Tectonic

PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

GEOTECHNICAL EVALUATION
PROPOSED STORMWATER DRAINAGE IMPROVEMENTS AND GAS MAIN
YONKERS PUBLIC SCHOOL 16
759 NORTH BROADWAY
YONKERS, NEW YORK

Submitted To:

SAMMEL ARCHITECTURE PLLC

332 Route 100
Somers, New York 10589

September 16, 2019

W.O. 9617.01

Submitted By:

Tectonic Engineering & Surveying Consultants P.C.

1279 Route 300, 2nd Floor
Newburgh, NY 12550

(P) 845.567.6656
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PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

SAMMEL ARCHITECTURE PLLC
332 Route 100
Somers, New York 10589

Attention: Ms. Charlene Gabriel
VIA E-MAIL (cg@sammelarchitecture.com)

September 16, 2019

RE: W.O. 9617.01
GEOTECHNICAL EVALUATION
PROPOSED STORMWATER DRAINAGE IMPROVEMENTS AND GAS MAIN
YONKERS PUBLIC SCHOOL 16
759 NORTH BROADWAY
YONKERS, NEW YORK

Dear Ms. Gabriel;

Tectonic Engineering & Surveying Consultants P.C. is pleased to submit this subsurface investigation and geotechnical engineering evaluation for the proposed new gas main and storm drainage improvements at Public School 16, located at 759 North Broadway in Yonkers, New York. The purpose of the investigation and evaluation was to identify the subsurface conditions in the areas of the proposed improvements and to develop geotechnical recommendations for their installation. This report presents our findings and recommendations.

We appreciate this opportunity to assist you with this project. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

TECTONIC ENGINEERING & SURVEYING CONSULTANTS P.C.

STATE OF NEW YORK
MARK ANDREW STIER
LICENSED PROFESSIONAL ENGINEER
076154

Mark Stier, P.E., PG
Executive Vice President

"G:\Newburgh\Geotechnical\9600\9617.01 PS 16\Report\TEC_2018 Cover Letter.docx"

Newburgh Office

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Equal Opportunity Employer

GEOTECHNICAL EVALUATION
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YONKERS PUBLIC SCHOOL 16
759 NORTH BROADWAY
YONKERS, NEW YORK

TABLE OF CONTENTS

1.0 INTRODUCTION

Tectonic Engineering & Surveying Consultants P.C. (Tectonic), has completed a subsurface investigation and geotechnical engineering evaluation for the proposed new gas main and storm drainage improvements at Public School 16, located at 759 North Broadway in Yonkers, New York. The purpose of the investigation and evaluation was to identify the subsurface conditions in the areas of the proposed improvements and to develop geotechnical recommendations for their installation. This report presents our findings and recommendations.

2.0 SCOPE OF SERVICES

The following services were performed for Sammel Architecture PLLC, hereafter referred to as Client:

- Drilling, sampling, and logging of seven (7) test borings to depths ranging from 8 to 12 feet below existing grade.
- Field inspection of test borings, including confirming conformance of drilling and sampling procedures to appropriate ASTM standards, classifying and logging soils samples, and recording groundwater depths.
- Laboratory testing of soil samples to assist in the evaluation of the engineering properties of the soils.
- Geotechnical engineering evaluation of the subsurface conditions as they relate to the design and construction of the proposed storm water improvements and gas main installation.
- Preparation of this engineering report presenting the results of the subsurface investigation, engineering analyses, and our geotechnical recommendations for the design and construction of the proposed improvements.

3.0 SITE AND PROJECT DESCRIPTION

The project site comprises the grounds of Public School 16, which is located at 759 North Broadway, in the City of Yonkers, Westchester County, New York. The school grounds consist of an existing two-story brick school building with asphalt paved parking areas, asphalt paved and concrete sidewalks, and landscaped areas containing mature trees. The parking areas are located to the south and west of the school building. The school building is separated from North Broadway by walkways and landscaped areas. The north end of the school is bounded by landscaped areas.

Regionally, the school is located near the crest of a small ridge, with surface grades dropping down away from the site to the north, west and east. Based on the drawing provided by the Client entitled "Site Restoration", drawing number A-101, grades within the paved region of the site generally slope down from the northwest to the southeast, with surface elevations ranging from approximately +284 feet on the northwest end of the site, to approximately +268 feet on the southeast end.

