
Sand and Gravel	120	32	0

It should be noted that the soil parameter evaluation is preliminary and is based on very limited subsurface data. The available subsurface data does not cover all locations of the project area requiring evaluation. The soil parameters should be re-evaluated once additional subsurface data is available.

7.0 Recommendations

Based on the review of existing geotechnical and geologic literature and available existing subsurface data at the Byram River Basin project area, we have identified multiple data gaps. While the data gaps that were noted may not present significant issues during the formulation of potential flood control alternatives at the conceptual stage, the data gaps will present issues for the flood control alternatives at the design stage and therefore must be filled. We are recommending the following for obtaining additional subsurface data:

- Conduct additional test borings along the length of the project alignment. Marine test borings should be conducted to obtain subsurface data within the river channel at segments of the Byram River where dredging and channel modification are proposed. Land test borings should be conducted along both river banks where proposed structural improvements are planned.

- Conduct test borings to greater depths. The available existing test borings did not extend into an impervious stratum, nor were the test borings drilled to the top of bedrock. Depth and thickness of the impervious strata are crucial in design and evaluation of floodwalls and for designing against underseepage at levees.

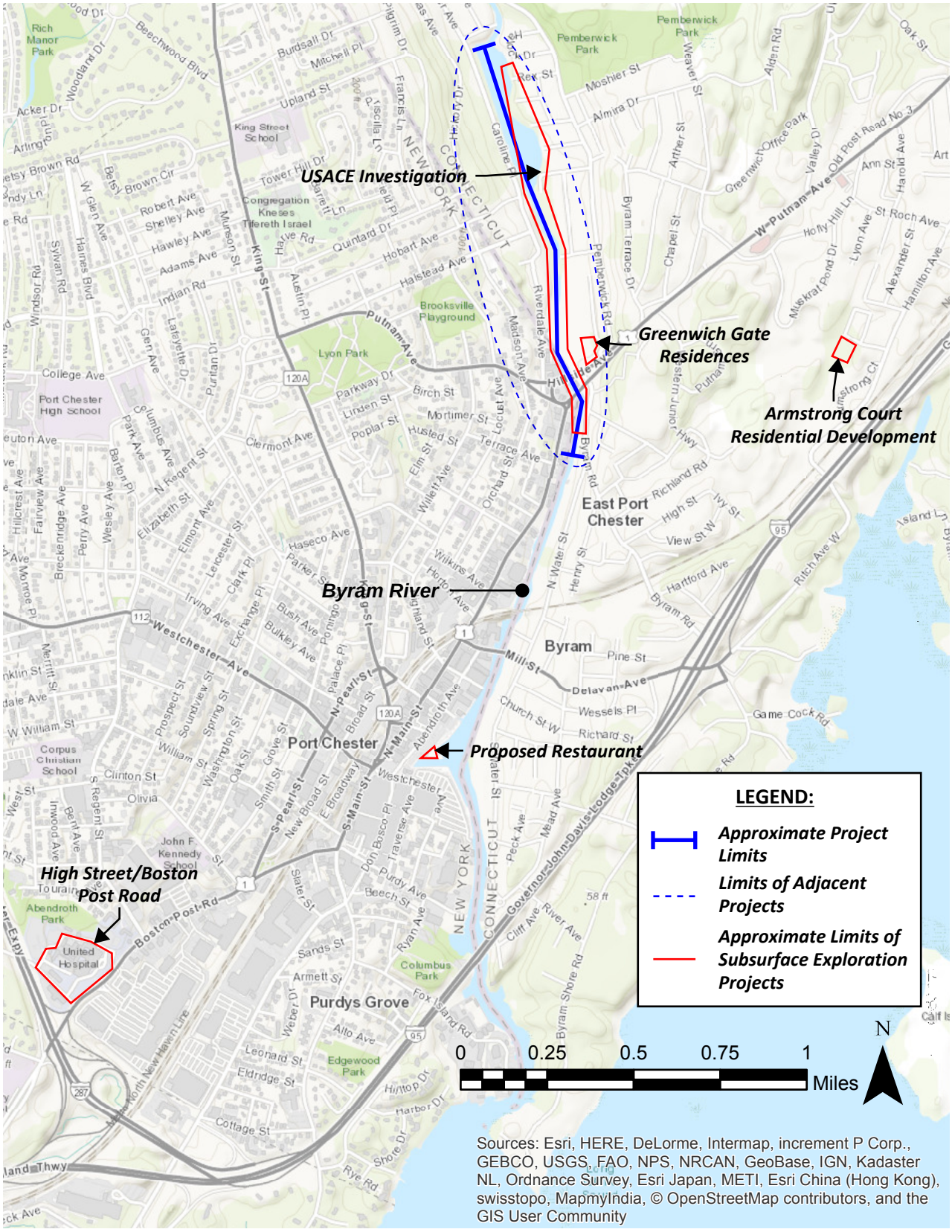
- Conduct additional geotechnical and analytical laboratory testing on samples collected during the future test boring program. Geotechnical laboratory testing should be focused on the application of the proposed alternative from where the test boring was performed (i.e. triaxial tests should be conducted to evaluate undrained shear strength where rotational failures of a floodwall could occur). Analytical testing should be performed on samples collected from the river channel for evaluation of waste disposal requirements during construction.

Attachments:

Figure 1 - Site Locus and Subsurface Explorations
Attachment A - Subsurface Exploration Location Plan and Boring Logs (USACE, 1977)
Attachment B - Geotechnical Laboratory Test Results (USACE, 1977)
Attachment C - Adjacent Subsurface Investigations by Others
- Greenwich Gate Residences – Greenwich, CT

Attachment D - Regional Subsurface Investigations by Others
- Proposed Restaurant – Port Chester, NY
- High Street/Boston Post Road – Port Chester, NY
- Armstrong Court Residential Development – Greenwich, CT

B5 Geotechnical Appendix
Figure



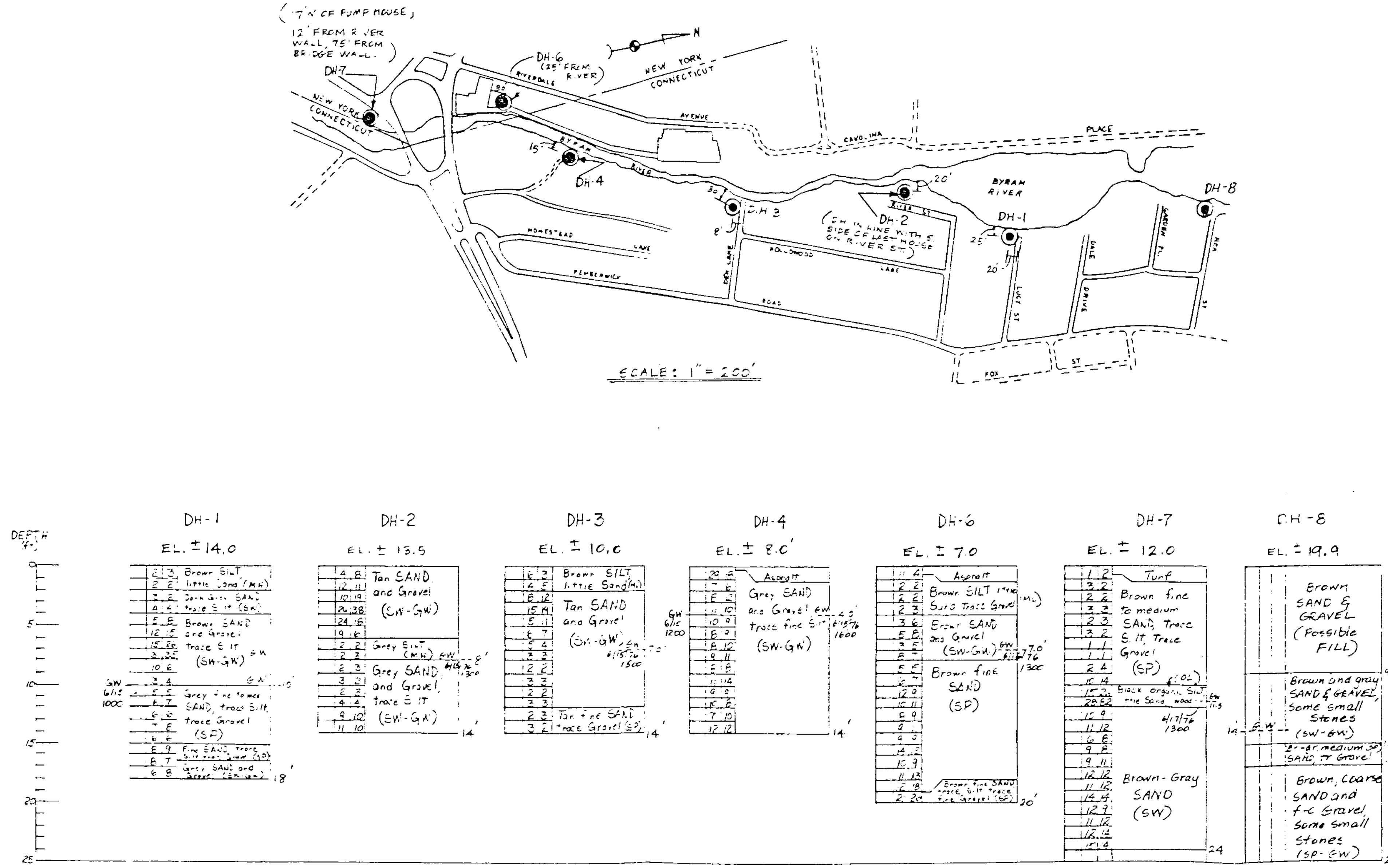
CDM Smith

TOWN OF GREENWICH, FAIRFIELD COUNTY, CONNECTICUT

FLOOD RISK MANAGEMENT AND WATERSHED MANAGEMENT
BYRAM RIVER BASIN

SITE LOCUS AND SUBSURFACE EXPLORATIONS
FIGURE 1
MARCH 2018

B5 Geotechnical Appendix
Attachment A



GENERAL NOTES

LEGEND

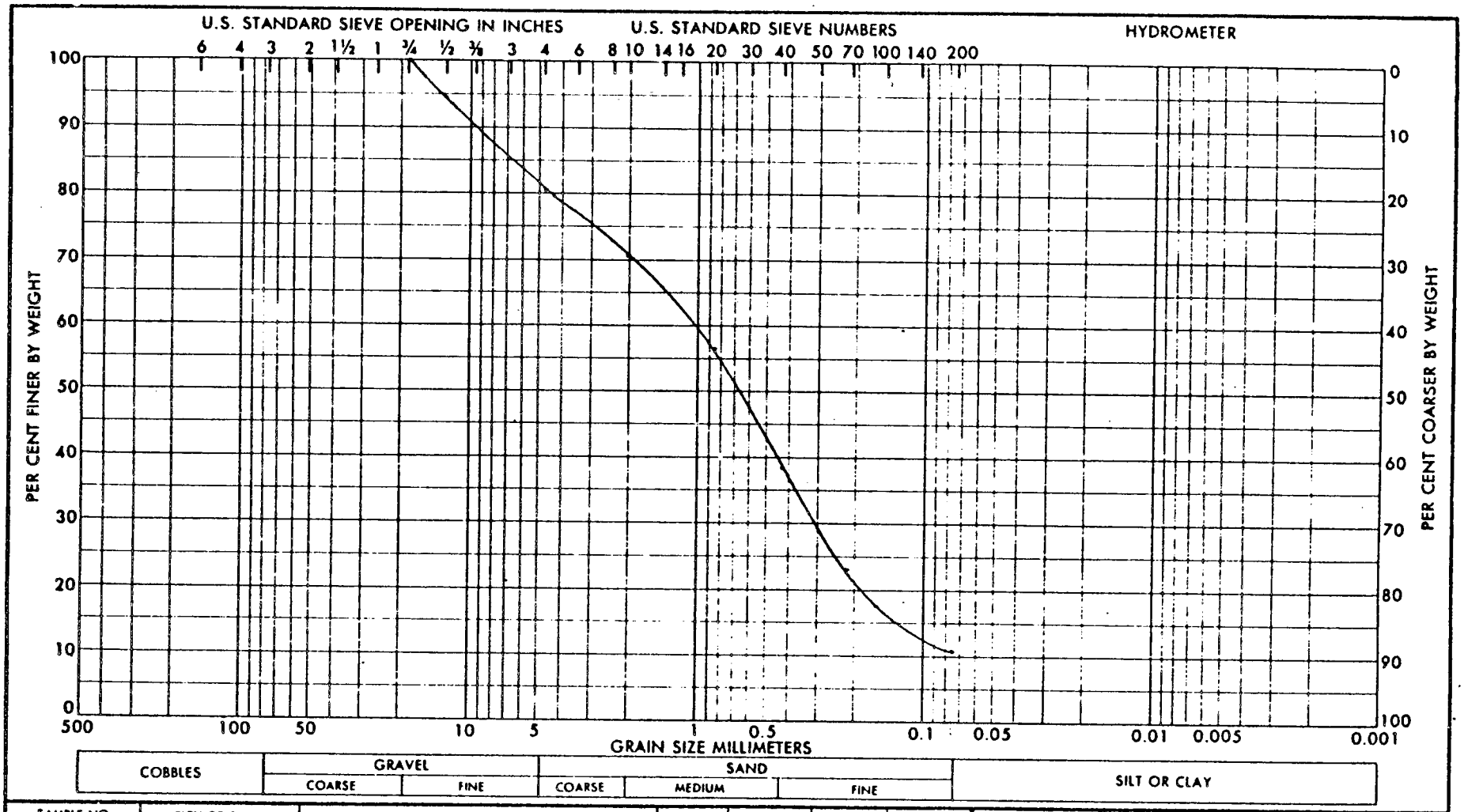
SUB-SURFACE EXPLORATIONS

BYRAM RIVER

GREENWICH, CONN. — PORT CHESTER, NEW YORK

FIGURE C9

B5 Geotechnical Appendix
Attachment B

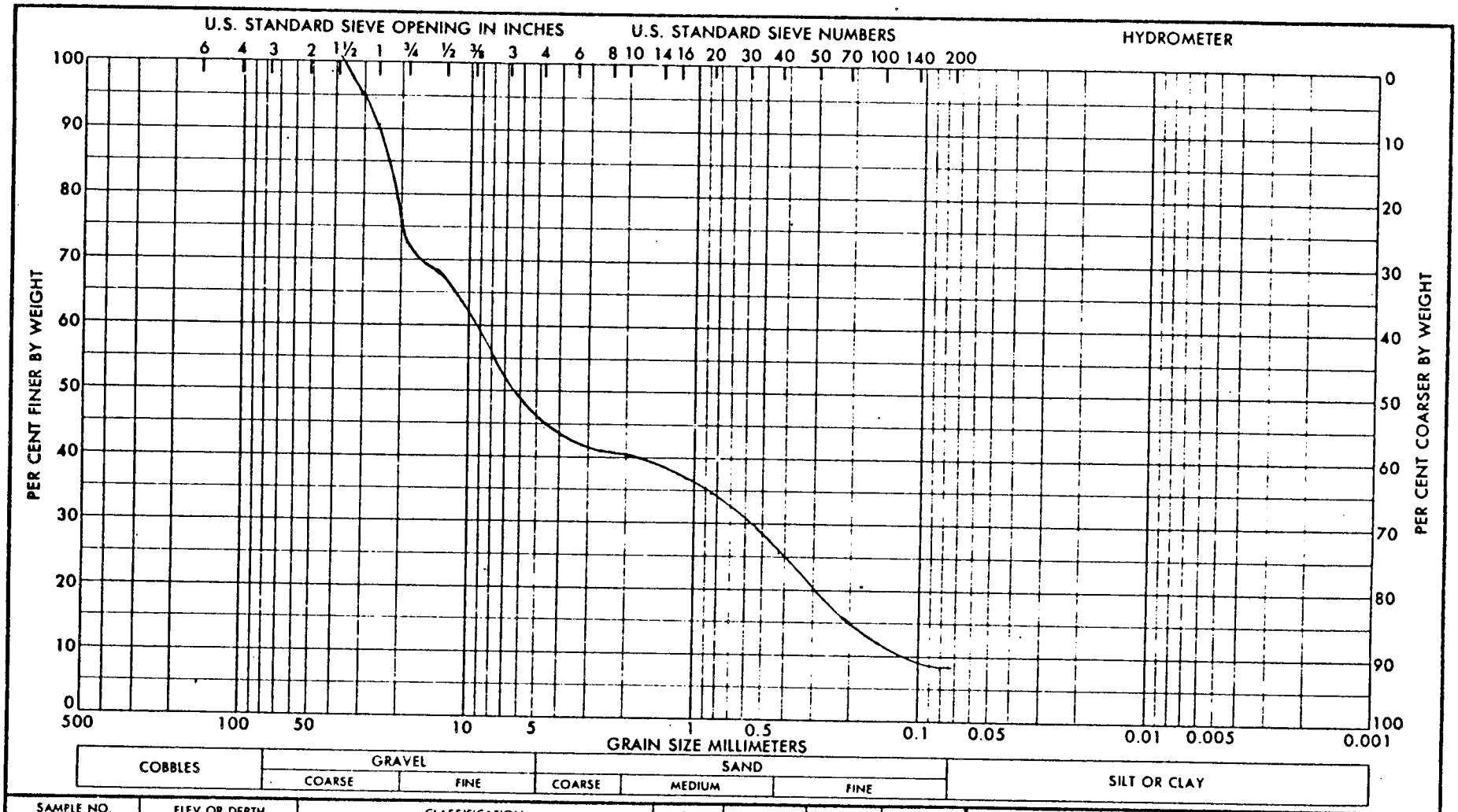


SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
7	12'-14'	Gray f/c SAND, little gravel and silt. (SW)				

GRADATION CURVES

PROJECT: Corps. of Engineers Byram River
AREA: N.Y. District
BORING NO: 1
DATE: 27 April 1977