Based on information provided by the Client, it is our understanding that the proposed site improvements consist of the installation of a new gas main, stormwater drainage piping, and two catch basins. The catch basins are to be located in the parking lot south of the school building, and the drainage piping, which is to be 4-inch nominal diameter pipe, is to be located in both the west and south parking lots, as well as the landscaped area located east of the building. The location of the gas main is not identified. The size and bearing depths of the catch basins are also not identified.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation consisted of the drilling, sampling, and logging of seven (7) test borings, designated as B-1 through B-3, B-3A, and B-4 through B-6. Boring B-3A was performed due to the relatively shallow refusal at boring B-3. In general, the borings were performed at the approximate locations identified on the drawing entitled "PS 16 Yonkers, Arial View Borings Locations", which was provided by the Client. The as-drilled boring locations are shown on the Boring Location Plan, which is attached as Figure 1.

The subsurface investigation was performed on November 12, 2018 by Craig Test Boring Co., Inc. using a truck mounted CME 75 drill rig. All of the borings except B-3A, B-4 and B-5 were advanced by continuous sampling with a split-spoon sampler. Borings B-3A, B-4 and B-5 were advanced using a 3-7/8-inch diameter tricone bit and mud rotary drilling techniques inside an upper section of 4-inch nominal driven steel casing that was installed to a depth of about 3.5 feet. Standard Penetration Testing was also performed continuously at borings B-4 and B-5. Borings B-1, B-2 and B-3A were performed to a depth of 10 feet. Borings B-4, B-5 and B-6 were advanced to a depth of 12 feet. Boring B-3 was terminated at a depth of 8 feet on split-spoon sampler refusal on an apparent cobble or boulder.

A geotechnical engineer observed the subsurface investigation and prepared logs of the encountered subsurface conditions under the direct purview of a Professional Engineer licensed in the State of New York. The materials encountered were classified in accordance with the modified Burmister Soil Classification

System and the Unified Soil Classification System (ASTM D2488). Copies of the boring logs are included in Appendix I.

5.0 LABORATORY TESTING

Laboratory testing was conducted on samples selected to assist in identifying the soils' engineering properties. The laboratory testing included four (4) soil gradations, performed in general accordance with ASTM D6913. The results of the laboratory testing are provided in Appendix II and are included in the soil descriptions presented below.

6.0 SUBSURFACE CONDITIONS

The results of our subsurface investigation indicate that in general, the site is underlain by fill soils, the majority of which appear to be reworked native site soils, and then native silty, gravelly sand soils. The fill soils underlie a variable 3 to 4 inch thick layer of asphalt pavement and an approximately 3 to 4 inch thick gravel subbase. Generalized descriptions of the encountered soil and groundwater conditions are provided below. More detailed descriptions are provided on the boring logs included in Appendix I.

6.1 Fill

Fill soils extend to an estimated depth of approximately 2 to 6 feet at all of the boring locations. The fill soils typically consist of coarse to fine sand with up to 50 percent silt and gravel. In boring B-6, the fill consists of coarse to fine gravel with up to 50 percent sand and up to 10 percent silt. A brick fragment was noted within the fill at boring B-2. Standard Penetration Test (SPT) N-Values within the fill vary from 4 to 26 blows per foot (bpf), which indicates that it is in a loose to medium dense state.

6.2 Native Soils

Native soils underlie the fill and extend to the 8 to 12 foot termination depths of the borings. As with the fill soils, the native soils most commonly consist of silty, gravelly sand, though occasionally at greater depths, the gravel content exceeds the sand content. At these locations, the gravel appears to consist of coarse gravel, cobble or boulder fragments. The sands vary from being coarse to fine to medium to fine in gradation, and the silt contents most commonly vary from about 10 to 35 percent. Silt contents in the gravel dominated soils are lower, ranging from a trace to approximately 20 percent. SPT N-values within the native soils ranged from 5 to 170 bpf, indicating that the soils range from a loose to a very dense state. The looser zones, encountered at borings B-2 through B-4,

extend to a depth of about 6 feet, and it is possible that they also represent disturbed soils. The native soils are typically dense to very dense below a depth of 6 feet at borings B-1, B-3, B-3A and below a depth of 8 feet at borings B-4 and B-6.

6.3 Groundwater

Groundwater was not encountered in any of the borings at the time of the subsurface investigation. It should be noted, however, that groundwater levels fluctuate with season and weather conditions. Consequently, groundwater should be anticipated to be encountered at other depths at other times.