FIGURE C10

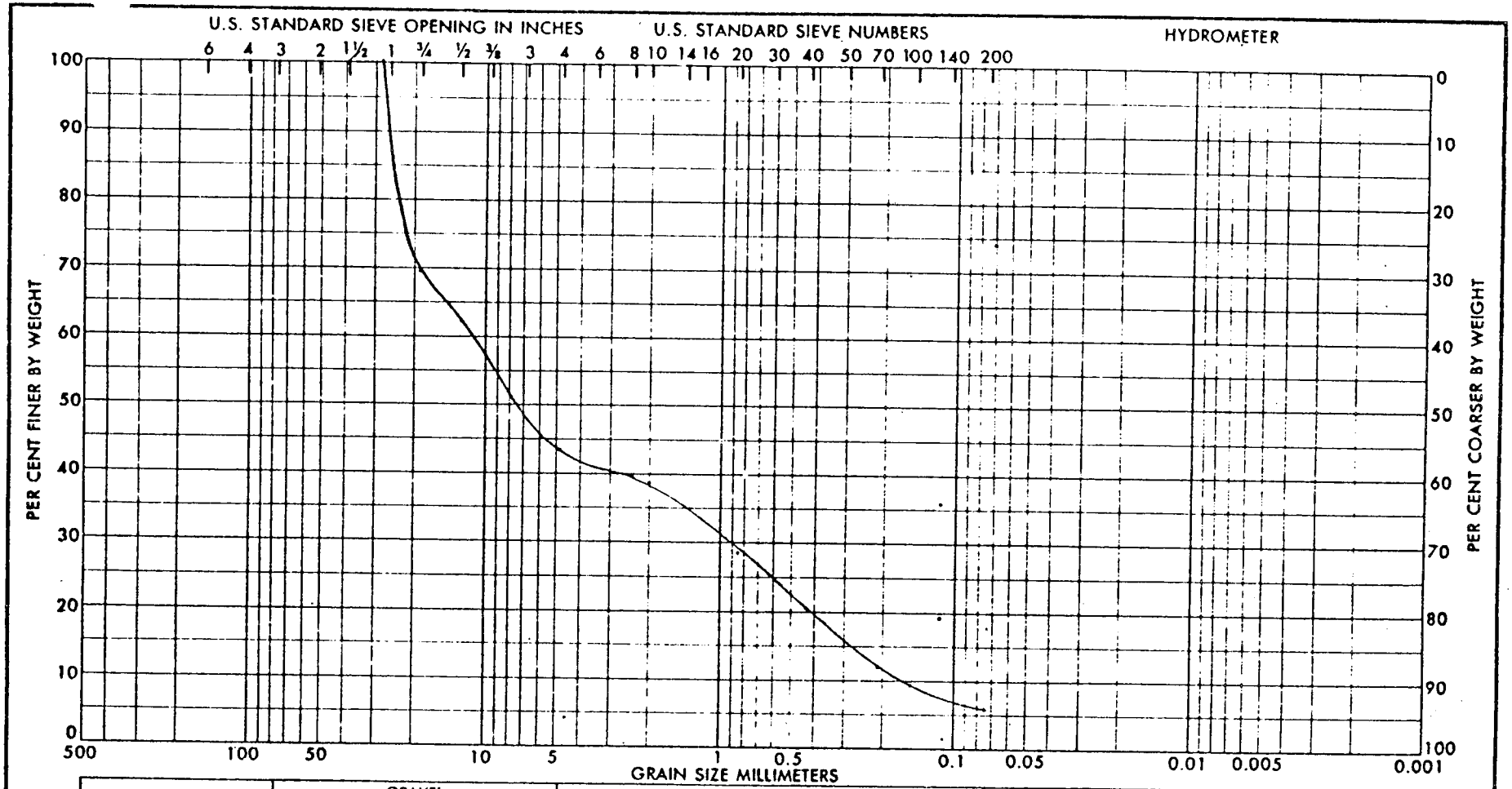


SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
6	10'-12'	Gray f/c SAND & GRAVEL, trace of silt, (GW-SW)				

GRADATION CURVES

PROJECT: Corps. of Engineers
N.Y. District
AREA: Byram River
BORING NO.: 2
DATE: 27 April 1977

FIGURE C11

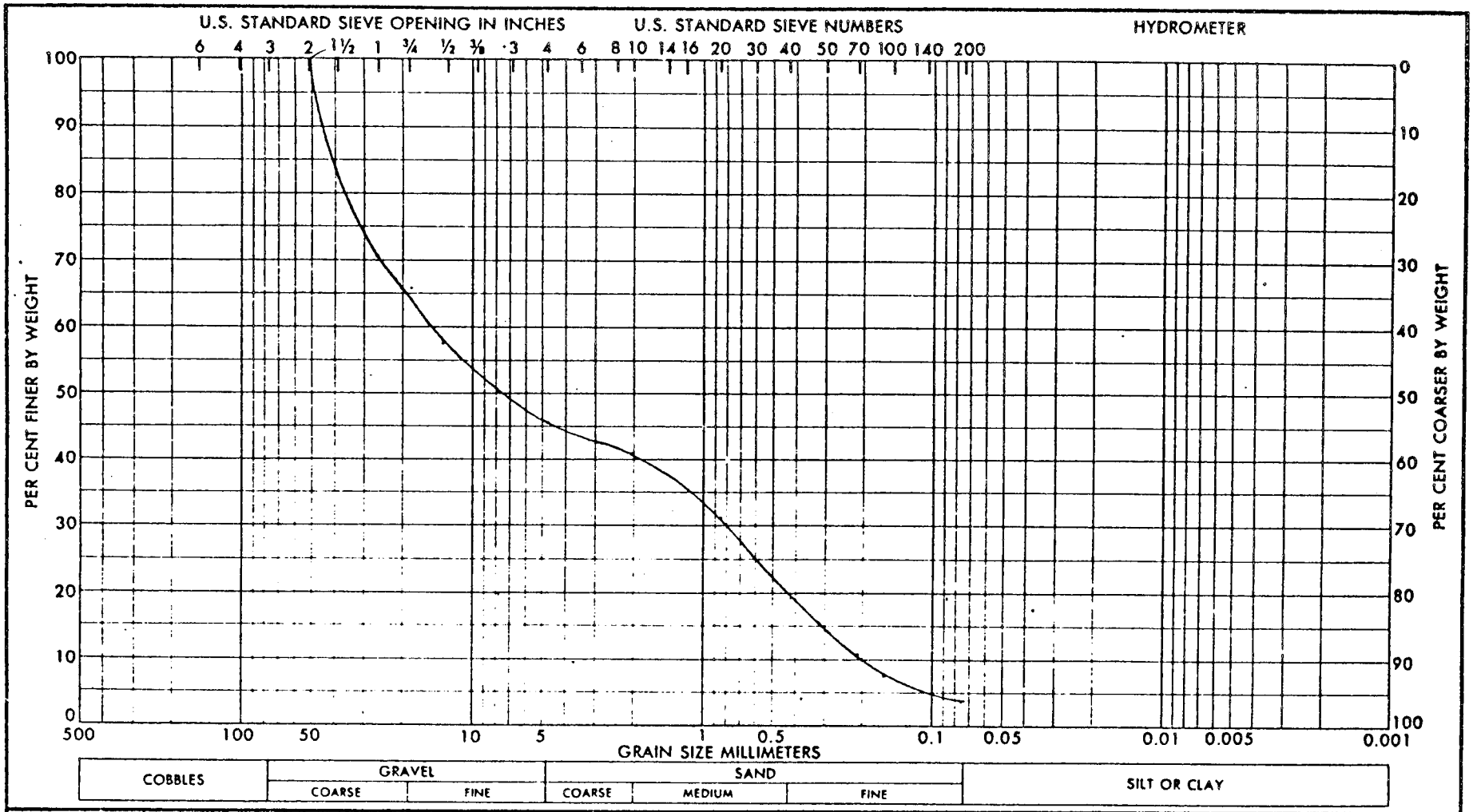


SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
5	8'-10'	Brown GRAVEL and f/c SAND, trace of silt. (GW-SW)				

GRADATION CURVES

PROJECT Corps. of Engineers
N.Y. District
AREA Byram River
BORING NO. 3
DATE 27 April 1977

FIGURE C12

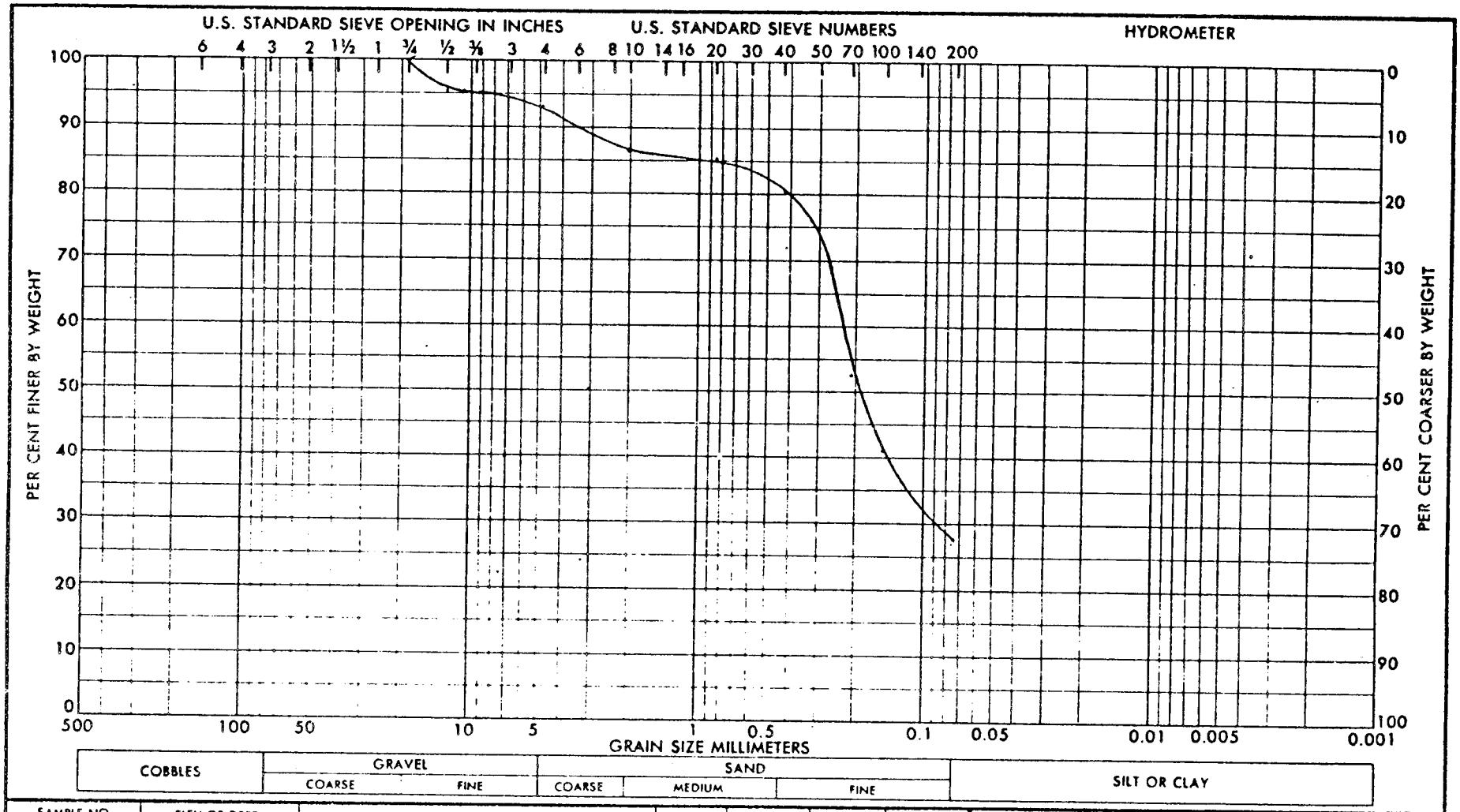


SAMPLE NO	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
5	8'-10'	Brown f/c SAND & GRAVEL, trace of silt. (GW)				

GRADATION CURVES

PROJECT	Corps. of Engineers
	N.Y. District
AREA	Byram River
BORING NO	4
DATE	27 April 1977

FIGURF C13



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
2	6'-8'	Brown f/m SAND, some silt, trace of gravel. (SM)				

GRADATION CURVES

PROJECT: Corps. of Engineers
N.Y. District

AREA: Byram River

BORING NO. 5

DATE: 27 April 1977

FIGURE C14

B5 Geotechnical Appendix
Attachment C

ATTACHMENT C

ADJACENT SUBSURFACE INVESTIGATIONS BY OTHERS

- GREENWICH GATE RESIDENCES – GREENWICH, CT (2003)
  - EXPLORATION LOCATION PLAN AND LOGS BY SOIL TESTING, INC.

REPLACE EXISTING ASPHALT SIDEWALK WITH CONCRETE SIDEWALK

N 13° 39' 30" W 177.12'

S 61° 02' 20" W 100.87'

SETBACK LINE (TYP.)

61' UNDER

GARAGE UNDER

PROPOSED BUILDING
F.F. 27.5
GARAGE EL. 18.0
F.L. 21.0

B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8

171.25'

216'

35'

37.5'

40'

8" C.P.P.

6" WATER
4" WATER

PROPOSED C.B.
GR. 26.5
F.L. 23.5

PROPOSED SANITARY SEWER MANHOLE
RIM 27.0
F.L. 20.5

RELOCATED GUARD RAIL

PHONE AND E SERVICE

WEST PUTN

PROPOSED HANDICAP RAMP (TYP.)

S 10° 26' 30" W 77.22'

STOP SIGN

PROPOSED 8' WIDE CONCRETE SIDEWALK

S 1° 01' E 332.80'

PROPOSED C.B. (TYPE C-4)
GR. 25.8
F.L. 21.5

PROPOSED GRANITE CURB

55'

T.W. 20.8

T.W. 25.8

PAVERS

PROPOSED 6" C.P.P. OVER-FLOW

PROPOSED 12" C.P.P.

PROPOSED TYPE C-1 C.B.
GR. 17.0 F.L. 14.5
8" C.P.P. OUT

PROPOSED TYPE C-1 C.B.
GR. 16.3
F.L. 13.7

PROPOSED 4' CONCRETE SIDEWALK

SIGHT LINE 220'

4' CONCRETE WALK

PROPOSED CONCRETE DRIVEWAY ENTRANCE

BENCH MARK SPIKE IN TREE EL. 13.09 N.G.V.D.

PROPOSED 12" C.P.P.

SIGHT LINE 282'

35'

HOMESTEAD LANE

PROPOSED C.B. TYPE C-1
GR. 16.3
F.L. 13.6

PROPOSED FENCE SEE DETAIL 9/L2

PROPOSED STO
RIM 13.2
F.L. IN 6.7
F.L. OUT 8.5

PROPOSED 12" C.P.P.
N 88° 30' 20" E 113.51'
PROPOSED STORM CEPT M.H. (NO. STC 900)
RIM 14.0 F.L. 9.6

PROPOSED TYPE C-1 C.B
GR. 12.70
F.L. 9.7

MILES

PROPOSED 12" C.C.P.

BOTTOM EL. 13.5
F.L. 13.5
F.L. 14.5

BOTTOM EL. 9.5
F.L. 9.5
F.L. 10.5

PROPOSED 12" R.C.P.

G159-6860-03
Soiltesting, Inc.
140 Oxford Road
Oxford, CT 06478-1943

SOILTESTING, INC. 140 OXFORD RD. OXFORD, CT 06478 CT (203) 888-4531 NY (914) 946-4850	CLIENT: Mercede Construction	SHEET 1 OF 1 HOLE NO. B-1
	PROJECT NO. G159-6860-03	
	PROJECT NAME Proposed Development	BORING LOCATIONS per plan
FOREMAN - DRILLER DD/cb	LOCATION West Putnam Avenue Greenwich, CT	
INSPECTOR	CASING / SAMPLER / CORE BAR TYPE FW / SS / NWG SIZE I.D. 3" / 1 3/8" / 2 1/8" HAMMER WT. / 140# / BIT HAMMER FALL / 30" / dia	OFFSET DATE START 10/13/2003 DATE FINISH 10/13/2003 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT NONE FT AFTER 0 HOURS AT FT AFTER HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
0											Dkbrn SAND,lit silt,cobbles,boulders
5		1	ss	24"	12"	7'0"	3 / 3 / 3 / 9		dry loose		Dkbrn FM SAND,sm silt,tr brick,cobbles,boulders
10		1	c	12"	3"	10'0"		5			
		2	ss	24"	8"	12'0"	13 / 7 / 12 / 11		dry compact	12'0"	Brn FM SAND,sm gravel,sm brick,cobbles, boulders
		2	c	60"	30"	17'0"		5 5 5			Boulders (FILL to 17')
15								4 5		17'0"	
20		3	ss	18"	12"	21'6"	8 / 12 / 15		wet moist compact		Brn FM SAND,sm silt,FC gravel
25		4	ss	24"	6"	27'0"	13 / 10 / 25 / 30		v moist -wet dense		Brn FM SAND & FC GRAVEL,tr silt,cobbles, boulders (Poss fractured partially decomposed bedrock)
30		5	ss	24"	6"	32'0"	12 / 16 / 16 / 18		moist dense		Brn FC SAND & GRAVEL,cobbles,boulders (Poss fractured partially decomposed bedrock)
35											E.O.B. 32'0"
40											

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. B-1

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 140 OXFORD RD. OXFORD, CT 06478 CT (203) 888-4531 NY (914) 946-4850	CLIENT: Mercede Construction	SHEET 1 OF 1 HOLE NO. B-2
	PROJECT NO. G159-6860-03	
	PROJECT NAME Proposed Development	BORING LOCATIONS per plan
FOREMAN - DRILLER DD/cb	LOCATION West Putnam Avenue, Greenwich, CT	
INSPECTOR		OFFSET

	CASING	SAMPLER	CORE BAR	
TYPE	FW	SS	HWG/NWD4	DATE START 10/17/2003
SIZE I.D.	4"/3"	1 3/8"	3"/2 1/8"	DATE FINISH 10/17/2003
HAMMER WT.		140#	BIT	SURFACE ELEV.
HAMMER FALL		30"	dia	GROUND WATER ELEV.

GROUND WATER OBSERVATIONS
AT 28 FT AFTER 0 HOURS
AT __ FT AFTER __ HOURS

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12 - 18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
													Brn FM SAND,FC gravel,sm silt,cobbles,boulders
5		1	ss	24"	12"	7'0"	8	15			dry dense		SAME,sm cobbles,boulders
							17	25					
10		1	c	12"	8"	10'0"				5	dry v dense		(4" FW Advanced to 15')
		2	ss	8"	8"	10'8"	18	50/2"					SAME,sm cobbles,boulders,concrete,steel
		2	c	48"	14"	15'0"				5			
										6			
										7			
15										6	dry-moist v dense		Brn FC SAND & FC GRAVEL,boulders, concrete,cobbles,lit silt
		3	ss	6"	4"	15'3"	50/3"						
		3	c	36"	4"	18'0"				7			
										5			
20										5			
		4	ss	24"	6"	22'0"	11	18			dry-moist dense		Brn FC SAND & GRAVEL,boulders,cobbles, lit silt,asphalt,concrete
							20	24					
		4	c	24"	4"	25'0"				5	dry-moist v dense v moist		Brn FM SAND & SILT,boulders,cobble, concrete,steel (FILL)
25		5	ss	2"	1"	25'2"	50/2"			6			
		5	c	24"	6"	27'0"				5		26'0"	
										6			
30													
		6	ss	12"	4"	31'0"	39	50			wet v dense		Brn FC SAND & GRAVEL,lit silt
35		7	ss	18"	8"	36'6"	34	25			wet v dense		Brn FC SAND,sm FC gravel,lit silt,cobbles
							50						
40		8	ss	24"	18"	42'0"	21	27			wet v dense		SAME (3" FW Advanced to 40')
							32	37					E.O.B. 42'0"
45													NOTE: Installed 1" SCH 40 PVC Observation well w/10' screen to 40' depth - 10' screen,35' riser,1 plug, 1 cap, 200# sand,50# bentonite seal (@15')

GROUND SURFACE TO ____FT. USED ____CASING THEN ____ CASING TO ____FT. HOLE NO. B-2

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST
WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS
SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

C = COARSE
M = MEDIUM

SOILTESTING, INC.
140 OXFORD RD.
OXFORD, CT 06478
CT (203) 888-4531
NY (914) 946-4850

FOREMAN - DRILLER: DD/cb
INSPECTOR:

GROUND WATER OBSERVATIONS
AT 25 FT AFTER 0 HOURS
AT __ FT AFTER __ HOURS

CLIENT: Mercede Construction
PROJECT NO. G159-6860-03
PROJECT NAME: Proposed Development
LOCATION: West Putnam Avenue, Greenwich, CT

	CASING	SAMPLER	CORE BAR
TYPE	FW	SS	NWG
SIZE I.D.	3"	1 3/8"	2 1/8"
HAMMER WT.		140#	BIT
HAMMER FALL		30"	dia

SHEET 1 OF 1
HOLE NO. B-3
BORING LOCATIONS: per plan
OFFSET:
DATE START 10/14/2003
DATE FINISH 10/14/2003
SURFACE ELEV.:
GROUND WATER ELEV.:

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
													Dkbrn FM SAND,sm silt,lit gravel,cobbles,boulders
5		1	ss	24"	12"	7'0"	4	4			dry loose		Black ash
							2	2					
10		2	ss	14"	10"	11'2"	28	25			dry v dense		Brn FM SAND,sm silt,lit gravel,cobbles,boulders (FILL)
							50/2"						
		1	c	42"	14"	15'0"				8			
										7			
15										8			
										7			
		3	ss	24"	8"	17'0"	30	13			moist compact		Dkbrn FM SAND,sm silt,lit gravel,concrete, cobbles,boulders (FILL)
							10	10					
		2	c	30"	10"	19'6"				8			
20										8			
		4	ss	24"	4"	22'0"	3	2			moist loose		Brn FM SAND,silt,brick,metal,cobbles,boulders (FILL)
							3	2					
25													
		5	ss	24"	10"	27'0"	4	5			wet loose	26'6"	Brn FM SAND & BRICK (FILL)
							5	10					Brn FM SAND
30													
		6	ss	18"	8"	32'0"	21	40			wet v dense		Brn FM SAND & GRAVEL,lit silt
							50/3"						
													E.O.B. 32'0"
35													NOTE: Installed 1" SCH 40 PVC observation well to 32' - 3 bags sand - 1/2 bag chips - 10' screen - 25' riser - 1 plug / 1 cap
40													

GROUND SURFACE TO ____ FT. USED ____ CASING THEN ____ CASING TO ____ FT. HOLE NO. B-3

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST
WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS
SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER
PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 140 OXFORD RD. OXFORD, CT 06478 CT (203) 888-4531 NY (914) 946-4850	CLIENT: Mercede Construction	SHEET 1 OF 1 HOLE NO. B-4
	PROJECT NO. G159-6860-03	
	PROJECT NAME Proposed Development	BORING LOCATIONS
FOREMAN - DRILLER DD/cb	LOCATION West Putnam Avenue Greenwich, CT	
INSPECTOR		OFFSET 20' North & 15' East
GROUND WATER OBSERVATIONS AT 8 FT AFTER 0 HOURS AT FT AFTER HOURS	CASING / SAMPLER / CORE BAR TYPE: HSA / SS / NWG SIZE I.D.: 3 3/4" / 1 3/8" / 2 1/8" HAMMER WT.: / 140# / BIT HAMMER FALL: / 30" / dia	DATE START 10/20/2003 DATE FINISH 10/20/2003 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	18"	7'0"	7 / 20 25 / 30		moist hard	8'0"	Brn SILT,sm FM sand,FC gravel,cobble,brick, concrete (FILL)
										10'0"	Brn FM SAND & GRAVEL,lit silt,cobbles (POSS FILL)
10		2	ss	24"	8"	12'0"	13 / 17 17 / 20		wet dense		Brn FM SAND,lit silt,FC gravel
15		3	ss	24"	12"	17'0"	7 / 8 7 / 8		wet compact		Brn FM SAND,sm FC gravel,lit silt
20		4	ss	24"	24"	22'0"	8 / 7 7 / 7		wet compact		Brn FM SAND,sm FC gravel,lit silt
25		5	ss	24"	18"	27'0"	7 / 6 8 / 7		wet compact		SAME
30											E.O.B. 27'0"
35											
40											

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. B-4

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 140 OXFORD RD. OXFORD, CT 06478 CT (203) 888-4531 NY (914) 946-4850	CLIENT: Mercede Construction	SHEET 1 OF 1 HOLE NO. B-5
	PROJECT NO. G159-6860-03	
	PROJECT NAME Proposed Development	BORING LOCATIONS per plan
FOREMAN - DRILLER DD/cb	LOCATION West Putnam Avenue, Greenwich, CT	
INSPECTOR	CASING / SAMPLER / CORE BAR TYPE: HSA / SS / NWG SIZE I.D.: 3 3/4" / 1 3/8" / 2 1/8" HAMMER WT.: _____ / 140# / BIT HAMMER FALL: _____ / 30" / dia	OFFSET 10' North DATE START 10/20/2003 DATE FINISH 10/20/2003 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT 8 FT AFTER 0 HOURS AT __FT AFTER __HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0-6 / 6-12 / 12-18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
										5'0"	Dkbrn FM SAND,lit silt,cobbles,boulders (FILL)
5		1	ss	24"	10"	7'0"	11 / 11 / 6 / 10		compact		Brn FM SAND,lit silt
10		2	ss	24"	10"	12'0"	13 / 18 / 14 / 18		wet dense		Brn FM SAND,lit silt,FC gravel,tr cobbles
15		3	ss	24"	14"	17'0"	7 / 7 / 8 / 8		wet compact		Brn FM SAND,lit gravel,lit silt
20		4	ss	24"	10"	22'0"	17 / 14 / 16 / 16		wet compact		SAME
25		5	ss	24"	10"	27'0"	10 / 9 / 10 / 9		wet compact		SAME
											E.O.B. 27'0"
30											
35											
40											

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. B-5

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

C = COARSE M = MEDIUM F = FINE

PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

SOILTESTING, INC. 140 OXFORD RD. OXFORD, CT 06478 CT (203) 888-4531 NY (914) 946-4850	CLIENT: Mercede Construction	SHEET 1 OF 1 HOLE NO. B-6
	PROJECT NO. G159-6860-03	
	PROJECT NAME Proposed Development	BORING LOCATIONS per plan
FOREMAN - DRILLER DD/cb	LOCATION West Putnam Avenue Greenwich, CT	
INSPECTOR	CASING / SAMPLER / CORE BAR TYPE: HSA / SS / NWG SIZE I.D.: 3 3/4" / 1 3/8" / 2 1/8" HAMMER WT.: / 140# / BIT HAMMER FALL: / 30" / dia	OFFSET DATE START 10/20/2003 DATE FINISH 10/20/2003 SURFACE ELEV. GROUND WATER ELEV.
GROUND WATER OBSERVATIONS AT 9 FT AFTER 0 HOURS AT __FT AFTER __HOURS		

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE Type	SAMPLE PEN	SAMPLE REC	SAMPLE DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6	6 - 12	12 - 18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
												3'0"	Dkbrn blk SILT
5		1	ss	6"	6"	5'6"	50				wet v dense	7'6"	Brick,cobbles,boulders,sm brn FM sand (FILL)
10		2	ss	24"	15"	12'0"	8 10	8 11			wet compact		Brn FM SAND & FC GRAVEL,lit silt
15		3	ss	24"	18"	17'0"	7 7	8 7			wet compact		SAME
20													E.O.B. 17'0"
25													
30													
35													
40													

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. B-6

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 140 OXFORD RD. OXFORD, CT 06478 CT (203) 888-4531 NY (914) 946-4850	CLIENT: Mercede Construction	SHEET 1 OF 1 HOLE NO. B-7
	PROJECT NO. G159-6860-03	
	PROJECT NAME Proposed Development	BORING LOCATIONS per plan
FOREMAN - DRILLER DD/cb	LOCATION West Putnam Avenue, Greenwich, CT	
INSPECTOR		OFFSET
GROUND WATER OBSERVATIONS AT 10 FT AFTER 0 HOURS AT __ FT AFTER __ HOURS	CASING / SAMPLER / CORE BAR TYPE: HSA / SS / NWG SIZE I.D.: 3 3/4" / 1 3/8" / 2 1/8" HAMMER WT.: _____ / 140# / BIT HAMMER FALL: _____ / 30" / dia	DATE START 10/19/2003 DATE FINISH 10/19/2003 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC.	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0-6 / 6-12 / 12-18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
5		1	ss	24"	8"	7'0"	6 / 8	6 / 8	moist stiff	8'0"	Dkbrn SILT,sm FM sand,gravel,brick,wood (FILL)
10		2	ss	24"	12"	12'0"	11 / 13	10 / 10	wet compact		Brn FM SAND & FC GRAVEL,lit silt,cobbles
15		3	ss	24"	18"	17'0"	8 / 7	8 / 9	wet compact		SAME
20											E.O.B. 17'0"
25											
30											
35											
40											

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. B-7

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

PORPORTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND =35 - 50%

C = COARSE
M = MEDIUM
F = FINE

SOILTESTING, INC. 140 OXFORD RD. OXFORD, CT 06478 CT (203) 888-4531 NY (914) 946-4850	CLIENT: Mercede Construction	SHEET 1 OF 1 HOLE NO. B-8
	PROJECT NO. G159-6860-03	BORING LOCATIONS per plan
FOREMAN - DRILLER DD/cb	PROJECT NAME Proposed Development	
INSPECTOR	LOCATION West Putnam Avenue Greenwich, CT	OFFSET
GROUND WATER OBSERVATIONS AT 25 FT AFTER 0 HOURS AT FT AFTER HOURS	TYPE: CASING FW, SAMPLER SS, CORE BAR HWG/NWG SIZE I.D.: 4"/3", 1 3/8", 3"/2 1/8" HAMMER WT.: 140# HAMMER FALL: 30" BIT: dia	DATE START 10/15/2003 DATE FINISH 10/15/2003 SURFACE ELEV. GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	Type	PEN	REC	DEPTH @ BOT	BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE) 0 - 6 / 6 - 12 / 12 - 18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
											Brn FM SAND,sm silt,gravel,cobbles,boulders
5		1	ss	24"	6"	7'0"	5 / 5 / 7 / 6		compact		Brn FM SAND,sm silt,gravel,cobbles,boulders (FILL)
10		1	c	12"	2"	10'0"		7			
		2	ss	12"	4"	11'0"	34 / 50		v dense		Brn FM SAND,sm silt,cobbles,boulders
		2	c	24"	5"	14'6"		8 / 7			(4" FW advanced to 15')
15		3	ss	24"	12"	17'0"	11 / 9 / 9 / 13		compact		Brn FM SAND,sm silt,FC gravel,brick,cobbles, boulders (FILL)
		3	c	24"	8"	20'0"		8 / 8			
20		4	ss	24"	14"	22'0"	5 / 3 / 3 / 3		loose		Brn FM SAND,lit gravel,silt,tr brick,cobbles, boulders (FILL to 25')
25										25'0"	
		5	ss	24"	20"	27'0"	5 / 6 / 6 / 5		v moist compact		Brn FM SAND,lit gravel,silt,cobbles
30		6	ss	24"	6"	32'0"	25 / 25 / 27 / 35		v dense		Brn FM SAND & FC GRAVEL,lit silt,cobbles
35		7	ss	24"	10"	37'0"	13 / 10 / 8 / 10		compact		Brn FM SAND,sm FC gravel,cobbles
40		8	ss	24"	10"	42'0"	14 / 27 / 29 / 17		wet v dense		Brn VF-FM SAND,sm silt,lit gravel,cobbles E.O.B. 42'0" (3" FW advanced to 42')

GROUND SURFACE TO _____FT. USED _____CASING THEN _____ CASING TO _____FT. HOLE NO. B-8

A = AUGER UP = UNDISTURBED PISTON T = THINWALL V = VANE TEST

WOR = WEIGHT OF RODS WOH = WEIGHT OF HAMMER & RODS

SS = SPLIT TUBE SAMPLER H.S.A. = HOLLOW STEM AUGER

C = COARSE
M = MEDIUM
F = FINE

CORRECTIONS USED: TRACE = 0 - 10% LITTLE = 10 - 20% SOME = 20 - 35% AND = 35 - 50%

B5 Geotechnical Appendix
Attachment D

ATTACHMENT D

REGIONAL SUBSURFACE INVESTIGATIONS BY OTHERS

- PROPOSED RESTAURANT – PORT CHESTER, NY (2011)
- HIGH STREET/ BOSTON POST ROAD – PORT CHESTER, NY (2014-2015)
- ARMSTRONG COURT RESIDENTIAL DEVELOPMENT – GREENWICH, CT (2014-2015)

PROPOSED RESTAURANT
PORT CHESTER, NY
2011

MELICK-TULLY AND ASSOCIATES, P.C.
GEOTECHNICAL ENGINEERS AND ENVIRONMENTAL CONSULTANTS

Principals:
RAYMOND J. TULLY, P.E.
EUGENE M. GALLAGHER JR., P.E.
ROBERT E. SCHWANKERT, P.E.
TODD E. HOROWITZ, P.E.
MARK R. DENNO, P.E.

Senior Associates:
RICHARD D. LEV, CPG
JAMES H. BEATTIE, P.E.

Associates:
CHRISTOPHER P. TANSEY, P.E.
STANLEY J. SEDWICK, P.E.

Consultants:
THOMAS E. TULLY, P.E.
CHARLES T. MELICK, P.E.
ROBERT J. VAN ORDEN, P.E.

September 9, 2011

G & S Investors
211 East 43rd Street
New York, New York 10017

Attention: Mr. John Faltings
Vice President of Development and Construction

Gentlemen:

Report
Subsurface Investigation
Proposed Restaurant
Port Chester, New York
G & S Investors

Introduction

This report presents the results of a subsurface investigation performed by Melick-Tully and Associates, P.C. (MTA) for a restaurant planned to be constructed in the Village of Port Chester, Westchester County, New York. The site is located east of Abendroth Avenue, to the north of its intersection with Westchester Avenue, as shown on the Site Location Map, Plate 1. This report was prepared in general accordance with our confirming proposal dated August 19, 2011.

Proposed Construction

An overall site plan provided to us of the entire retail development indicates that a 4,794 square foot restaurant will be constructed on a vacant parcel in the development. Details of the proposed construction have not been provided to us at this time. Site grading plans were not provided, but it is expected the building would be of slab-on-grade construction. Typically, structures of the type planned impose relatively light foundation and floor slab loads.

Please Reply to:
☐ NJ OFFICE: 117 Canal Road, South Bound Brook, NJ 08880 / Phone: (732) 356-3400 Fax: (732) 356-9054
☑ NY OFFICE: 324 Route 208, Monroe, NY 10950 / Phone: (845) 783-9190 Fax: (845) 783-5060

Purpose and Scope of Work

The purpose of our services was to:

1) explore the subsurface soil, rock and groundwater conditions within the approximate limits of the proposed building area;

2) estimate the relevant geotechnical engineering properties of the encountered materials;

3) evaluate the site foundation requirements considering the anticipated structural loads and encountered subsurface conditions;

4) recommend an appropriate type of foundation for support of the proposed structure and provide geotechnical-related foundation design and installation criteria, including an estimate of the Site Class as defined by the Building Code of New York State, 2010 Edition for seismic design purposes;

5) provide recommendations for the support and the need for subdrainage of the lowest level floor slab; and

6) discuss appropriate earthwork operations or considerations consistent with the proposed construction and encountered subsurface conditions.

To accomplish these purposes, a field exploration program consisting of three supervised test borings was performed. The borings were advanced utilizing truck-mounted, hollow-stem auger drilling equipment and extended to depths ranging from approximately 27 to 51 feet below the existing surface grades. The locations of the borings are shown on the Plot Plan, Plate 2.

Our representative located the explorations in the field utilizing the limited plans provided and existing site features, maintained continuous logs of the explorations as the work proceeded, and supervised the soil sampling procedures to develop the appropriate subsurface information. Detailed descriptions of the subsurface conditions encountered in the borings are shown on the individual Logs of Borings, Plates 3A through 3C. The soils were visually classified in general accordance with the Unified Soil Classification System described on Plate 4.

All soil samples obtained from the borings were brought to our office where they were further examined in our soil mechanics laboratory. Thirteen of the samples were subjected to laboratory testing consisting of natural moisture content tests and grain-size analyses to aid in their engineering classification. The results of the grain-size tests are presented on Plate 5, Gradation Curves. The results of the moisture content testing are presented on Plate 5 and on the appropriate boring logs.

The results of our field exploration and laboratory testing programs have provided the basis for our engineering analyses and design recommendations. The following discussions of our findings are subject to the limitations attached as an Appendix to this report.

Site Conditions

Surface Features: The site is currently a relatively open grass covered area bordered on the west by a paved automobile parking area and on the north and east sides by a bulkhead and the Byram River, and to the south by a bulkhead and a cove.

Detailed topographic information was not provided to us at the time of our study; however, our visual observations suggest that the site is relatively flat.

Subsurface Conditions: The results of the test borings indicate that the proposed restaurant area is underlain by the following generalized strata, listed in order of increasing depth:

1) Topsoil: A surficial layer of topsoil approximately four to six inches in thickness blanketed the site.