7.0 SEISMIC SITE COEFFICIENTS AND LIQUEFACTION POTENTIAL

Should design of any of the proposed structures require consideration of earthquake inertial forces, the site falls under Site Class D for seismic design based on the encountered subsurface conditions. The corresponding spectral acceleration at short periods (S_{MS}) is equal to 0.440g, and the corresponding spectral acceleration at a 1-second period (S_{M1}) is equal to 0.174g.

As groundwater was not encountered at any of the test borings and all of the test borings were terminated in medium dense to very dense soils, the site soils are not subject to liquefy during the design earthquake event.

8.0 DISCUSSION AND CONCLUSIONS

As the installation of catch basins typically results in a decrease in stress at the bearing elevation and the installation of piping generally results in a negligible stress increase on supporting soils, soil bearing capacity and structure settlement are not typically design concerns considering the subsurface conditions encountered. Subgrades consisting of the loose soils encountered to depths up to 6 feet at borings B-2, B-3 and B-4 can be assumed to have a net allow bearing pressure of 2,500 pounds per square foot (psf), whereas the medium dense to very dense soils encountered below these loose soils, and comprising the native soils elsewhere, can be assumed to have a minimum net allowable bearing capacity of 4,000 psf provided subgrades are prepared as described in this report. Unless substantial grade changes are made subsequent to the installation of the improvements, negligible structure settlements are anticipated.

The main geotechnical consideration in regards to the proposed improvements include that dense to very dense soils with cobbles and possibly boulders were encountered below a depth of approximately 6 feet at borings B-1 and B-3 and below a depth of 8 feet at boring B-6. Shallower soils may also contain oversized materials. Excavation of these materials will likely require heavy duty excavation equipment.

As the majority of the site soils contain relatively high quantities of silt, and are susceptible to frost heave, it is recommended that the native site soils not be used as structural fill. However, they can be used as general fill provided oversized particles are removed and the moisture conditions are within an acceptable range.

Other conclusions that can be drawn from the investigation are as follows:

- The site soils impacting the proposed construction can be assumed to fall under OSHA Class C soils.
- As groundwater was not encountered, the need for dewatering is not anticipated.
- The site soils are not subject to liquefy during the design earthquake event.

9.0 RECOMMENDATIONS

The following recommendations are based on the results of the subsurface investigation, geotechnical evaluations and Tectonic's experience with similar soil conditions.

9.1 Foundations

For the design of catch basins, soils characterized as loose can be assumed to have a net allowable bearing capacity of 2,500 pounds per square foot (psf), and the soils characterized as medium dense to very dense can be assumed to have a minimum net allowable bearing capacity of 4,000 psf. These incorporate a minimum factor of safety of 2 against bearing failure. As the proposed structures will result in minimal stress increase at the bearing elevation, foundation settlement can be expected to be minimal if the subgrades are prepared as recommended herein.

9.2 Design for Lateral Loading

If needed for the design of the proposed catch basins, the following design parameters can be used to evaluate lateral earth pressure.

Soil Parameter	Existing Soil	Structural Fill	Crushed Stone Fill[1]
Angle of internal Friction	30º	34º	45º
At rest earth pressure Coefficient (Ko)	0.50	0.44	0.29
Passive earth pressure Coefficient[1]	3.00	3.54	5.83
Coefficient of base Friction	0.26	0.31	0.40
Total unit weight of soil (pounds per cubic foot)	115	135	125

Notes:

1) Passive pressure should be reduced by ½ within the zone of frost penetration (3.5 feet).

Additional loading due to temporary and permanent surcharges should be added to the lateral loading exerted by the backfill. Loads due to supported structures should be applied in appropriate combinations with the lateral loads.

10.0 EARTHWORK CONSTRUCTION CRITERIA

The following sub-sections present our recommendations regarding general site preparation and earthwork construction.

10.1 General Site Preparation

The areas of proposed improvements should be cleared of existing pavement, surface and subsurface obstructions, vegetation and topsoil. Topsoil and subsoils that contain appreciable amounts of organic materials should be stripped and stockpiled separately for re-use in landscape areas (if warranted). Tectonic has not performed any laboratory testing to determine the organic content or other horticultural properties of near-surface materials encountered in unpaved areas of the subsurface investigation. Therefore, the term "topsoil" used within this report should not be confused with any topsoil materials that may be specified for the project. If a contractor wishes to use surficial soils encountered at the site for the project, it should be specified that it is their responsibility to have the material tested to verify that it fits project specifications or needs augmentation to do so.

Debris, vegetation, and deleterious materials from the clearing and stripping operations should be removed from the site and disposed of in accordance with local ordinances. The limits of surface preparation should extend no less than 3 feet horizontally beyond the edge of the excavations, as permissible.