2) Fill: Fill materials consisting of silty sands containing varying amounts of cinders, brick, concrete and glass were encountered in all of the borings performed for this study. The fill extended to depths of approximately 10 to 16 feet below the existing surface grades.

3) Organic Silt: Below the surficial topsoil and fill materials, a layer of organic clayey silt was encountered. The organic silt layer was found to be soft to medium in consistency and ranged from approximately one to seven and

one-half feet in thickness. The organic soils extended to depths of approximately 17 to 20-1/2 feet below grade.

4) Silty Sand: The surficial fill and organic silts were in turn underlain by silty sands which extended to the completion depths in Borings No. 1 and 3 of approximately 27 to 46 feet below grade. The sandy materials ranged from loose to very dense in consistency. In Boring No. 2, the sandy materials were underlain by a layer of hard sandy silt encountered at a depth of 48 feet below grade, extending to the completion depth in Boring No. 2 of 51 feet - 2 inches.

Groundwater was observed in the explorations at the time of our study at depths of approximately ten feet below the existing surface grades.

Conclusions and Recommendations

General: Based on the results of our study, it is our opinion that:

1) The existing fill and underlying soft organic silts are not suitable for support of foundations or floor slabs of the restaurant. The unsuitable fill and soft organic soils were found to extend to depths of approximately 17 to 20-1/2 feet below grade. Groundwater was encountered at approximately ten feet. Consequently, excavation and replacement of the unsuitable materials does not appear to be a feasible alternative for site development. We recommend that the building foundation and floor slab be supported on a deep pile foundation system.

2) In our opinion, treated timber piles which derive their support from the loose to very dense sands would be the most economical pile type. We estimate piles could achieve vertical capacities of 25 tons per pile in the sands.

Detailed discussions of these and other items considered relevant to the proposed construction are discussed in subsequent sections of this report.

Site Preparation and Earthwork: Detailed site grading plans have not been developed at this time. Based on our visual observations of the adjacent improvements including sidewalks and parking areas, we believe that the finished floor of the proposed structure would probably be established at or relatively close to the existing surface grades. Consequently, site preparation will be minimal for the proposed building.

Prior to pile driving, existing utilities should be located and removed from below the proposed structure. Our conversations with your representative indicated no utilities were present within the existing building footprint; however, tie-backs for the sheeting present on the river and cove sides which abut both sides of the property are present. We recommend the as-built condition be determined to confirm that any tie-backs and "dead men" that are present do not interfere with the building footprint and will not be damaged by pile installation. We believe that the in-place fill will generally provide temporary support for pile driving equipment.

Any fill required in the building should consist of granular materials with a maximum particle size of four inches that can be compacted to a relatively dense condition and support construction and pile driving equipment.

Pile Foundation System: Both the structure and floor slab of the proposed restaurant should be supported by a pile foundation system deriving its support from the loose to medium dense silty sands encountered at depths of approximately 17 to 20-1/2 feet below the existing surface grades.

In our opinion, eight-inch minimum tip diameter treated timber piles could be developed for allowable vertical capacities of 25 tons per pile on the sands at depths of 30 to 40 feet below the existing surface grades. The piles should confirm to the ASTM D-25 specifications for the physical properties of the piles and the AWPA C-3 specifications for pressure treatment. We recommend that several test piles be driven throughout the building area prior to commencement of the production pile driving operations to determine the actual pile lengths. However, delivering the proper length piles to the site should be the sole responsibility of the contractor.

The piles should be driven to a tip resistance required by the Modified Engineering News Formula using a fixed-lead pile driving rig and a single-acting hammer which delivers a minimum rated energy of 15,000 foot pounds per blow. We recommend that the required resistance be

maintained for twelve consecutive inches, or until refusal is met. Refusal may be determined as a resistance of twice the driving resistance. Care should be exercised not to overdrive the piles to help minimize damage to the piles. All driving operations should be observed by a geotechnical engineer from MTA to confirm that the piles extend to the design bearing strata and are driven to the required driving resistance.

During the drilling operations, some brick, concrete and other debris were observed within the fill materials. Very dense layers were also encountered in the fill. If obstructions are present in the fill or very dense fill is encountered, spudding, pre-excavation and/or pre-drilling should be performed by the contractor as necessary to advance the timber piles through the existing fill to avoid damaging the piles.

The New York State Building Code does not require load testing for piles designed for gross vertical capacities of less than 40 tons per pile that are driven to the resistance of an approved driving formula. Provided the piles are installed in accordance with our recommendations, it is our opinion that load testing is not necessary to verify the pile capacity.

We estimate post-construction settlement of piles designed and installed in accordance with our recommendations would be on the order of one inch, or less.

Lateral Loads: Timber piles driven in accordance with our recommendations could be designed to resist lateral loads of one ton per pile. If greater lateral loads are required, batter piles may be necessary.

Lateral loads can also be resisted by passive pressures on the pile caps. All backfill adjacent to the pile caps should consist of approved granular soils placed and compacted to 95 percent of their ASTM D-1557 maximum dry density.

Floor Slab: It is our opinion that the floor slab should be structurally supported by treated timber piles designed and installed as described above.

Seismic Design Criteria: The subsurface conditions encountered in the borings performed for this study indicate that the site would be considered a Site Class "D".

Detailed grading plans were not provided to us at the time of our study. If the site grades are to be raised, down drag forces should be considered due to the compression of the fill and organic soils resulting from the weight of the fill placed. We recommend MTA be provided with final grading plans to determine if down drag allowance is required.

Please contact us if you have any questions regarding this report.

The following Plates and Appendix are attached and complete this report.

Plate 1 – Site Location Map
Plate 2 – Plot Plan
Plates 3A through 3C – Logs of Borings
Plate 4 – Unified Soil Classification System
Plate 5 – Gradation Curves
Appendix – Limitations

Respectfully submitted,

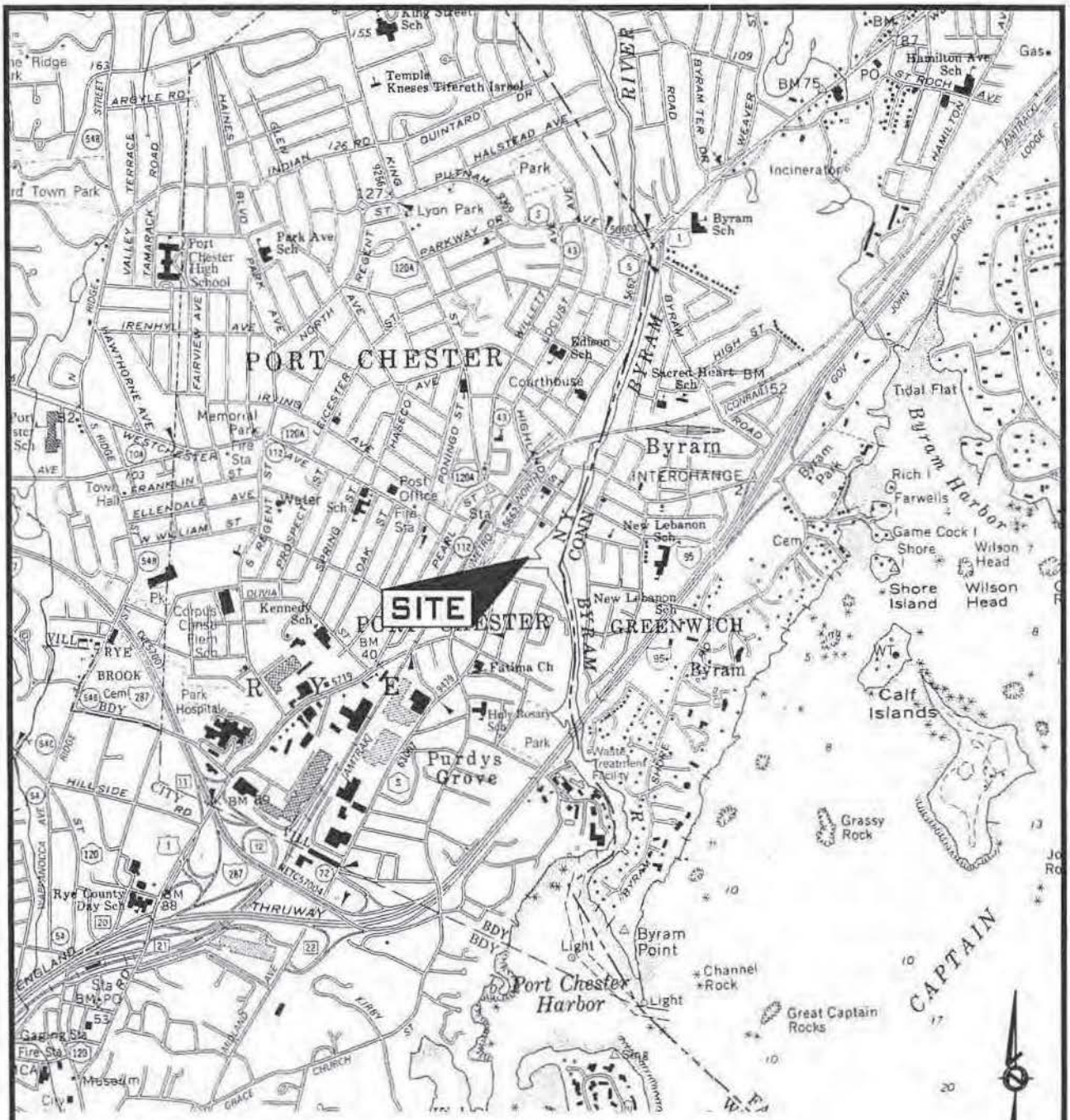
MELICK-TULLY and ASSOCIATES, P.C.

James H. Beattie, P.E.
Senior Associate

Eugene M. Gallagher, Jr., P.E.
Vice President

JHB:EMG/mh
4134-009*1D
(3 copies submitted)

APPENDIX B



FROM: The New York State GIS Clearing House website, Raster Map section for Westchester County (http://www.nysgis.state.ny.us/gisdata/quads/drg24/index.htm).

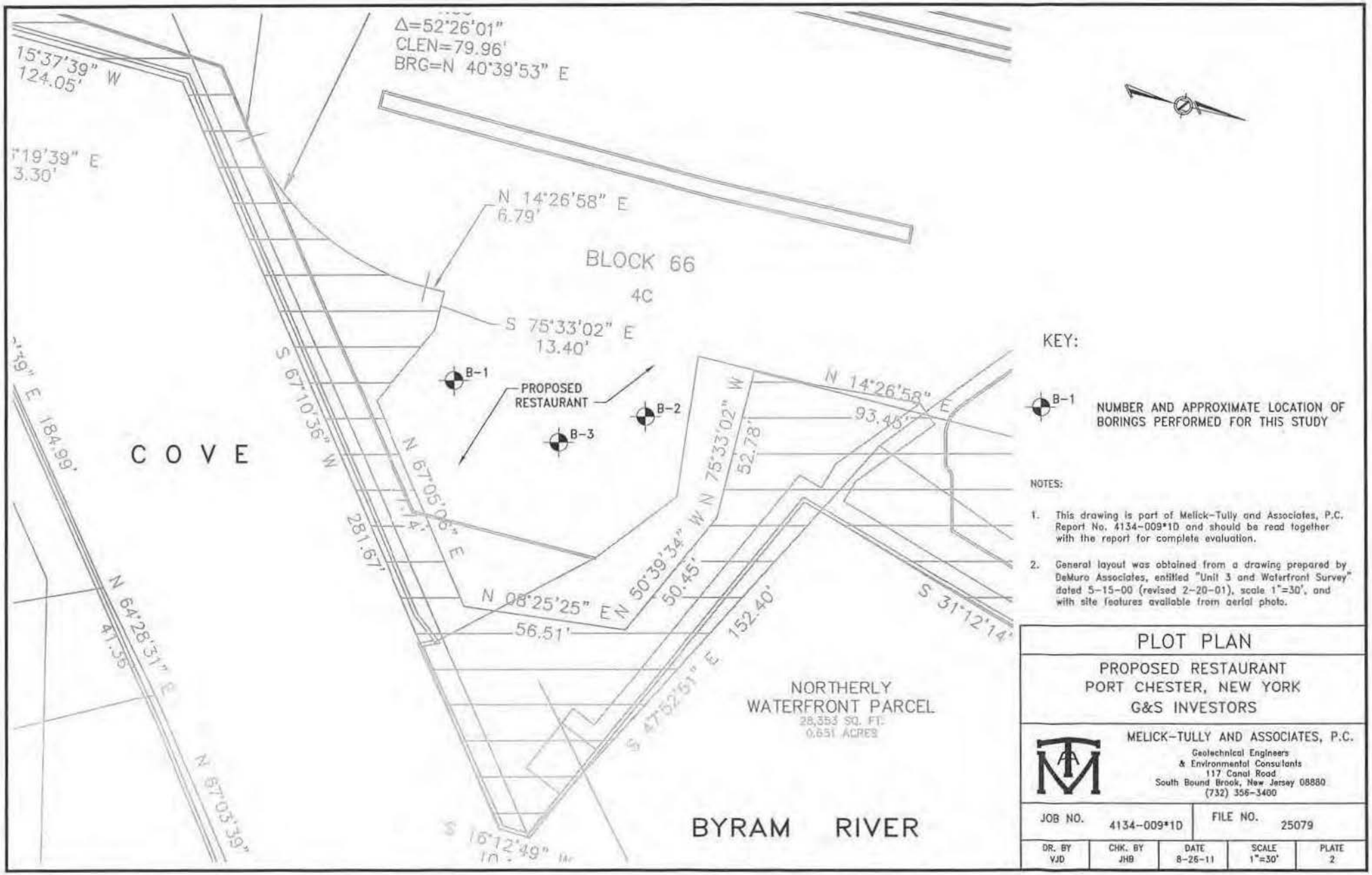
MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers
& Environmental Consultants
117 Canal Road
South Bound Brook, New Jersey 08880
(732) 356-3400

SITE LOCATION MAP

PROPOSED RESTAURANT
PORT CHESTER, NEW YORK
G&S INVESTORS

JOB NO.	FILE NO.	DR. BY	CHK. BY	DATE	SCALE	PLATE
4134-009*1D	25079	VJD	JHB	8-26-11	1"=2,000'	1

APPENDIX B


Δ=52°26'01"
CLEN=79.96'
BRG=N 40°39'53" E
15°37'39" W
124.05'
19'39" E
3.30'
N 14°26'58" E
6.79'
BLOCK 66
4C
S 75°33'02" E
13.40'
B-1
PROPOSED
RESTAURANT
B-2
B-3
COVE
S 67°10'36" W
281.67'
N 67°05'06" E
1.4'
N 08°25'25" E
56.51'
N 50°39'34" W
50.45'
N 75°33'02" W
52.78'
N 14°26'58" E
93.45'
S 31°12'14"
152.40'
S 47°52'51" E
N 64°28'31" E
41.55'
N 67°03'39"
184.99'
NORTHERLY
WATERFRONT PARCEL
28,353 SQ. FT.
0.651 ACRES
BYRAM RIVER
KEY:
B-1
NUMBER AND APPROXIMATE LOCATION OF BORINGS PERFORMED FOR THIS STUDY
NOTES:
1. This drawing is part of Melick-Tully and Associates, P.C. Report No. 4134-009*1D and should be read together with the report for complete evaluation.
2. General layout was obtained from a drawing prepared by DeMuro Associates, entitled "Unit 3 and Waterfront Survey" dated 5-15-00 (revised 2-20-01), scale 1"=30', and with site features available from aerial photo.
PLOT PLAN
PROPOSED RESTAURANT
PORT CHESTER, NEW YORK
G&S INVESTORS
MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers
& Environmental Consultants
117 Canal Road
South Bound Brook, New Jersey 08880
(732) 356-3400
JOB NO. 4134-009*1D
FILE NO. 25079
DR. BY VJD
CHK. BY JHB
DATE 8-26-11
SCALE 1"=30'
PLATE 2

LOG OF BORING

BORING NO. 1

COMPLETION DATE: 8/19/11 | SURFACE ELEVATION: N/A | WATER LEVEL: 10'

JOB NUMBER: 4134-009*1D | READING DATE: 8/19/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S1	45	9.1		4" Topsoil FILL - Dark brown fine to coarse sand, some silt, little fine to coarse gravel, some brick, glass and cinders	
	S2	120	20.3			
5	S3	23			FILL - Dark gray fine to medium sand, little silt, trace ceramic fragments	5
	S4	21				
10	S5	23			FILL - Black fine to medium sand, trace to little silt	10
	S6	3	67.6			
15	S7	5	114.3	OH	Black organic clayey silt, with roots (wet)(medium)	15
				SP/SM	Gray fine to medium sand, trace silt, trace fine gravel (wet)(dense)	
20	S8	31	20.7			20
				SM	Light brown micaceous fine sand, some silt (wet)(loose to medium dense)	
25	S9	9				25
30						30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 8/11

Sheet: 1 of 2 PLATE: 3A

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 1

COMPLETION DATE: 8/19/11
JOB NUMBER: 4134-009*1D

SURFACE ELEVATION: N/A

WATER LEVEL: 10'
READING DATE: 8/19/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH (ft.)
	S10	24			Light brown micaceous fine sand, some silt (wet)(loose to medium dense)	
35	S11	8	30.1	SM		35
	S12	25				
40	S13	25				40
				SM	Gray fine sand, little silt, little fine to coarse gravel (wet)(very dense)	
45	S14	60/3"				45
50					Boring completed @ 45'-9" Groundwater encountered @ 10'	50
55						55
60						60

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 8/11

Sheet: 2 of 2 PLATE: 3A

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 2

COMPLETION DATE: 8/19/11 SURFACE ELEVATION: N/A WATER LEVEL: 10'

JOB NUMBER: 4134-009*1D READING DATE: 8/19/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH (ft.)
					6" Topsoil	
	S1	40			FILL - Black fine to coarse sand, some silt, little fine gravel, some cinders	
	S2	95	13.5			
5	S3	90				5
	S4	26			FILL - Black fine to coarse sand, and silt, trace fine gravel	
10	S5	3	62.8		Black organic clayey silt, little to some fine to medium sand, with peat and roots (wet)(soft)	10
	S6	4	89.6	OH		
15	S7	5			- (medium)	15
	S8	55	23.8		Gray fine to medium sand, and silt, some fine to coarse gravel (wet)(very dense)	
20	S9	43	38.0	SM		20
					Brown-gray fine to medium sand, little silt, trace fine gravel (wet)(medium dense)	
25	S10	10	26.1	SM		25
30						30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 8/11