10.2 Subgrade Preparation

It is anticipated that the soils encountered below a depth of 2 feet at the boring locations will provide satisfactory bearing for the proposed catch basins and utility lines. However, as noted in Section 9, in the event that proposed structures require a bearing capacity in excess of 2,500 psf, any loose existing fill or native soils should be removed and replaced with properly compacted fill. All soils encountered at the borings are suitable for support of pipe bedding.

All subgrades should be inspected by the geotechnical engineer prior to placement of fill, bedding or structures. If fill soils contain oversize materials, debris or otherwise deleterious materials, or if organic soils or other materials determined by the geotechnical engineer to be unsuitable for bearing are encountered, they should be removed as directed by the geotechnical engineer. Once an approved subgrade is achieve, the bedding (or fill, if necessary) and structure may be placed.

10.3 Protection of Subgrades

Subgrades should be protected from the effects of frost, construction traffic, and surface water. The necessary protection should be provided until the bedding or the structures themselves are placed. Although not anticipated, if groundwater is encountered, dewatering should be performed to allow construction in the dry.

10.4 Fill and Backfill Materials

It is recommended that the on-site fill and native soils not be used for structural fill. This is due to their relatively high silt contents, and the moisture sensitivity that results, the presence of oversized materials, and the frost susceptibility of the soils. Structural fill should consist of sand, gravel, crushed stone, or a mixture of these, and should contain no organic matter. The structural fill materials should meet the requirements from NYDOT for Select Granular Fill (Item Nos. 733.1301 to 733.1305) and conform to the following gradation:

Sieve Size	Percent Finer by Weight
4 inch	100
No. 40	0 - 70
No. 200	0 - 15

The fill and native soil can be used as general fill, provided oversized particles are removed and the moisture conditions are within an acceptable range. All fill should be compacted to at least 95 percent of the maximum dry density, as determined by the modified Proctor test (ASTM Standard D1557). The degree of compaction should be tested and documented by a geotechnical engineer for each lift of fill.

The lift thickness for the fill soils will vary depending on the type of compaction equipment used. Fill should generally be placed in uniform horizontal lifts not exceeding 8 inches in loose thickness when compacted with a trench roller. In confined areas, the loose lift thickness should be 4 inches or less and each lift should be compacted with sufficient passes of hand operated vibratory or impact compaction equipment. A geotechnical engineer with appropriate field and laboratory support should inspect all subgrades, approve materials for use as fill, and test backfill materials for compliance with the recommended compaction.

All bedding should be in accordance with manufacturer's recommendations and guidelines. Bedding should be specified to be "well-compacted'. For the purpose of this project 'well-compacted" should be defined as compacted by either a minimum of 4 passes of a vibratory trench compactor having a static weight of 3,000 pounds, or greater, or a minimum of 6 passes of a vibratory plate tamper having a static weight of at least 1,000 pounds, or a "jumping jack" compactor. Lighter plate tampers should not be used.

10.5 General Excavation

All excavations should conform to the latest OSHA requirements regarding worker safety. We recommend that the existing soils on the site be assumed to have the OSHA designation of Type C soils. All vertical cuts in soil greater than 4 feet in height should be sloped back for safety unless sheeting or a bracing system is used. Design of all shoring and bracing should be performed by a Professional Engineer licensed in the State of New York.

11.0 CONSTRUCTION MONITORING

A geotechnical engineer familiar with the existing subsurface conditions and having the appropriate laboratory and field testing support should be engaged by the owner to observe that all earthwork is performed in accordance with the specifications, the Code, and the criteria provided in this report. As a minimum, the following work should be performed under the observation of the geotechnical engineer:

- Inspection of subgrades
- Placement and compaction of fill
- Dewatering, if necessary
- Shoring/excavation support, if necessary

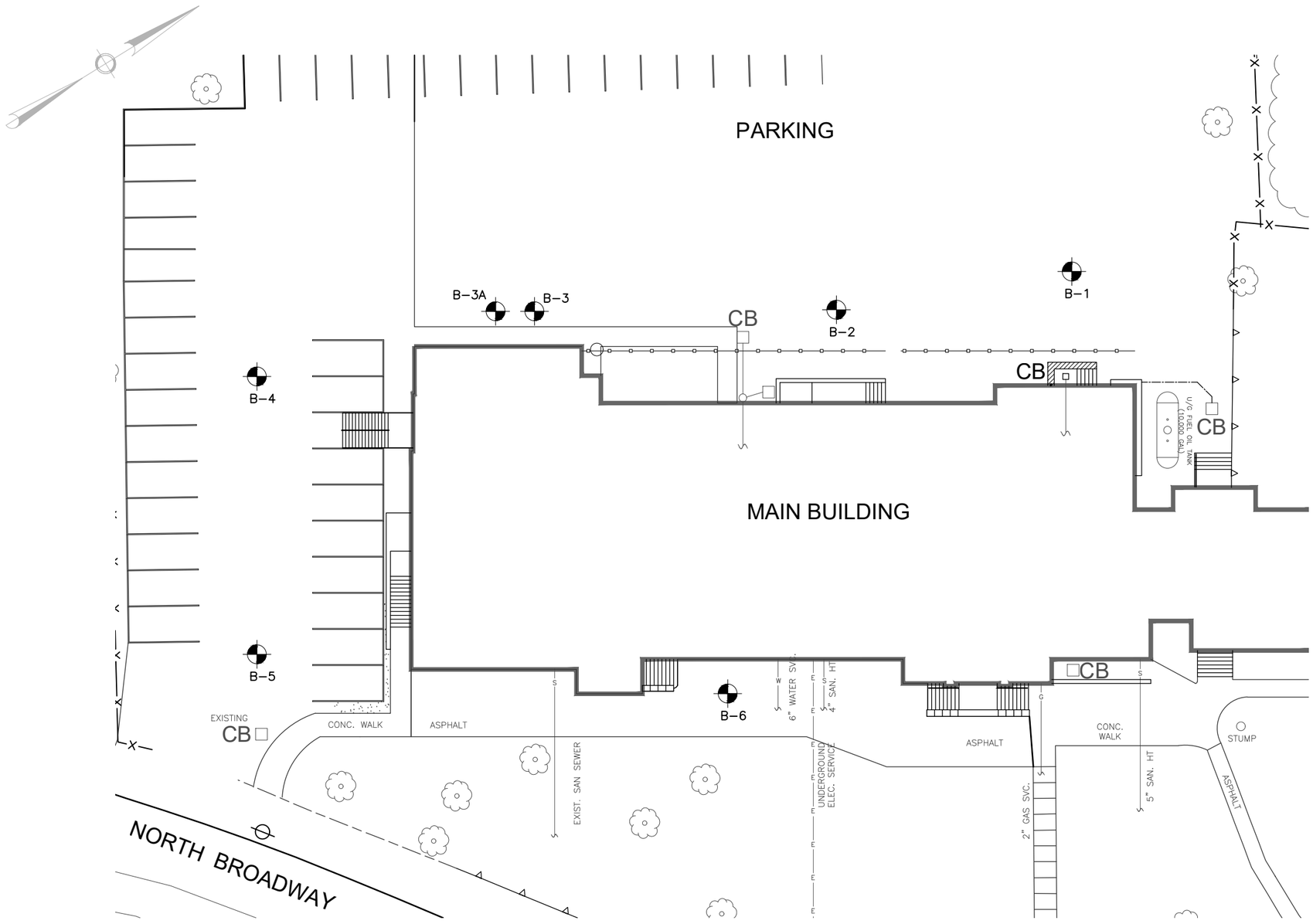
12.0 LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The recommendations contained in this report are intended for design purposes only. Contractors and others involved in the construction of this project are advised to make an independent assessment of the soil, bedrock, and groundwater conditions for the purpose of establishing quantities, schedules and construction techniques.

This report has been prepared for the exclusive use of Sammel Architecture PLLC and their designees for the proposed site improvements described in this report. We recommend that prior to construction, Tectonic review the project plans and specifications. It should be noted that upon review of those documents, some recommendations presented herein might be revised or modified. In the event that any changes in the design or location of the proposed structures are planned, Tectonic shall not consider the conclusions and recommendations contained in this report valid unless reviewed and verified in writing. It is further recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein.