Sheet: 1 of 2 PLATE: 3B

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF BORING

BORING NO. 2

COMPLETION DATE: 8/19/11 SURFACE ELEVATION: N/A WATER LEVEL: 10'

JOB NUMBER: 4134-009*1D READING DATE: 8/19/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH (ft.)
35	S11	12		SM	Brown micaceous fine sand, some silt (wet)(medium dense)	35
	S12	13				
40	S13	6	26.7			40
45						45
50	S14	77/8"		ML	Gray silt, and fine to coarse sand, trace fine gravel (wet)(hard)	50
55					Boring completed @ 51'-2" Groundwater encountered @ 10'	55
60						60

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 8/11

Sheet: 2 of 2 PLATE: 3B

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

APPENDIX B

LOG OF BORING

BORING NO. 3

COMPLETION DATE: 8/19/11 | SURFACE ELEVATION: N/A | WATER LEVEL: 10'

JOB NUMBER: 4134-009*1D | READING DATE: 8/19/11

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH (ft.)
					6" Topsoil	
	S1	70			FILL - Brown fine to coarse sand, little silt, little fine gravel, little cinders	
5	S2	48				5
					FILL - Gray fine to coarse sand, and silt, little fine to coarse gravel	
10	S3	2				10
	S4	29			Black organic clayey silt, little fine to coarse sand, trace roots, and organic peat (wet)(soft to stiff)	
15	S5	5		OH		15
		10				
20	S6	29		SM	Gray fine to coarse sand, little silt, some fine to coarse gravel (wet)(medium dense)	20
25	S7	14		SM	Brown micaceous fine sand, some silt, trace fine gravel (wet)(medium dense)	25
					Boring completed @ 27'	
30					Groundwater encountered @ 10'	30

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: jhb/mh 8/11

Sheet: 1 of 1 PLATE: 3C

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is LARGER than No. 200 Sieve	GRAVEL & GRAVELLY SOILS More than 50% of coarse fraction RETAINED on No. 4 Sieve	CLEAN GRAVELS (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS More than 50% of coarse fraction PASSING a No. 4 Sieve	CLEAN SAND (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.
			SP	Poorly-graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS More than 50% of material is SMALLER than No. 200 Sieve.	SILTS AND CLAYS	Liquid limit LESS than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS	Liquid limit GREATER than 50	MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			PT	Peat, humus, swamp soils with high organic contents

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

GRADATION*		COMPACTNESS* sand and/or gravel		CONSISTENCY* clay and/or silt	
% Finer by Weight		Relative Density		Range of Shearing Strength in Pounds per Square Foot	
Trace	0% to 10%	Loose	0% to 40%	Very Soft	less than 250
Little	10% to 20%	Medium Dense	40% to 70%	Soft	250 to 500
Some	20% to 35%	Dense	70% to 90%	Medium	500 to 1000
And	35% to 50%	Very Dense	90% to 100%	Stiff	1000 to 2000
				Very Stiff	2000 to 4000
				Hard	Greater than 4000

**Values are from laboratory or field test data, where applicable. When no testing was performed, values are estimated.*

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

Gradation Curve(s)

	% Cobbles	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	6.1	5.8	43.0	38.9	6.2
□	0.0	0.0	0.0	0.0	0.4	72.0	27.6
△	0.0	0.0	4.9	6.0	21.7	48.4	19.0
◇	0.0	0.0	0.0	0.0	2.2	74.6	23.2

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-1	S-8	20-22	Fine to medium Sand, trace Silt, trace fine Gravel. (MC=20.7%)	SP-SM
□	B-1	S-11	35-37	Micaceous fine Sand, some Silt. (MC=30.1%)	SM
△	B-2	S-10	25-27	Fine to medium Sand, little Silt, trace fine Gravel. (MC=26.1%)	SM
◇	B-2	S-13	40-42	Micaceous fine Sand, some Silt. (MC=26.7%)	SM

Melick-Tully & Associates, P.C. **South Bound Brook, NJ**	**Client:** G&S Investors **Project:** **Project No.:** 4134-009 **Plate** 5

HIGH STREET/BOSTON POST ROAD
PORT CHESTER, NY
2014
(PHASE 1)

CARLIN • SIMPSON & ASSOCIATES

Consulting Engineers
Geotechnical & Environmental

MEMO

DATE: 23 October 2014

TO: Mr. Jeremy Sedrish
Starwood Capital Group

FROM: Robert B. Simpson, P.E.
Meredith R. Anke, P.E.

RE: Port Chester Gateway
Port Chester, New York

JOB NO: 14-144

In accordance with our proposal dated 8 August 2014, we have performed a Subsurface Soil and Foundation Investigation at the referenced site. The following is a summary of the preliminary geotechnical design recommendations for the referenced project. The recommendations below are considered preliminary in nature and are intended to give guidance in the planning and designing of the new construction. The recommendations below are not intended for final design and construction. Once the planned building elevations are known and the site grading plan is available, they should be forwarded to this office for review. The final geotechnical report will be completed once this information is available.

We understand that the planned construction will consist of a new mixed use development. During this study, 25 borings and one (1) borehole permeability test were performed at the site. The boring locations are shown on the attached Boring Location Plan. The boring observations are summarized in the following table.

Summary of Boring Data

Boring No.	Approximate Ground Surface Elevation	Depth to Bottom of Existing Fill (Elevation)	Depth to Completely Weathered Rock (Elevation)	Depth to Bedrock or Auger Refusal on Probable Bedrock (Elevation)
B-1	+107.0	2’0” (+105.0)	5’6” (+101.5)	26’6” (+80.5)
B-2	+106.0	6’0” (+100.0)	10’0” (+96.0)	NE to 17’0”
B-3	+90.0	NE	5’0” (+85.0)	NE to 15’2”
B-4	+95.0	8’0” (+87.0	13’0” (+82.0)	24’0” (+71.0)*
B-5	+98.0	8’0” (+90.0)	13’0” (+85.0)	26’6” (+71.5)
B-6	+101.5	NE	10’0” (+91.5)	11’0” (+90.5)*
B-7	+93.5	8’0” (+85.5)	13’0” (+80.5)	17’6” (+76.0)
B-8	+98.0	5’6” (+92.5)	9’6” (+88.5)	15’0” (+83.0)*
B-9	+95.0	4’0” (+91.0)	15’0” (+80.0)	18’0” (+77.0)
B-10	+88.0	2’0” (+86.0)	2’0” (+86.0)	5’0” (+83.0)*
B-11	+95.0	2’0” (+93.0)	2’0” (+93.0)	21’0” (+74.0)
B-12	+93.0	NE	5’0” (+88.0)	10’0” (+83.0)*
B-13	+91.5	5’0” (+86.5)	5’0” (+86.5)	10’0” (+81.5)*

Boring No.	Approximate Ground Surface Elevation	Depth to Bottom of Existing Fill (Elevation)	Depth to Completely Weathered Rock (Elevation)	Depth to Bedrock or Auger Refusal on Probable Bedrock (Elevation)
B-14	+82.5	NE	10’6” (+72.0)	16’0” (+66.5)
B-15	+77.0	NE	NE	8’0” (+69.0)*
B-16	+86.0	NE	NE	5’0” (+81.0)*
B-17	+79.5	NE	5’0” (+74.5)	8’0” (+71.5)*
B-18	+106.0	2’0” (+104.0)	6’0” (+100.0)	28’0” (+78.0)
B-19	+102.0	2’0” (+100.0)	NE	6’0” (+96.0)*
B-20	+94.0	5’6” (+88.5)	15’6” (+78.5)	23’0” (+71.0)
B-21	+93.0	5’0” (+88.0)	NE	NE to 22’6”
B-22	+89.0	3’0” (+86.0)	NE	10’0” (+79.0)*
B-23	+106.0	4’0” (+102.0)	NE	4’0” (+102.0)*
B-24	+106.0	2’0” (+104.0)	2’0” (+104.0)	5’0” (+101.0)*
B-25	+99.0	NE	NE	10’0” (+89.0)

NE – Not Encountered
(*) – Bedrock was cored

Soil Conditions

1. **Asphalt** – The surface layer in borings B-1 through B-10, B-12, B-13, B-15, and B-18 through B-25 is asphalt pavement that varies from approximately 0’2” to 0’3” in thickness and is underlain by gravel that ranges from approximately 0’3” to 0’6” in thickness at the boring locations.

2. **Topsoil** – The surface layer in borings B-11, B-14, B-16, and B-17 is topsoil that varies from approximately 0’5” to 0’11” in thickness at the boring locations.

3. **Existing Fill** – Beneath the surface layers at several boring locations is existing fill that generally consists of loose to medium dense brown coarse to fine SAND, little Silt, trace (to some) coarse to fine Gravel. The fill layer continues to depths ranging from 2’0” to 8’0” below the existing ground surface at the boring locations.

4. **Sand with Silt and Gravel or Sandy Silt with Gravel** – Underlying the fill is virgin soil that consists of medium dense to dense brown coarse to fine SAND, little (to some) Silt, trace (to some) coarse to fine Gravel or SILT and, coarse to fine Sand, little coarse to fine Gravel that transitions to completely weathered or decomposed rock.

5. **Gneiss Bedrock** – Gneiss bedrock or auger refusal on the probable bedrock surface was encountered in 22 of the 25 test borings at depths ranging from 4’0” to 28’0” below the existing ground surface. The upper 4’0” to 10’0” of the bedrock was cored at 13 locations. The rock core recoveries ranged from 40% to 100% and the rock quality designation (RQD) of the recovered cores ranged from 0% to

70%. This indicates that the upper portion of the bedrock ranges from very poor to fair quality in a blocky and seamy, shattered, or crushed condition.

Groundwater

- Groundwater was encountered in boring B-7 at a depth of 12'0" (+81.0) and in boring B-9 at a depth of 9'0" (+86.0) below the existing ground surface. The observed groundwater appears to be perched above the completely weathered bedrock layer.

- Groundwater was not encountered in any of the remaining test borings that were performed during this investigation.

- Groundwater on this site will be controlled by topography and the underlying bedrock surface.

- Dewatering with sumps and pumps will be required in the event that trapped or perched water is encountered during construction.

Bedrock

- Completely weathered bedrock was encountered in 18 of the 25 test borings at depths ranging from 2'0" to 15'6" below the existing ground surface, as indicated in the table above.

- Harder bedrock or auger refusal on the probable bedrock surface was encountered in 22 of the 25 test borings at depths ranging from 4'0" to 28'0" below the existing ground surface, as indicated in the table above.

- The completely weathered bedrock may be "rippable" to some extent using large construction equipment. However, penetration into the completely weathered bedrock and the underlying harder bedrock with excavation equipment will depend of the degree of weathering and fracturing in the rock. We anticipate that the "rippability" of the bedrock will be variable and may be limited. Zones of harder rock may be present at shallower depths and zones of weathered rock may be present at deeper intervals. Depending on the proposed grades, rock blasting and/or the use of hydraulic hammers may be required to excavate bedrock at the subject site.

Existing Fill

- During this investigation, existing fill was encountered in 17 of the test borings and extended to depths ranging from 2'0" to 8'0" beneath the existing ground surface.

- The existing fill observations from this study are summarized in the table above.

- The existing fill is not suitable for support of the proposed building foundations and floor slabs. Therefore, the existing fill shall be completely removed from the proposed building areas and replaced with new structural fill.

New Building Foundations

- The virgin soils, weathered bedrock, and new compacted fill are suitable for supporting the new building foundations.

- The new building foundations may be designed as spread footing type foundations bearing on the virgin soil, weathered bedrock, or new compacted fill.

- Net design bearing pressure = 2 TSF for virgin soil and new compacted fill.

- Net design bearing pressure = 5 TSF for completely weathered bedrock.

- Minimum depth for frost protection = 42 inches.

Floor Slab

- The virgin site soils, weathered bedrock, and new compacted fill are suitable for supporting the new floor slabs.

- Floor slab on grade using a Modulus of Subgrade Reaction of 200 pci. A six (6) inch layer of 3/4-inch crushed stone is recommended beneath the concrete slab for additional support and drainage.

- Sump pits and pumps should be provided for all basement levels.

Foundation Wall Design Parameters

- The soil adjacent to the foundation walls will exert a horizontal pressure against the walls. This pressure is based on the soil density and the coefficient of earth pressure at rest (k_o) which is applicable to non-yielding foundation walls.

- For preliminary design, the following values may be used:

    a. In-place soil density = 130 pcf
    b. Angle of internal friction (phi) = 30 degrees
    c. Coefficient of earth pressure at rest (k_o) = 0.50
    d. Equivalent fluid pressure = 65 pcf
    e. Soil/concrete friction factor = 0.45

Seismic

- The new building shall be designed to resist stress produced by lateral forces computed in accordance with the New York State Building Code. The project site can be classified as Site Class C – Very Dense Soil and Soft Rock Profile.

Stormwater

- We understand that a stormwater management system is planned for the western portion of the site. The type of system and the proposed invert elevation were unknown at the time of this study.

- During this investigation, one (1) borehole permeability test was performed in the area of the proposed stormwater management system. The test depth was 6'0", which corresponds to elevation +84.0.

- Based on the field permeability test, the virgin soil in this area has a permeability rate of approximately 3 inches per hour. For design, a factor of safety of two (2) must be applied to the field permeability rate.

- The stormwater management system shall be designed in accordance with the applicable New York State Department of Conservation (NYSDEC) regulations and the New York State Stormwater Management Design Manual (August 2010). The testing requirements are outlined in Appendix D of the manual. The testing that was performed during this study was for initial feasibility testing. Therefore, additional testing within the proposed stormwater management area will be required to confirm the soil conditions and infiltration rates at the bottom of the system and to finalize the design of the system.

- Should stormwater management areas be planned in other areas of the site, they must be evaluated on a case-by-case basis.

Suitability of Site Soils for Use as Compacted Fill

- Asphalt and topsoil are not suitable for use as compacted fill.

- The existing fill may be used as new compacted fill provided that the fill material is free of organic material and debris, and that it has not become too wet for proper compaction.

- The virgin site soils may be reused as compacted fill provided that the material has not become too wet for proper compaction.

- Proper moisture conditioning of the soil will be required. New compacted fill should be within 2% (+/-) of its optimum moisture content at the time of placement. In the event that the on-site material is too wet at the time of placement and cannot be adequately compacted, the soil should be aerated and allowed to dry or the material removed and a drier fill material used. In the event that the on-site material is too dry at the time of placement and cannot be adequately compacted, water may be needed to increase the soil moisture content for proper compaction.

BORING LOCATION (25)

BORING LOCATION PLAN

1"=40' 10.23.14

HIGH STREET/BOSTON POST ROAD
PORT CHESTER, NY
2015
(PHASE 2)

1.0 Introduction

The objective of this Fugitive Dust Control Plan (Plan) is to inform the Project contractor and its subcontractors of required measures to reduce the impact of dust on the nearby community (i.e., off-site receptors including residences, businesses) and on-site workers as a result of construction and soil handling activities. Additionally, this plan helps prevent the off-site spread of dust that may result from Project construction activity. Fugitive dust includes Total Suspended Particulates (TSP), particulate matter with an aerodynamic diameter less than 10 micrometers (PM10), and particulate matter with an aerodynamic diameter less than 2.5 micrometers (PM2.5). All of these components of fugitive dust are addressed in this plan and are referred to collectively as "fugitive dust", or "dust."

This Plan describes control measures to be implemented before, after, and while conducting any dust generating operation. The Plan requires monitoring, corrective actions to abate emission of dust and documentation of control measures taken. It will be the responsibility of Project contractors, working with designated Village of Port Chester environmental inspectors and Project Construction managers to identify all activities generating fugitive dust and to implement feasible control measures. This plan will be followed during construction of all phases of the Project.

2.0 Applicability and Fugitive Dust Sources

The Plan is applicable to any fugitive dust emissions associated with construction vehicle movement including routine use of unpaved roads and unstabalized site areas, soil excavation, vegetation removal, and handling of any other dusty materials. Fugitive dust is generated by the mechanical disturbance of granular material exposed to the air. Dust from open sources is termed fugitive because it is not discharged to the atmosphere via a confined stream flow such as an exhaust pipe. The following activities are identified as having potential for generation of fugitive dust.

- Vehicle and motorized equipment movement on paved and unpaved surfaces;
- Building demolition and construction;
- Vegetation Removal;

- Clearing and Grading;
- Soil Stabilization; and
- Bulk/Piles material loading, unloading, hauling, etc.

3.0 Dust Emissions and Control Measures

The Project Construction Contractor (Contractor) will visually monitor the presence of airborne dust at the downwind boundary of the work site. If excessive airborne dust is detected at the boundary of the work site or if complaints about dust are received, the Contractor should check for the presence of airborne dust on the upwind side of the construction area and implement dust control measures if construction activity is clearly the major contributing factor to increased dust emissions downwind. The Contractor will discontinue construction activities if generation of dust cannot be controlled to avoid soiling of structures or personal belongings on adjacent properties.

The Contractor will take measures to reduce dust generation and employ practices to prevent excessive fugitive dust emissions (e.g., visible dust clouds). No dust control measures are generally required during precipitation events. Dust control measures are required especially during warm dry weather and those days with strong winds. A source of clean, potable water or other commercially-available dust control agents will be made available to wet down exposed soil surfaces. Dust control measures include but are not limited to:

Soil Excavation and Handling

- Load haul trucks such that the load is below the freeboard;
- Prevent spillage;
- Apply water or other commercially-available dust control agents when needed prior to disturbance and during disturbance to prevent dust generation;
- Maintain existing ground coverings (e.g., existing pavement) until disturbance is required for construction and stabilize exposed soil with gravel or other stabilizing material, if dust generation is observed; and

- Discontinue construction activities if generation of dust cannot be controlled to avoid soiling of structures or personal belongings on adjacent properties.

Unpaved areas within site boundary

- Apply water or other dust control agents when needed;
- Control and immediately remove any tracked mud out of the construction site by utilizing wheel washing stations at site exits;
- Cover loads, as appropriate;
- Maintain appropriate low vehicle speeds in unpaved areas; and
- Route vehicles and equipment to covered surfaces (e.g., paved or graveled) when possible.

Water Trucks

The Contractor will make all practicable efforts to minimize fugitive dust emissions from construction activities. The Contractor will have one or more water trucks that will load water from approved permitted sources, to spray areas for dust control. Unsealed trafficable areas should be kept sufficiently damp during working hours to minimize wind-blown or traffic-generated dust emissions.

Areas to be watered include disturbed locations within the Project work areas; for example, but not limited to:

- Designated access roads;
- Active grading areas;
- Un-stabilized areas;
- Stockpiles;
- Staging and Laydown areas;
- Parking areas; and
- Other sources of fugitive dust.

The frequency at which the water truck will spray the Project areas will vary based on weather and site conditions. For example, in dry conditions, construction traffic may increase the amount of dust generated on access roads. Thus, the water truck would be instructed to spray frequently throughout the day. In contrast, if there is light

traffic, minimal dust generating activities, and/or precipitation, the water truck would be used infrequently or may not be necessary. It will be at the discretion of the Village of Port Chester Environmental Inspector (EI), Project Construction Director, and Project Environmental Inspectors to engage water spraying of the site.

Additional dust control measures within the designated Project construction areas are:

3.1 Enforcing a speed-limit on unpaved roads and construction areas within site boundary

Open-bodied haul trucks and all construction vehicles moving within the site boundary will be limited to a maximum speed of 5 mph. The Project construction manager will install speed limit signs, with a limit of 5 mph, on unpaved areas within the construction area. The United Hospital Redevelopment Project Manager has the authority to adjust limits for individual operations. Any observances of excessive speeds will be reported to the appropriate Construction supervisors for corrective action, and removal of operators from the Project, if necessary. Speeding on the Project Site will not be tolerated. Signs will be placed, as appropriate, to ensure that all equipment/vehicle operators are aware of the speed limit on the road that is being travelled.

3.3 Open-bodied haul trucks

The Project and Construction managers, Contractor Supervisors, and EIs will continuously be observing activities on-site. If there are observances of excessive dust being generated from open bodied trucks, proper corrective measures will be taken to mitigate the generation of dust including potential additional misting/wetting of soils prior to loading or adjustment of speed limits along designated haul routes during periods where weather conditions contribute to the excessive dust. Other measures may also be used as appropriate to control dust based on the investigation of the source/contributing factors. Covering of open-bodied haul trucks will be used to control fugitive dust, if other dust controls measure are not successful at reducing emissions.

3.4 Disturbed areas

All disturbed areas shall be stabilized as soon as practicable to prevent or minimize wind-blown dust and erosion due to rainfall. Additionally, disturbed areas will be minimized by conducting clearing and grading in accordance with the erosion and sediment control plans.

3.5 Stockpiles

Dust emissions from storage piles shall be controlled by watering and/or by covering by tarps, plastic or other suitable materials, as necessary.

3.6 Soil Stabilization

In the event that soil conditions warrant or surface finishes require it, soil stabilization by addition of a reagent may be used. The Project contractors have mechanical equipment and specific practices that will minimize nuisance dust generation during the addition of a reagent. However, spraying a water mist directly on the soil where reagent was applied is only conducted to maintain proper soil moisture levels for stabilization.

Any persons that must work in a dusty environment will wear appropriate respiratory protection or will be in a dust-proof enclosure.

4.0 Responsibility and Authority

During all phases of Site Preparation and Construction, the Project Directors and Managers will ensure the appropriate authorities are on site at all times.

The following individuals have the equal authority to:
1. Determine if/when water needs to be reapplied for dust control.
2. Determine if/when a palliative (subject to approved stormwater management, erosion and sediment control plans, etc.) needs to be applied for dust control.
3. Stop the dust-producing activity if the Contractor does not comply with the dust control measures.

Position	Name	Cell Phone
Village of Port Chester Environmental Inspector		
Construction Director		
Project Director		
Project ES&H Manager		

The Construction Contractor will furnish, operate and maintain equipment and employ methods to minimize the migration of dust beyond the boundaries of the work site. The Contractor also will provide a copy of the Dust Control Plan to all applicable site subcontractors. The Contractor Construction Superintendent will be responsible for implementing the Dust Control Plan. The Construction/Project/ES&H Managers and Village of Port Chester EIs have stop work authority for any non-compliance issues.

5.0 Recordkeeping and Monitoring

The Contractor will document in their daily report the actual application or implementation of the control measures delineated in the Dust Control Plan or otherwise.

Village of Port Chester and Project Environmental Inspectors

EIs will be employed during construction to oversee compliance with all federal, state, and local environmental permit conditions, including compliance with items set forth in this plan. EI responsibilities and authorities with regard to dust control include, but are not necessarily limited to:

a. Determining if/when water needs to be applied/reapplied for dust control;
b. Determining if/when a palliative needs to be used for dust control;
c. Stopping work if the contractor does not comply with dust control measures;

d. Daily field inspections for dust control to determine if dust control measures are or will be necessary, based on the presence of visible dust, ongoing activities, planned activities, weather forecasts, and other factors; and

e. Recording the following information on a daily basis for incorporation into the EI daily report:

- Project activities;
- Weather conditions (temperature, wind speed, and direction);
- Number of water trucks in use;
- Cases where visible dust was of such a concentration that abatement measures were implemented;
- Condition of Project soils (crusted, damp, or unstable);
- Condition of Project access roads (crusted, damp, or unstable);
- Presence of track-out and when it was cleaned; and
- Overall status of dust control compliance.

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-26 Ground Surface Elevation: +96.6

	Depth	*Elevation*	
Proposed Infiltration System Bottom:	11'7"	+85.0	
Groundwater:	12'0"	+84.6	
Bedrock:	16'0"	+80.6	NE*
Recommended Infiltration System Bottom:	4'0"	+88.0	
Infiltration Test Performed at:	10'5"	+86.2†	
Infiltration Test Result:	0.1 in/hr		

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to groundwater

Note:

The brown gray coarse to fine SAND, little (+) Silt, little (-) coarse to fine Gravel layer above the test elevation has an estimated infiltration rate of 1 in/hr.

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-26

Project:	**Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY**									**SHEET NO.:**	1 of 1
Client:	**Starwood Capital Group**									**JOB NUMBER:**	14-144
Drilling Contractor:	**General Borings, Inc.**									**ELEVATION:**	+96.6
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**		**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**				**START DATE:**	18 Nov 15
18-11-15	**1035**	**12'0"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**				**FINISH DATE:**	18 Nov 15
				WGHT		**140#**				**DRILLER:**	R. Poynton
				FALL		**30"**				**INSPECTOR:**	EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1						
2						
3						
4						
5						
6		S-1	11 16		Br gr cf S, l (+) $, l (-) cf G	Rec = 17" moist
7			20 23			
8					**Brown gray coarse to fine SAND, little (+) Silt, little (-) coarse to fine Gravel**	
9						
10					10'0"	
11		S-2	9 14		Gr br cf S, s $, t (-) f G	Rec = 16" moist
12			22 24			
13		S-3	30 35		same	Rec = 10" wet
14			50/4"		**Gray brown coarse to fine SAND, some Silt, trace (-) fine Gravel**	
15						
16		S-4	25 50		same 16'0"	Rec = 8" wet
17					**End of Boring @ 16'0"**	
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-27 Ground Surface Elevation: +96.0

	Depth	*Elevation*
Proposed Infiltration System Bottom:	11'0"	+85.0
Groundwater:	8'0"	+88.0
Bedrock:	11'9"	+84.3 NE*
Recommended Infiltration System Bottom:	6'0"	+90.0
Infiltration Test Performed at:	6'6"	+89.5†
Infiltration Test Result:	1 in/hr	

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to groundwater

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-27
Project: Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY		**SHEET NO.:** 1 of 1
Client: Starwood Capital Group		**JOB NUMBER:** 14-144
Drilling Contractor: General Borings, Inc.		**ELEVATION:** +96.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 18 Nov 15
18 Nov 15	**0900**	**9'0"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 18 Nov 15
18 Nov 15	**1000**	**8'0"**	**HSA**	**WGHT**		**140#**			**DRILLER:** R. Poynton
				FALL		**30"**			**INSPECTOR:** EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1						
2						
3						
4						
5						
6		S-1	3 3	■	Gr br $ s , cf S	No recovery
7			3 3	■	**Gray brown SILT some, coarse to fine Sand**	
8			4	■	8'0"	
9		S-2	4 15	■	Gr cf S, l $, l (+) cf G (completely weathered Shist)	Rec = 17"
10			13	■	**Gray coarse to fine SAND, little Silt, (+) coarse to fine Gravel (completely weathered Schist)**	moist-wet
11		S-3	11 15	■	same	Rec = 2"
12			20 50/3"	■	11'9"	wet
13					**End of Boring @ 11'9"**	
14						
15						
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-28 Ground Surface Elevation: +94.5

	Depth	*Elevation*
Proposed Infiltration System Bottom:	10’6”	+84.0
Groundwater:	12’0”	+82.5
Bedrock:	14’1”	+80.5
Recommended Infiltration System Bottom:	10’5”	+84.1
Infiltration Test Performed at:	10’5”	+84.1
Infiltration Test Result:	1 in/hr	

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-28

Project:	**Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY**									**SHEET NO.:**	1 of 1
Client:	**Starwood Capital Group**									**JOB NUMBER:**	14-144
Drilling Contractor:	**General Borings, Inc.**									**ELEVATION:**	+94.5
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**		**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**				**START DATE:**	18 Nov 15
18 Nov 15	**1235**	**12'0"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**				**FINISH DATE:**	18 Nov 15
				WGHT		**140#**				**DRILLER:**	R. Poynton
				FALL		**30"**				**INSPECTOR:**	EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
					Asphalt 0'2"	
1						
2						
3						
4						
5						
			25		Br cf S, s (+) $, a (-) cf G	
6		**S-1**	20			Rec = 10"
			11			moist
7			12			
					Brown coarse to fine Sand, some (+) Silt, and (-) coarse to fine Gravel	
8						
9						
10						
			12		same	
11		**S-2**	12			Rec = 16"
			13		11'6"	very moist
12			22		Schist, completely weathered	
			51			
13		**S-3**	60/2"		**Schist, completely weathered**	Rec = 5"
						very moist-wet
14						
		S-4	50/1"		14'1"	Rec = 1"
15					**End of Boring @ 14'1"**	very moist-wet
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-29 Ground Surface Elevation: +93.2

	Depth	*Elevation*
Proposed Infiltration System Bottom:	9'2"	+84.0
Groundwater:	7'0"	+86.2 NE*
Bedrock:	7'0"	+86.2
Recommended Infiltration System Bottom:	4'0"	+89.2
Infiltration Test Performed at:	5'6"	+87.7†
Infiltration Test Result:	12 in/hr	

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to shallow bedrock conditions (auger refusal at elevation +86.2)

Note:

The infiltration test rate of 19 in/hr is in weathered Schist. The infiltration rate in this layer can be highly variable. We recommend that an infiltration rate of 1 in/hr be used for design.

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-29

Project:	**Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY**								**SHEET NO.:**	1 of 1
Client:	**Starwood Capital Group**								**JOB NUMBER:**	14-144
Drilling Contractor:	**General Borings, Inc.**								**ELEVATION:**	+93.2
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	18 Nov 15
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	18 Nov 15
				WGHT		**140#**			**DRILLER:**	R. Poynton
				FALL		**30"**			**INSPECTOR:**	EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1						
2						
3						
4			21		Br cf S, s (-) $, s (-) mf G	
		S-1	35			Rec = 10"
5			50		**Brown coarse to fine Sand, some (-)**	moist
			50/2"		**Silt, some (-) medium to fine Gravel**	
6		S-2	50/3"		5'6"	Rec = 2"
					Schist, highly to completely weathered	moist
7					7'0"	Auger refusal @ 7'0"
8					**End of Boring @ 7'0"**	
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-30 Ground Surface Elevation: +91.8

	Depth	*Elevation*
Proposed Infiltration System Bottom:	7'10"	+84.0
Groundwater:	7'0"	+84.8 NE*
Bedrock:	7'0"	+84.8
Recommended Infiltration System Bottom:	4'0"	+87.4
Infiltration Test Performed at:	5'5"	+86.4†
Infiltration Test Result:	19 in/hr	

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to shallow bedrock conditions (auger refusal at elevation +84.8)

Note:

The infiltration test rate of 19 in/hr is in weathered Schist. The infiltration rate in this layer can be highly variable. We recommend that an infiltration rate of 1 in/hr be used for design.

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-30
Project: Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY		**SHEET NO.:** 1 of 1
Client: Starwood Capital Group		**JOB NUMBER:** 14-144
Drilling Contractor: General Borings, Inc.		**ELEVATION:** +91.8

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 18 Nov 15
				DIA.	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 18 Nov 15
No water encountered				**WGHT**		**140#**			**DRILLER:** Bob
				FALL		**30"**			**INSPECTOR:** EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1						
2						
3						
4		S-1	19 20 50/4"	■	Br cf S, l (+) $, a (+) cf G **Brown coarse to fine Sand, little (+) Silt, and (+) coarse to fine Gravel**	Rec = 8" moist
5						
6		S-2	50 50/4"	■	same, w/weathered Schist 5'6" **Schist, highly to completely weathered**	Rec = 3" moist
7					7'0" **End of Boring @ 7'0"**	Auger refusal @ 7'0"
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-31 Ground Surface Elevation: +91.0

	Depth	*Elevation*	
Proposed Infiltration System Bottom:	7'0"	+84.0	
Groundwater:	11'0"	+80.0	NE*
Bedrock:	11'0"	+80.0	NE*
Recommended Infiltration System Bottom:	7'0"	+84.0	
Infiltration Test Performed at:	9'0"	+82.0	
Infiltration Test Result:	1 in/hr		

* NE - Not Encountered to depth/elevation indicated

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-31

Project:	**Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY**	**SHEET NO.:**	1 of 1
Client:	**Starwood Capital Group**	**JOB NUMBER:**	14-144
Drilling Contractor:	**General Borings, Inc.**	**ELEVATION:**	+91.0
		DATUM:	Topo
		START DATE:	18 Nov 15
		FINISH DATE:	18 Nov 15
		DRILLER:	R. Poynton
		INSPECTOR:	EJS

GROUNDWATER					CASING	SAMPLE	CORE	TUBE
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS		
				DIA.	3 1/4"	1 3/8"		
No water encountered				WGHT		140#		
				FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
					Asphalt/Gravel 0'6"	
1						
2						
3						
			10		FILL (Dk br cf S, l (+) $, l cf G)	
4		S-1	12		**FILL (Dark brown coarse to fine SAND,**	Rec = 12"
			17		**little (+) Silt, little coarse to fine Gravel)**	moist
5			17			
			12		FILL (same)	
6		S-2	15		6'0"	Rec = 14"
			18		Br cf S, l (+) $, t (+) f G	moist
7			19			
		S-3	10		same	Rec = 14"
8			10		**Brown coarse to fine SAND, little (+)**	moist
			9		**Silt, trace (+) fine Gravel**	
9			10			
		S-4	12		same	Rec = 12"
10			14			moist
			14			
11			15		11'0"	
					End of Boring @ 11'0"	
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-32 Ground Surface Elevation: +93.9

	Depth	*Elevation*
Proposed Infiltration System Bottom:	9'11"	+84.0
Groundwater:	14'0"	+79.9 NE*
Bedrock:	14'0"	+79.9 NE*
Recommended Infiltration System Bottom:	12'0"	+81.9
Infiltration Test Performed at:	12'0"	+81.9
Infiltration Test Result:	1 in/hr	

* NE - Not Encountered to depth/elevation indicated

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-32
Project: Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY		**SHEET NO.:** 1 of 1
Client: Starwood Capital Group		**JOB NUMBER:** 14-144
Drilling Contractor: General Borings, Inc.		**ELEVATION:** +93.9

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 18 Nov 15
				DIA.	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 18 Nov 15
No water encountered				**WGHT**		**140#**			**DRILLER:** R. Poynton
				FALL		**30"**			**INSPECTOR:** EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1		**Topsoil** 0'5"	
1		**S-1**	4		FILL (Br cf S, l $, s (+) cf G)	Rec = 14"
			12			moist
2			27			
3					**FILL (Brown coarse to fine SAND, little Silt, some (+) coarse to fine Gravel)**	
4						
5						
			9		FILL (same)	
6		**S-2**	7			Rec = 4"
			9			moist
7			7		7'0"	
8						
9						
10						
			7		Br cf S, l $, s (+) mf G	
11		**S-3**	12			Rec = 15"
			16		**Brown coarse to fine SAND, little Silt, some (+) medium to fine Gravel**	moist
12			12			
			10		same	
13		**S-4**	14			Rec = 14"
			15			moist
14			18		14'0"	
15					**End of Boring @ 14'0"**	
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-33 Ground Surface Elevation: +96.5

	Depth	*Elevation*
Proposed Infiltration System Bottom:	12'6"	+84.0
Groundwater:	14'9"	+81.8 NE*
Bedrock:	14'9"	+81.8
Recommended Infiltration System Bottom:	11'9"	+84.8
Infiltration Test Performed at:	12'0"	+86.2†
Infiltration Test Result:	4.5 in/hr	

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to groundwater

Note:

The infiltration test rate of 4.5 in/hr is in weathered Schist. The infiltration rate in this layer can be highly variable. We recommends that an infiltration rate of 1 in/hr be used for design.