FIGURE I



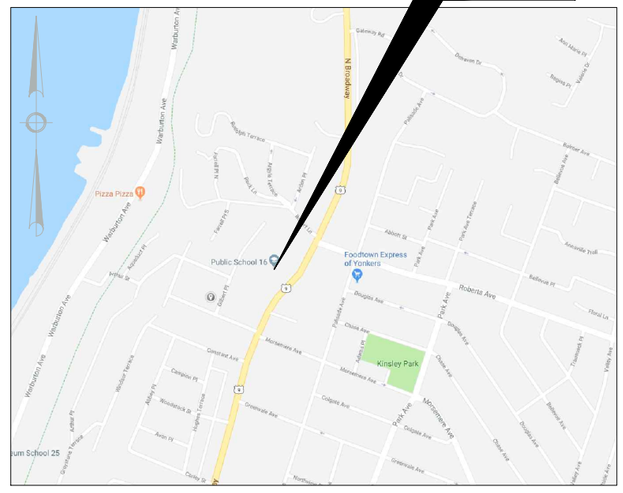
LEGEND

B-1 APPROXIMATE BORING LOCATION

NOTES

1. PLAN BASED ON A DRAWING BY SAMMEL ARCHITECTURE ENTITLED "PS 16 – YONKERS".
2. BORING LOCATIONS WERE FIELD LOCATED BY TECTONIC AND SHOULD BE CONSIDERED APPROXIMATE.

SITE



0 1 2 3

ORIGINAL SIZE IN INCHES

Tectonic
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BORING LOCATION PLAN

YONKERS SCHOOL 16
759 NORTH BROADWAY
CITY OF YONKERS
WESTCHESTER COUNTY, NEW YORK 10701

Date	Work Order	Drawing No.	Rev
11/28/18	9617.01	FIGURE 1	0
Scale 1" = 30'			

APPENDIX I

Tectonic

PROJECT No. **9617.01**
PROJECT: **PS 16**
LOCATION: **Yonkers, NY**

BORING No. B-1

SHEET No. 1 of 1

CLIENT: **Sammel Architecture PLLC**
CONTRACTOR: **Craig Test Borings Co., Inc.**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 75 Truck Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **45° F**
DEPTH TO ROCK: ---
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Mark Aquino**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **11/12/18**
DATE FINISH: **11/12/18**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	13	8 7 6 5	S-1	16		M	SM	3" Asphalt, 4" subbase Bwn-gy m-f SAND, little c-f Gravel, little Silt (FILL)		
3	15	7 7 8 6	S-2	14		M	SM	Bwn-gy c-f SAND, and Silt, trace f Gravel		
5	14	8 7 7 9	S-3	16		M	SM	Bwn m-f SAND, little Silt, trace f Gravel		275.0
7	58	22 29 29 27	S-4	18		M	SP-SM	Gy & bwn c-f SAND, and c-f Gravel, trace Silt (Gravel appears to be fractured, decomposed cobble)		
9	48	30 26 22 14	S-5	12		M	SP-SM	Same		270.0
10								End of Boring at 10'		
15										265.0
20										260.0
25										255.0

REMARKS: Site elevations estimated based on topographic survey provided by Sammel Architecture PLLC, entitled "Site Restoration". Groundwater not encountered to depth explored.

BORING LOG 9617.01.GPJ TECTONIC ENG.GDT 12/11/18

Tectonic

PROJECT No. **9617.01**
PROJECT: **PS 16**
LOCATION: **Yonkers, NY**

BORING No. B-2

SHEET No. 1 of 1

CLIENT: **Sammel Architecture PLLC**
CONTRACTOR: **Craig Test Borings Co., Inc.**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 75 Truck Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **45° F**
DEPTH TO ROCK: ---
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Mark Aquino**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **11/12/18**
DATE FINISH: **11/12/18**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	10	6 6 4 3	S-1	16		M	SM	4" Asphalt, 4" subbase Bwn m-f SAND, some Silt, little f Gravel, brick fragment near top of sample (FILL)		
3	7	5 4 3 3	S-2	20		M	SM	Bwn m-f SAND, some Silt, trace f Gravel		
5	6	2 3 3 4	S-3	14		M	SM	Same, little c-f Gravel		275.0
7	12	6 4 8 9	S-4	0				No Recovery		
9	17	10 8 9 51	S-5	6		M	SP-SM	Gy c-f SAND, and c-f Gravel, trace Silt		270.0
10								End of Boring at 10'		
15										265.0
20										260.0
25										255.0

REMARKS: Site elevations estimated based on topographic survey provided by Sammel Architecture PLLC, entitled "Site Restoration". Groundwater not encountered to depth explored.

BORING LOG 9617.01.GPJ TECTONIC ENG.GDT 12/11/18

Tectonic

PROJECT No. **9617.01**
PROJECT: **PS 16**
LOCATION: **Yonkers, NY**

BORING No. B-3

SHEET No. 1 of 1

CLIENT: **Sammel Architecture PLLC**
CONTRACTOR: **Craig Test Borings Co., Inc.**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 75 Truck Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **45° F**
DEPTH TO ROCK: ---
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Mark Aquino**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **11/12/18**
DATE FINISH: **11/12/18**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*
1–2	5	7 2 3 3	S-1	16		M	SM	4" Asphalt, 4" Subbase Blk-bwn m-f SAND, some Silt, little c-f Gravel (FILL)	
3–4	9	6 4 5 5	S-2	14		M	SM	Bwn m-f SAND, little Silt, little c-f Gravel (Fill)	
5–6	5	4 2 3 7	S-3	12		M	SM	Gy-bwn c-f SAND, some Silt, little c-f Gravel (FILL)	
7	75+	25 25 50/2	S-4	14		M	GP-GM	Gy-bwn c-f GRAVEL, and c-f Sand, trace Silt	
								End of Boring at 7.2'	

ELEVATION (FT.): 275.0, 270.0, 265.0, 260.0, 255.0

REMARKS: Site elevations estimated based on topographic survey provided by Sammel Architecture PLLC, entitled "Site Restoration". Groundwater not encountered to depth explored.

BORING LOG 9617.01.GPJ TECTONIC ENG.GDT 12/11/18

Tectonic

PROJECT No. **9617.01**
PROJECT: **PS 16**
LOCATION: **Yonkers, NY**

BORING No. B-3A

SHEET No. 1 of 1

CLIENT: **Sammel Architecture PLLC**
CONTRACTOR: **Craig Test Borings Co., Inc.**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | **3 7/8"** | **0** TO **6'**
CASING: | | TO
DIAMOND CORE: | | TO
CME 75 Truck Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **45° F**
DEPTH TO ROCK: **---**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Mark Aquino**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **11/12/18**
DATE FINISH: **11/12/18**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–6								Drilled to 6' without sampling		
7	60	35 25 35 35	S-1	18		M	GP-GM	Gy-bwn c-f GRAVEL, and c-f Sand, trace Silt		
8	80+	80/2	S-2	4		D	GP	Gy c-f GRAVEL, trace c-f Sand (apparent weathered cobble fragments)		
9								End of Boring at 8.2'		
10–25										

275.0
270.0
265.0
260.0
255.0

REMARKS: Site elevations estimated based on topographic survey provided by Sammel Architecture PLLC, entitled "Site Restoration". Groundwater not encountered to depth explored.

BORING LOG 9617.01.GPJ TECTONIC ENG.GDT 12/11/18

Tectonic

PROJECT No. **9617.01**
PROJECT: **PS 16**
LOCATION: **Yonkers, NY**

BORING No. B-4

SHEET No. 1 of 1

CLIENT: **Sammel Architecture PLLC**
CONTRACTOR: **Craig Test Borings Co., Inc.**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | **3 7/8"** | **0** TO **10'**
CASING: | **4"** | **0** TO **4'**
DIAMOND CORE: | | TO
CME 75 Truck Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **49° F**
DEPTH TO ROCK: **---**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Mark Aquino**
SURFACE ELEVATION: **279.0**
DATUM: **See Remarks**
DATE START: **11/12/18**
DATE FINISH: **11/12/18**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	6	4 3 3 2	S-1	22		M	SM	4" Asphalt, 4" Subbase Bwn-blk m-f SAND, and Silt, little c-f Gravel (FILL)		
3	12	5 6 6 3	S-2	16		M	SM	Same, trace f Gravel (FILL)		
5	7	3 4 3 3	S-3	20		M	SM	Same, some Silt, trace f Gravel (FILL)		274.0
7	11	9 5 6 8	S-4	20		M	SM	Bwn m-f SAND, some c-f Gravel, little Silt		
9	35	25 20 15 13	S-5	10		M	SM	Bwn-blk m-f SAND, some c-f Gravel, little Silt		269.0
11	35	24 20 15 10	S-6	8		M	GM	Bwn-blk c-f GRAVEL, and c-f Sand, little Silt		
12								End of Boring at 12'		
										264.0
										259.0
										254.0

REMARKS: Site elevations estimated based on topographic survey provided by Sammel Architecture PLLC, entitled "Site Restoration". Groundwater not encountered to depth explored.