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-33
Project: Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY		**SHEET NO.:** 1 of 1
Client: Starwood Capital Group		**JOB NUMBER:** 14-144
Drilling Contractor: General Borings, Inc.		**ELEVATION:** +96.5

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 19 Nov 15
No water encountered				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 19 Nov 15
				WGHT		**140#**			**DRILLER:** R. Poynton
				FALL		**30"**			**INSPECTOR:** EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			2		**Brown Sandy Topsoil** 0'6"	
1		**S-1**	5		FILL (Br cf S, l (+) $, l (+) cf G)	Rec = 8"
			11			moist
2			19			
					FILL (Brown coarse to fine SAND, little (+) Silt, little (+) coarse to fine Gravel)	
3						
4						
5						
			26		FILL (same) 5'6"	
6		**S-2**	23		Br cf S, l $, s (-) cf G	Rec = 17"
			20			moist
7			17		**Brown coarse to fine SAND, little Silt, some (-) coarse to fine Gravel**	
8						
9						
10					10'0"	
			15		Br cf S, l $, a (-) cf G, w/weathered Schist	
11		**S-3**	35		**Brown coarse to fine SAND, little Silt,**	Rec = 10"
			50/4"		**and (-) coarse to fine Gravel, with** 11'4"	moist
12					**weathered Schist**	
13					**Schist, highly to completely weathered**	
14						
			50		Schist, highly to completely weathered	Rec = 5"
15		**S-4**	50/3"		14'9"	moist
					End of Boring @ 14'9"	
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-34 Ground Surface Elevation: +102.5

	Depth	*Elevation*
Proposed Infiltration System Bottom:	9'0"	+93.5
Groundwater:	10'0"	+92.5 NE*
Bedrock:	10'0"	+92.5
Recommended Infiltration System Bottom:	7'0"	+95.5
Infiltration Test Performed at:	8'0"	+86.2†
Infiltration Test Result:	1 in/hr	

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to groundwater

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-34
Project: Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY		**SHEET NO.:** 1 of 1
Client: Starwood Capital Group		**JOB NUMBER:** 14-144
Drilling Contractor: General Borings, Inc.		**ELEVATION:** +102.5

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 19 Nov 15
				DIA.	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 19 Nov 15
No water encountered				**WGHT**		**140#**			**DRILLER:** R. Poynton
				FALL		**30"**			**INSPECTOR:** EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1						
2						
3					**FILL (Brown coarse to fine SAND, little Silt, little (+) coarse to fine Gravel)**	
4					4'0"	
5						
6		S-1	8 7		Br cf S, l $, l (+) cf G, w/weathered Schist	Rec = 17"
7			10 7		**Brown coarse to fine SAND, little Silt, little (+) coarse to fine Gravel, with weathered Schist**	moist
8		S-2	8 10			Rec = 7"
9		S-3	10 10		9'0"	moist Rec = 14"
10			22 35		**Schist, highly to completely weathered** 10'0"	moist
11					**End of Boring @ 10'0"**	
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-35 Ground Surface Elevation: +98.0

	Depth	*Elevation*
Proposed Infiltration System Bottom:	9'0"	+89.0
Groundwater:	4'0"	+94.0 NE*
Bedrock:	4'0"	+94.0
Infiltration Test Performed at:	4'0"	+86.2†
Infiltration Test Result:	0.5 in/hr	

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to groundwater

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-35
Project: Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY		**SHEET NO.:** 1 of 1
Client: Starwood Capital Group		**JOB NUMBER:** 14-144
Drilling Contractor: General Borings, Inc.		**ELEVATION:** +98.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 18 Nov 15
				DIA.	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 18 Nov 15
No water encountered				**WGHT**		**140#**			**DRILLER:** R. Poynton
				FALL		**30"**			**INSPECTOR:** EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
					Asphalt/Gravel 0'5"	
1						
2					**Brown coarse to fine SAND, little Silt, little coarse to fine Gravel**	
3						
						No recovery
4		**S-1**	50/1"		Br cf S, l $, l cf G 4'0"	Auger refufsal @ 4'0"
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-36 Ground Surface Elevation: +93.5

	Depth	*Elevation*
Proposed Infiltration System Bottom:	9'6"	+84.0
Groundwater:	11'6"	+82.0
Bedrock:	14'0"	+79.5 NE*
Recommended Infiltration System Bottom:	8'6"	+85.0
Infiltration Test Performed at:	10'6"	+83.0†
Infiltration Test Result:	1 in/hr	

* NE - Not Encountered to depth/elevation indicated
†Permeability test elevation was raised due to groundwater

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-36

Project:	**Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY**									**SHEET NO.:**	1 of 1
Client:	**Starwood Capital Group**									**JOB NUMBER:**	14-144
Drilling Contractor:	**General Borings, Inc.**									**ELEVATION:**	+93.5
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**		**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**				**START DATE:**	19 Nov 15
19 Nov 15	**1430**	**12'0"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**				**FINISH DATE:**	19 Nov 15
19 Nov 15	**1530**	**11'6"**	**HSA**	**WGHT**		**140#**				**DRILLER:**	R. Poynton
				FALL		**30"**				**INSPECTOR:**	EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
					Asphalt/Gravel 0'6"	
1						
			5		FILL (Br cf S, l $, s (-) cf G)	
2		**S-1**	9			Rec = 4"
			12		**FILL (Brown coarse to fine SAND, little**	moist
3			18		**Silt, some (-) coarse to fine Gravel)**	
4						
5					5'0"	
			2		Br $ s (+), cf S, t (-) f G, w/topsoil	
6			3			Rec = 20"
			5			moist
7		**S-2**	7		Gr $ t, cf S	
					Brown gray SILT and (-), coarse to fine	
8					**Sand, trace fine Gravel**	
			13		Br gr cf S, a (-) $, l (-) f G	
9		**S-3**	14			Rec = 14"
			15			moist
10			19			
			19		Br gr $ a (+), cf S, t (+) f G	
11		**S-4**	21			Rec = 16"
			19			very moist-wet
12			22			
			10		Br cf S, s $, l mf G	
13		**S-5**	13		**Brown coarse to fine SAND, some**	Rec = 10"
			17		**Silt, little medium to fine Gravel**	wet
14			15		14'0"	
					End of Boring @ 14'0"	
15						
16						
17						
18						
19						
20						
21						
22						

Proposed Mixed-Use Development
Port Chester Gateway
Port Chester, NY
(14-144)

14 June 2016

BOREHOLE PERMEABILITY TEST SUMMARY

BH-37 Ground Surface Elevation: +95.0

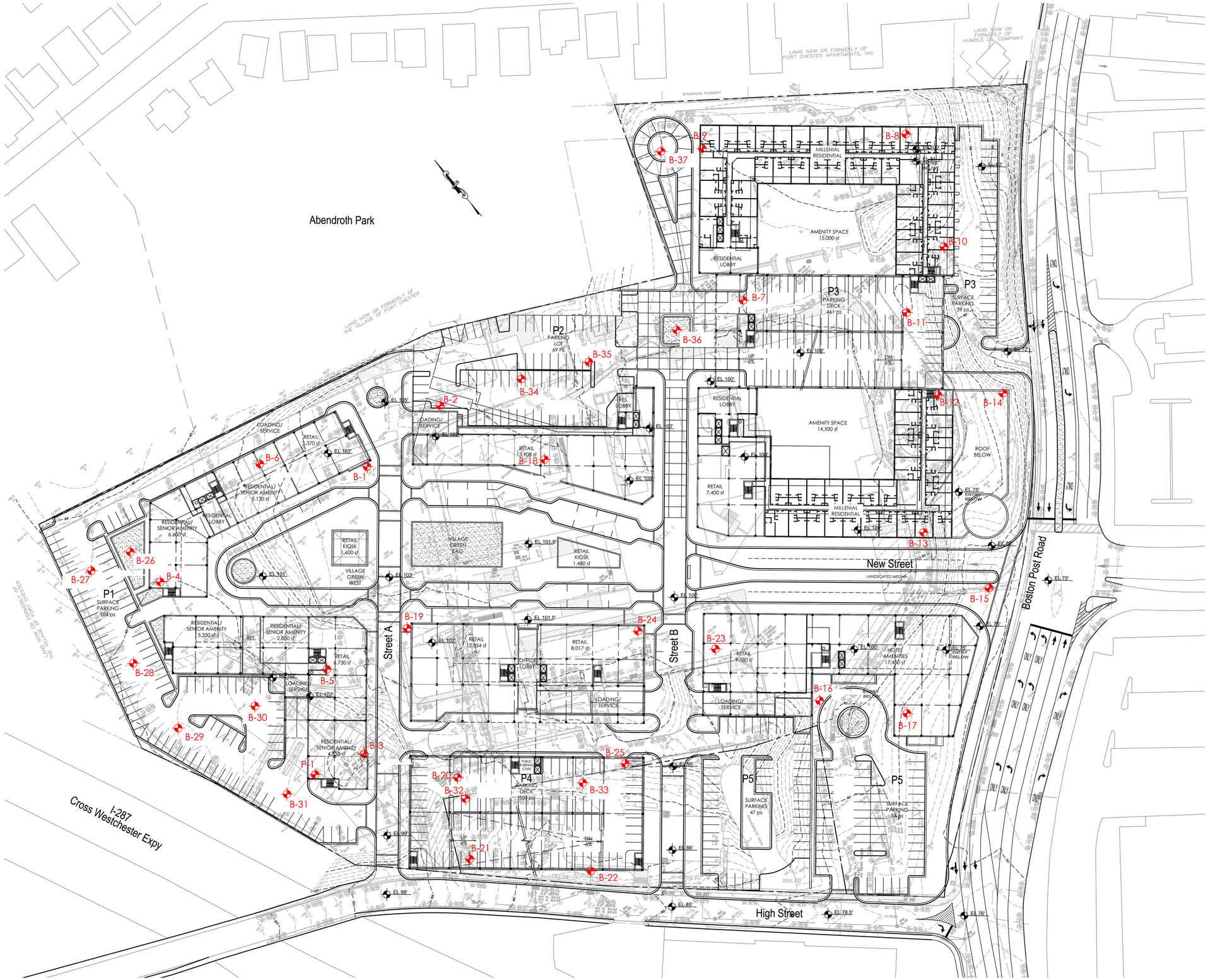
	Depth	*Elevation*
Proposed Infiltration System Bottom:	6'0"	+89.0
Groundwater:	10'0"	+85.0 NE*
Bedrock:	10'0"	+85.0 NE*
Recommended Infiltration System Bottom:	6'0"	+83.0
Infiltration Test Performed at:	8'0"	+87.0
Infiltration Test Result:	2 in/hr	

* NE - Not Encountered to depth/elevation indicated

CARLIN - SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-37
Project: Proposed Mixed-Use Development, Port Chester Gateway, Port Chester, NY		**SHEET NO.:** 1 of 1
Client: Starwood Capital Group		**JOB NUMBER:** 14-144
Drilling Contractor: General Borings, Inc.		**ELEVATION:** +95.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	**DATUM:** Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:** 18 Nov 15
				DIA.	**3 1/4"**	**1 3/8"**			**FINISH DATE:** 18 Nov 15
No water encountered				**WGHT**		**140#**			**DRILLER:** R. Poynton
				FALL		**30"**			**INSPECTOR:** EJS

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
					Topspoil 0'5"	
1						
2					**FILL (Brown coarse to fine SAND, little (+) Silt, little coarse to fine Gravel)**	
3					3'0"	
4						
5						
			7		Br cf S, a $, l mf G	
6		S-1	20			Rec = 17"
			15		**Brown coarse to fine Sand, and**	moist
7			22		**Silt, little medium to fine Gravel**	
			16		same	
8		S-2	14			Rec = 14"
			15			moist
9			15			
			15		same	
10		S-3	16		10'0"	Rec = 7"
					End of Boring @ 10'0"	moist
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						



GENERAL NOTES:

1. GENERAL LAYOUT WAS OBTAINED FROM AN DRAWING PREPARED BY TRC ENGINEERS INC., ENTITLED "REVISED SITE & SUPPLEMENTAL BORING LOCATION PLAN", DWG NO. SK-1, DATED 10-27-15.
2. BORING LOCATIONS WERE LAID OUT IN THE FIELD BY CARLIN-SIMPSON & ASSOCIATES (CSA).
3. BORINGS WERE PERFORMED BY GENERAL BORINGS INC. IN SEPTEMBER 2014, OCTOBER 2014, AND NOVEMBER 2015 UNDER THE FULL TIME INSPECTION OF CSA.
4. LOCATIONS ARE APPROXIMATE.

LEGEND:

- BORING/BOREHOLE PERMEABILITY TEST LOCATION

ROBERT B. SIMPSON, P.E.
PROFESSIONAL ENGINEER

LICENSE NO. | SIGNATURE | DATE

BORING LOCATION PLAN

PROPOSED MIXED-USE DEVELOPMENT
PORT CHESTER GATEWAY
PORT CHESTER, NEW YORK

DRAWN: SR	SCALE: 1" = 50'
CHECKED: RBS	DATE: 30 NOV 15
PROJECT NO.: 14-144	DWG NO.: FIG - 1
APPROVED:	

CARLIN-SIMPSON AND ASSOCIATES
61 Main Street
Sayreville, NJ 08872
Consulting Geotechnical and Environmental Engineers

ARMSTRONG COURT RESIDENTIAL DEVELOPMENT
GREENWICH, CT
2014
(PHASE 1)

REPORT
ENVIRONMENTAL SOIL SAMPLING & TESTING

PROPOSED ARMSTRONG COURT RESIDENTIAL DEVELOPMENT
GREENWICH, FAIRFIELD COUNTY, CONNECTICUT
GREENWICH HOUSING AUTHORITY

November 21, 2014

Prepared By:
Melick-Tully and Associates, P.C.
117 Canal Road
South Bound Brook, NJ 08880
Tel: 732-356-3400 Fax: 732-356-9054

MTA Project No.: 9242-002*1D

MELICK-TULLY AND ASSOCIATES, P.C.
GEOTECHNICAL ENGINEERS AND ENVIRONMENTAL CONSULTANTS

Principals:
RAYMOND J. TULLY, P.E.
EUGENE M. GALLAGHER JR., P.E.
ROBERT E. SCHWANKERT, P.E.
TODD E. HOROWITZ, P.E.
MARK R. DENNO, P.E.
CHRISTOPHER P. TANSEY, P.E.

Senior Associates:
RICHARD D. LEV, CPG
JAMES H. BEATTIE, P.E.

November 21, 2014

Greenwich Housing Authority
249 Milbank Avenue
Greenwich, Connecticut 06830

Attention: Mr. Tony Johnson

Re: Environmental Soil Sampling and Testing
Proposed Armstrong Court Residential Development
Greenwich, Fairfield County, Connecticut
Greenwich Housing Authority

Introduction

This report presents the results of environmental sampling and testing of in-place soils in in the parking area for the proposed Armstrong Court site development to be constructed in Greenwich, Fairfield County, Connecticut for the Greenwich Housing Authority (GHA). The portions of the site evaluated as part of this investigation are located adjacent to the north and south sides of Armstrong Court, to the west of Booth Place, as shown on the Site Location Map, Plate 1.

Proposed Construction

The Armstrong Court development will include the construction of new "Family" units, identified as three-unit townhouse buildings which will be two stories in height. Several of the structures would be underlain by crawl spaces, while some of the buildings would contain walk-out basements. In addition, a senior building with outside dimensions of about 60 feet by 185 feet would be constructed at the Armstrong Court development, and consist of a multi-level structure underlain by a crawl space.

Purpose and Scope of Work

The purpose of our services was to perform limited sampling of the in-place soils in the proposed parking area for initial characterization as requested by Greenwich Housing Authority.

As requested, one discreet soil sample was collected from each of the four test pits advanced in the proposed parking area at the Armstrong Court site for laboratory testing. The materials encountered in the test pits were screened in the field for volatile organic vapors using a calibrated photoionization detector (PID), placed into laboratory prepared glassware, immediately stored on ice and transported to a Connecticut DPH certified laboratory for Target Analyte List/Target Compound List (TAL/TCL+30) testing. The laboratory testing was performed on a standard one-week faxed deliverables. The results of the laboratory testing were compared to the current Connecticut Department of Energy and Environmental Protection (CDEEP) standards.

As agreed, our scope of work was to be an initial screening on a limited portion of the property. If a higher degree of confidence is desired, a Phase I environmental site assessment of the property is recommended. The Phase I would be a preliminary evaluation of the subject property in general conformance with the ASTM E 1527-13 consensus document, resulting in a professional opinion regarding the presence of recognized environmental conditions in connection with the property. If recognized environmental conditions are discovered during Phase I, a decision will be required whether to proceed to a Phase II assessment to further evaluate the recognized environmental conditions. Additional investigation may involve soil borings; soil/ground water/material sampling; and laboratory analytical testing; ground water monitoring; geophysical measurements; or other ancillary studies. The conclusions and findings of this report are subject to the limitations attached in Appendix I.

Discussion

On October 24, 2014, a representative of Melick-Tully and Associates, P.C. (MTA) was present at the property to conduct the soil sampling. Four test pits were advanced at widely spaced locations chosen by GHA within the proposed parking area, which extended from approximately ten to ten and one half feet below existing ground surface. The approximate test pit locations are shown on Plate 2. Our visual observations indicated that the encountered materials consisted of 12 to 15 inches of topsoil over approximately seven feet of silty sand or clayey silt fill. Underlying the fill material were natural sands, clayey silts and organic silt/peat. The materials encountered in the test pits were screened for volatile organic vapors using a calibrated photoionization detector (PID). No elevated PID readings, staining or odors were detected in the materials encountered in the test pits.

As no field indicators were observed, discrete samples were collected for testing from each test pit based on professional judgment. The soil samples were placed into laboratory-prepared glassware, immediately stored on ice, transported under chain-of-custody to Integrated Analytical Laboratories (IAL), (Connecticut DPH certification# PH-0699) and analyzed for EPA Target Analyte List/Target Compound List (TAL/TCL +30) parameters.

The results of the laboratory testing did not report any compounds at concentrations above the current CDEEP Direct Exposure for Soil Residential Criteria. A summary of the laboratory test results is presented on Table 1. The IAL laboratory summary report and chain-of-custody form are attached in Appendix II. The complete laboratory report will be forwarded upon receipt by our office.

The following Plates and Appendices are attached and complete this report:

Plate 1 – Site Location Map
Plate 2 – Plot Plan
Plates 3A through 3D – Logs of Test Pits
Table 1 – Summary of Laboratory Testing Results
Appendix I – Limitations
Appendix II – IAL Laboratory Summary and Chain-of-Custody Form

Very truly yours,

MELICK-TULLY and ASSOCIATES, P.C.

Kenneth A. Haduch
Project Manager

Eugene M. Gallagher, Jr., P.E.
Vice President

KAH:EMG/kh
9242-002*1D
(2 copies submitted)

Aerial Photo courtesy of Google Earth Pro

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers
& Environmental Consultants
117 Canal Road
South Bound Brook, New Jersey 08880
(732) 356-3400

SITE LOCATION MAP

ARMSTRONG COURT RESIDENTIAL DEVELOPMENT
GREENWICH, CONNECTICUT
GREENWICH HOUSING AUTHORITY

JOB NO.	FILE NO.	DR. BY	CHK. BY	DATE	SCALE	PLATE
9242-002*1D	26496	VJD	JHB	11-6-14	1"=2,000'	1

KEY:

TP-1	NUMBER AND APPROXIMATE LOCATION OF TEST PITS PERFORMED FOR THIS STUDY
(>10.5)	APPROXIMATE DEPTH IN FEET TO BOTTOM OF UNSUITABLE SOILS
NE	NOT ENCOUNTERED

NOTES:

1. This drawing is part of Melick–Tully and Associates, P.C. Report No. 9242–002*1D and should be read together with the report for complete evaluation.
2. General layout was obtained from a drawing prepared by Rocco V. D'Andrea, Surveyor, entitled "Development Plan–2 OF 2" dated 9/15/14, scale 1"=30'.

PLOT PLAN

ARMSTRONG COURT RESIDENTIAL DEVELOPMENT
GREENWICH, CONNECTICUT
GREENWICH HOUSING AUTHORITY

MELICK–TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers
& Environmental Consultants
117 Canal Road
South Bound Brook, New Jersey 08880
(732) 356–3400

JOB NO.	FILE NO.
9242–002*1D	26496

DR. BY	CHK. BY	DATE	SCALE	PLATE
VJD	JHB	11–7–14	1"=40'	2

LOG OF TEST PIT

TEST PIT NO. TP-1

COMPLETION DATE: 10/24/14 | SURFACE ELEVATION: +40 ft. (±) | WATER LEVEL: 7'

JOB NUMBER: 9242-002*1D | READING DATE: 10/24/14

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
				12" Topsoil	
	S1			Fill: Light brown fine to coarse sand, some to and silt, trace fine gravel (moist)(medium dense)	
5					5
	S2		OL/PT	Black organic clayey silt, and peat (wet)(soft)	
10					10
				Test pit completed @ 10'-5" Moderate groundwater seepage encountered @ 7'	
15					15

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 11/14

Sheet: 1 of 1 PLATE: 3A

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF TEST PIT

TEST PIT NO. TP-2

COMPLETION DATE: 10/24/14 | SURFACE ELEVATION: +38 ft. (±) | WATER LEVEL: 7'

JOB NUMBER: 9242-002*1D | READING DATE: 10/24/14

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
				12" Topsoil	
				Fill: Light brown fine to coarse sand, some silt, trace fine gravel (moist)(medium dense)	
	S1				
5					5
	S2		SM	Black fine to coarse sand, some silt, little fine to coarse gravel (wet)(medium dense)	
10					10
				Test pit completed @ 10'-6" Slight groundwater seepage encountered @ 7'	
15					15

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 11/14

Sheet: 1 of 1 PLATE: 3B

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF TEST PIT

TEST PIT NO. TP-3

COMPLETION DATE: 10/24/14 | SURFACE ELEVATION: +39.5 ft. (±) | WATER LEVEL: 10'-6"

JOB NUMBER: 9242-002*1D | READING DATE: 10/24/14

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
				15" Topsoil	
				Fill: Dark gray fine to medium sand, and silt, trace fine gravel (moist)(loose)	
	S1				
5				Fill: Gray-brown silt, some fine to medium sand, trace roots (moist)(medium)	5
	S2				
				Gray clayey silt, and fine to medium sand (wet)(stiff)	
	S3		ML		
10					10
				Test pit completed @ 10'-6"	
				Moderate groundwater seepage encountered @ 10'-6"	
15					15

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 11/14

Sheet: 1 of 1 PLATE: 3C

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF TEST PIT

TEST PIT NO. TP-4

COMPLETION DATE: 10/24/14 | SURFACE ELEVATION: +38.5 ft. (±) | WATER LEVEL: 7'

JOB NUMBER: 9242-002*1D | READING DATE: 10/24/14

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	SYMBOL	DESCRIPTION	DEPTH
				12" Topsoil	
				Fill: Black clayey silt, little fine sand (moist)(soft)	
	S1				
5					5
				Black organic clayey silt, and peat (wet)(very soft)	
			OL/PT		
	S2				
10					10
				Test pit completed @ 10'	
				Moderate groundwater seepage	
				encountered @ 7'	
15					15

NOTES FOR COLUMNS:
1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:
TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: JHB/pm 11/14

Sheet: 1 of 1 PLATE: 3D

MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

TABLE 1
SUMMARY OF LABORATORY TESTING RESULTS - SOIL SAMPLING
Town of Greenwich, Fairfield County, Connecticut
Greenwich Housing Authority

Sample Number:	TP-1	TP-2	TP-3	TP-4			
Sample Depth (ft.):	3.0	4.0	4.0	4.0			
Sample Matrix	Soil	Soil	Soil	Soil			
Sample Date:	10/24/2014	10/24/2014	10/24/2014	10/24/2014			
Laboratory ID No:	10367-001	10367-002	10368-003	10367-004			
ANALYTE	**Concentration in Parts Per Million (ppm)**				**"A"**	**"B"**	**"C"**
Volatile Organic Compounds (VOC):							
Carbon disulfide	ND (0.000731)	ND (0.000684)	ND (0.00134)	0.00222	NS	NS	NS
Total VOC's	ND	ND	ND	0.00222	CS	CS	CS
VOC-TIC's	ND	ND	ND	ND	NS	NS	NS
Total VOC's & TIC's	ND	ND	ND	0.00222	NS	NS	NS
Semivolatiles- PAH's:							
Naphthalene	ND (0.022)	ND (0.21)	ND (0.041)	0.111	1,000	5.6	56
2-Methylnaphthalene	ND (0.027)	ND (0.26)	ND (0.050)	0.124	NS	NS	NS
Acenaphthylene	ND (0.022)	ND (0.21)	ND (0.041)	0.049	1,000	8.4	84
Fluorene	ND (0.022)	ND (0.21)	ND (0.041)	0.067	1,000	5.6	56
Phenanthrene	0.067	0.171	ND (0.041)	0.461	1,000	4	40
Anthracene	ND (0.022)	0.044	ND (0.041)	0.114	1,000	40	400
Carbazole	ND (0.022)	ND (0.21)	ND (0.041)	0.050	NS	NS	NS
Fluoranthene	0.120	0.354	ND (0.041)	0.903	1,000	5.6	56
Pyrene	0.108	0.284	ND (0.041)	0.768	1,000	4	40
Benzo[a]anthracene	0.065	0.165	ND (0.041)	0.549	1	1	1
Chrysene	0.077	0.194	ND (0.041)	0.615	NS	NS	NS
Bis(2-ethylhextyl)phthalate	0.060	0.104	ND (0.041)	ND (0.036)	44	1	11
Benzo[b]fluoranthene	0.070	0.185	ND (0.041)	0.659	1	1	1
Benzo[k]fluoranthene	0.060	0.149	ND (0.041)	0.309	8.4	1	1
Benzo[a]pyrene	0.074	0.183	ND (0.041)	0.501	1	1	1
Indeno[1,2,3-cd]pyrene	0.051	0.134	ND (0.041)	0.369	NS	NS	NS
Dibenz[a,h]anthracene	ND (0.037)	0.065	ND (0.041)	0.126	NS	NS	NS
Benzo[g,h,i]perylene	0.056	0.148	ND (0.041)	0.394	NS	NS	NS
Total BNA's	0.808	2.18	ND	6.17	CS	CS	CS
Total TIC's	ND	1.25	7.98	18.1	NS	NS	NS
Total BNA's & TIC's	0.808	3.43	7.98	24.3	NS	NS	NS
PCB's:	0.00217	0.015	ND (0.0014)	ND (0.00124)	1	0.0005*	0.005*

Notes:
"A" Connecticut Direct Exposure Criteria for Soil Residential Criteria
"B" Connecticut Pollutant Mobility Criteria for Soil (GA & GAA Ground Water Classification)
"C" Connecticut Pollutant Mobility Criteria for Soil (GB Ground Water Classification)
* Mobility Criteria by TCLP or by SPLP
ND Not detected (laboratory method detection limit in parenthesis)
NS No Standard established
CS Compound Specific
Bold Concentration above Connecticut Direct Exposure Criteria for Soil Residential Criteria
Italics Concentration above Connecticut State Agencies Pollutant Mobility Criteria for Soil

TABLE 1
SUMMARY OF LABORATORY TESTING RESULTS - SOIL SAMPLING
Town of Greenwich, Fairfield County, Connecticut
Greenwich Housing Authority

Sample Number:	TP-1	TP-2	TP-3	TP-4			
Sample Depth (ft.):	3.0	4.0	4.0	4.0			
Sample Matrix	Soil	Soil	Soil	Soil			
Sample Date:	10/24/2014	10/24/2014	10/24/2014	10/24/2014			
Laboratory ID No:	10367-001	10367-002	10368-003	10367-004			
ANALYTE	**Concentration in Parts Per Million (ppm)**				**"A"**	**"B"**	**"C"**
Pesticides:							
4,4'-DDE	ND (0.000908)	0.00578	ND (0.000349)	ND (0.00155)	NS	NS	NS
4,4'-DDD	ND (0.000908)	0.00522	ND (0.000349)	0.035	NS	NS	NS
4,4'-DDT	0.00128	0.029	ND (0.000349)	ND (0.00155)	NS	NS	NS
Chlordane	0.00103	0.00731	ND (0.000349)	ND (0.00155)	NS	0.066	0.066
Metals:							
Aluminum	16,500	14,600	15,000	23,200	NS	NS	NS
Antimony	ND (0.298)	ND (0.275)	ND (0.561)	ND (0.501)	27	0.006*	0.06*
Arsenic	1.12	3.62	3.27	9.16	10	0.05*	0.5*
Barium	140	196	377	328	4,700	1*	10.0*
Beryllium	1.30	0.720	1.28	1.33	2	0.004*	0.04*
Cadmium	ND (0.149)	0.156	0.570	1.00	34	0.005*	0.05*
Calcium	3,730	5,230	2,840	3,410	NS	NS	NS
Chromium	280	70.8	39.1	61.9	NS	0.05*	0.5*
Cobalt	14.6	12.0	5.36	13.6	NS	NS	NS
Copper	10.4	29.0	32.5	48.5	2,500	1.3*	13*
Iron	20,400	22,500	9,100	27,500	NS	NS	NS
Lead	16.0	39.9	10.0	218	500	0.015*	0.15*
Magnesium	20,200	10,100	2,620	6,600	NS	NS	NS
Manganese	424	400	113	330	NS	NS	NS
Mercury	ND (0.022)	0.031	0.085	0.530	20	0.002*	0.02*
Nickel	177	34.9	24.7	32.6	1,400	0.1*	1.0*
Potassium	4,440	6,270	586	1,720	NS	NS	NS
Selenium	ND (0.596)	1.55	7.15	3.48	340	0.05*	0.5*
Silver	ND (0.149)	ND (0.138)	ND (0.280)	0.258	340	0.036*	0.36*
Sodium	93.9	103	123	180	NS	NS	NS
Thallium	0.391	0.655	0.305	0.562	5.4	0.005*	0.05*
Vanadium	27.1	48.1	28.8	53.5	470	0.05*	0.50*
Zinc	48.8	73.3	45.2	554	20,000	5*	50*
Total Cyanide:	ND (0.447)	ND (0.442)	ND (0.839)	ND (0.743)	1,400	0.2*	2.0*

Notes:
"A" Connecticut Direct Exposure Criteria for Soil Residential Criteria
"B" Connecticut Pollutant Mobility Criteria for Soil (GA & GAA Ground Water Classification)
"C" Connecticut Pollutant Mobility Criteria for Soil (GB Ground Water Classification)
* Mobility Criteria By TCLP or by SPLP
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Bold Concentration above Connecticut Direct Exposure Criteria for Soil Residential Criteria
Italics Concentration above Connecticut State Agencies Pollutant Mobility Criteria for Soil

ARMSTRONG COURT RESIDENTIAL DEVELOPMENT
GREENWICH, CT
2015
(PHASE 2)

FUSS & O'NEILL

June 5, 2015

Mr. Anthony L. Johnson
Executive Director
The Housing Authority of the Town of Greenwich
249 Milbank Avenue
Greenwich, CT 06830

RE: Limited Subsurface Soil Investigation
Armstrong Court Apartments, Greenwich, CT
Fuss & O'Neill Project Number: 20140157.A30

Dear Mr. Johnson:

Fuss & O'Neill, Inc. is pleased to submit this letter report summarizing our findings of a Limited Subsurface Investigation conducted at Armstrong Court Apartments in Greenwich, CT (the "site").

Introduction

The primary objective of this soil sampling program was to characterize and determine the quality of the subsurface materials at select locations across the above referenced property.

The investigation specifically focused on locations which were identified by the Town of Greenwich Planning and Zoning on March 24, 2015, see *Figure 1*.

The site is not currently in a state clean-up program and is therefore not subject to clean-up under Connecticut's Remediation Standard Regulations (RSRs); however, investigations were conducted in general conformance with the Connecticut Department of Energy and Environmental Protection (DEEP) *Site Characterization Guidance Document* (CTDEP, 2010). Baseline RSR criteria were also used as a frame of reference and to provide a relative understanding of the potential exposure and environmental concerns associated with the reported concentrations of constituents.

Limited Subsurface Investigation Scope of Study

A limited soil subsurface investigation was conducted at the Site on May 19, 2015 to investigate the soil quality in the locations identified by the Greenwich Housing Authority and Greenwich Planning and Zoning on March 24, 2015. The following sub-sections provide an overview of the methods used to investigate the Site and evaluate the data collected. They describe data quality objectives, constituents of concern, laboratory methods used to analyze environmental samples, and field investigation methods.

56 Quarry Road
Trumbull, CT
06611
t 203.374.3748
800.286.2469
f 203.374.4391

www.fando.com

Connecticut
Massachusetts
Rhode Island
South Carolina

Data Quality Objectives and Reasonable Confidence Protocols

Data quality objectives are used to ensure that data is collected in a manner that permits it to be used to evaluate a site and support decisions based on those evaluations. Procedures used to ensure that the DQOs for the project were met include:

- Development of preliminary conceptual models used to guide the selection of appropriate constituents of concern and sampling locations
- Selection of analytical methods with appropriate detection limits
- Use of pre-determined sample handling and custody procedures
- Use of pre-determined data management and documentation procedures
- Selection of sampling locations and constituents of concern appropriate to the potential release area
- Use of Connecticut's Reasonable Confidence Protocols and laboratory QA/QC procedures
- Collection of a duplicate sample

Constituents of Concern

A list of constituents of concern to be investigated was developed for the site. The constituent list comprises those compounds most likely to be released based on knowledge of site operations and results of any previous investigation. The constituents of concern include:

- Petroleum hydrocarbons (ETPH)
- Pesticides
- Metals (RCRA 8 and hexavalent chromium)
- Polynuclear Aromatic Hydrocarbons (PAHs)
- Polychlorinated Biphenyls (PCBs)

The analytical methods presented in the following table were selected to identify and evaluate potential releases because they are capable of achieving analytical detection limits less than the baseline numeric RSR clean-up criteria applicable to the Site.

Constituent of Concern	Analytical Method
Petroleum hydrocarbons	Connecticut ETPH Method
Pesticides	EPA Method 8081
Metals (RCRA 8 and hexavalent chromium)	EPA Method 6000/7000
Polynuclear Aromatic Hydrocarbons	EPA Method 8270
Polychlorniated Biphenyls	EPA Method 8082 – Soxhlet Extraction

Sample analysis was conducted by York Analytical Laboratory of Stratford, Connecticut.

Soil Subsurface Investigative Procedures

Sample locations are depicted on *Figure 1*. Details of the sampling program and the sampling rationale for the Site are presented in the following scope of work. The following subsections provide overviews of the site characterization methods identified above.

Soil Sampling

Soil borings were advanced at eight locations using a direct-push Geoprobe®. Soil samples were collected continuously from the ground surface using a 60-inch, stainless steel sampler when collected with the Geoprobe®. Each soil sample was inspected by an engineer from Fuss & O'Neill for physical evidence of contamination, such as staining or odors. Samples were also field screened using a photoionization detector (PID). Field data sheets are provided in *Attachment B*.

Soil sampling intervals were selected to characterize the maximum concentrations of constituents of concern within a release area and/or confirm the extent of impacted soil. If visual inspection and field screening did not yield evidence of impacted soil, samples were selected for laboratory analysis from predetermined intervals based on the conceptual release model for the Site.

Soil Subsurface Scope of Work

The Greenwich Housing Authority and Greenwich Planning and Zoning had pre-selected eight soil boring locations. Fuss & O'Neill collected two samples from each boring location based on the map provided to us (*Figure 1*) and analyzed for the following constituents of concern:

- Extractable Petroleum Hydrocarbons (CT Method)
- RCRA 8 Metals + Hexavalent Chromium (EPA Method 6000/7000 series)
- Polynuclear Aromatic Hydrocarbons (PAHs) by (EPA Method 8270)
- Polychlorinated Biphenyls/Soxhlet Extraction (EPA Method 8082)
- Pesticides(EPA Method 8081)

A shallow soil sample from the upper two feet of the soil column was collected along with a deeper sample, which was determined in the field based on the observed depth of fill (two samples per boring). All constituents of concern were analyzed in every sample except for pesticides, which was only analyzed in the shallow soil sample.

Reasonable Confidence Protocols and Data Usability

The laboratory reported that all of the QA/QC performance criteria specified in the CTDEP Reasonable Confidence Protocol documents were not achieved. A review of the narratives identified that several PAH samples required dilutions due to the levels of target compounds encountered and/or matrix interferences, which resulted in elevated reporting limits. Several PAH surrogate concentrations and laboratory control samples were recovered outside of the specified QC limits. Alachlor (pesticide) matrix spike was recovered outside of the specified QC limits which could potentially bias the samples high. Additionally, chromium, hexavalent chromium and ETPH matrix spikes were recovered outside of the specified QC limits which could potentially bias the samples low. Upon evaluation of the QA/QC data we do not believe that the above referenced items would adversely affect the usability of the data.

Results

Investigation Results

Constituents detected in soil are summarized in *Table 1*. Laboratory analytical reports for samples collected during the subsurface investigation are provided in *Attachment A*.

Constituents detected in soil above laboratory reporting limits included PAHs, pesticides, PCBs, ETPH, and select metals. This indicates that there has been a release at the site, likely associated with the fill material that was observed in every boring at depths up to nine feet below grade. Debris observed in the fill at the site included asphalt, brick, coal, and glass fragments. A summary of the detected concentration range of constituents identified in soil at the site are provided in *Table 2*.

Conclusions

Fuss & O'Neill conducted a subsurface investigation at the site on May 19, 2015. The investigation included the completion of eight soil boring locations which were predetermined by the Greenwich Housing Authority and Greenwich Planning and Zoning. The analytical data generated from this boring and soil sampling program, generally confirm the previous sampling results conducted by Melick-Tully Associates. Soil at the site is polluted, which is likely a result of fill material that includes asphalt, brick, coal, and glass fragments. Soil does not appear to be contaminated above the Residential Direct Exposure Criteria in the locations sampled, please note that some PAHs had elevated reporting limits due to matrix interferences at the laboratory.

FUSS & O'NEILL

Please contact us if you have any questions. Thank you for requesting environmental services from Fuss & O'Neill.

Sincerely,

Caleb D. Scheetz
Senior Hydrogeologist

Andrew R. Zlotnick, LEED AP, LEP
Senior Vice President

Attachments: Figure 1 – Site Plan
Table 1 – Soil Analytical Results
Table 2 – Summary of Constituents Identified
Attachment A – Laboratory Analytical Report
Attachment B – Field Data Sheets