BORING LOG 9617.01.GPJ TECTONIC ENG.GDT 12/11/18

Tectonic

PROJECT No. **9617.01**
PROJECT: **PS 16**
LOCATION: **Yonkers, NY**

BORING No. B-5

SHEET No. 1 of 1

CLIENT: **Sammel Architecture PLLC**
CONTRACTOR: **Craig Test Borings Co., Inc.**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 75 Truck Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **49° F**
DEPTH TO ROCK: ---
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Mark Aquino**
SURFACE ELEVATION: **278.0**
DATUM: **See Remarks**
DATE START: **11/12/18**
DATE FINISH: **11/12/18**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	26	13 10 16 9	S-1	8		M	SP-SM	3" Asphalt over 3" subbase Gy c-f SAND, and c-f Gravel, trace Silt (FILL)		
3	19	13 8 11 12	S-2	18		M	SM	Bwn c-f SAND, little c-f Gravel, little Silt		
5	27	20 12 15 12	S-3	20		M	SM	Same		273.0
7	14	4 6 8 13	S-4	10		M	SM	Bwn c-f SAND, some Silt, trace f Gravel		
9	25	8 11 14 12	S-5	16		M	GP	Gy-bwn c-f GRAVEL, some m-f Sand, trace Silt		268.0
11	25	13 10 15 21	S-6	20		M	GP	Gy-bwn c-f GRAVEL, and m-f Sand, trace Silt		
12								End of Boring at 12'		
15										263.0
20										258.0
25										253.0

REMARKS: Site elevations estimated based on topographic survey provided by Sammel Architecture PLLC, entitled "Site Restoration". Groundwater not encountered to depth explored.

BORING LOG 9617.01.GPJ TECTONIC ENG.GDT 12/11/18

Tectonic

PROJECT No. **9617.01**
PROJECT: **PS 16**
LOCATION: **Yonkers, NY**

BORING No. B-6

SHEET No. 1 of 1

CLIENT: **Sammel Architecture PLLC**
CONTRACTOR: **Craig Test Borings Co., Inc.**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 75 Truck Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **45° F**
DEPTH TO ROCK: ---
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Mark Aquino**
SURFACE ELEVATION: **280.0**
DATUM: **See Remarks**
DATE START: **11/12/18**
DATE FINISH: **11/12/18**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1-2	4	7 2 2 2	S-1	6		M	GP-GM	2' Asphalt, 4" Subbase Gy-bwn c-f GRAVEL, and c-f Sand, trace Silt (FILL)		
3-4	16	15 7 9 5	S-2	8		M	GP-GM	Gy-bwn c-f GRAVEL, some c-f Sand, trace Silt (FILL)		
5-6	36	16 12 24 14	S-3	20		M	SP-SM	Bwn c-f SAND, and c-f Gravel, trace Silt		275.0
7-8	11	17 6 5 14	S-4	14		M	SP-SM	Gy-bwn c-f SAND, some c-f Gravel, trace Silt		
9-10	53	29 30 23 31	S-5	12		M	SP-SM	Same		270.0
11-12	170	80 60 110 95	S-6	20		M	SP-SM	Same		170
13								End of Boring at 12'		
15										265.0
20										260.0
25										255.0

REMARKS: Site elevations estimated based on topographic survey provided by Sammel Architecture PLLC, entitled "Site Restoration". Groundwater not encountered to depth explored.

BORING LOG 9617.01.GPJ TECTONIC ENG.GDT 12/11/18

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

LEGEND FOR SOIL DESCRIPTION

COARSE GRAINED SOIL (Coarser then No. 200 Sieve)

DESCRIPTIVE TERM & GRAIN SIZE

TERM	SAND					GRAVEL
coarse - c	No.	4	Sieve to No.	10	Sieve	3" to 3/4"
medium - m	No.	10	Sieve to No.	40	Sieve	3/4" to 3/16"
fine - f	No,	40	Sieve to No.	200	Sieve	

COBBLES 3" to 10"

BOULDERS 10" +

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
fine, f	Less than 10% coarse to medium
medium to fine, m-f	Less than 10% coarse
medium, m	Less than 10% coarse and fine
coarse to medium, c-m	Less than 10% fine
coarse, c	Less than 10% medium and fine
coarse to fine, c-f	All greater than 10%

FINE GRAINED SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0 - 1	none
Clayey Silt	2 - 5	slight
Silt & Clay	6 - 10	low
Clay & Silt	11 - 20	medium
Silty Clay	21 - 40	high
Clay	greater than 40	very high

PROPORTION

DESCRIPTIVE TERM	PERCENT OF SAMPLE WEIGHT
trace	1 - 10
little	10 - 20
some	20 - 35
and	35 - 50

The primary component is fully capitalized

COLOR

Blue - blue	Gy - gray	Wh - white
Blk - black	Or - orange	Yl - yellow
Bwn - brown	Rd - red	Lgt - light
Gn - green	Tn - tan	Dk - dark

SAMPLE NOTATION

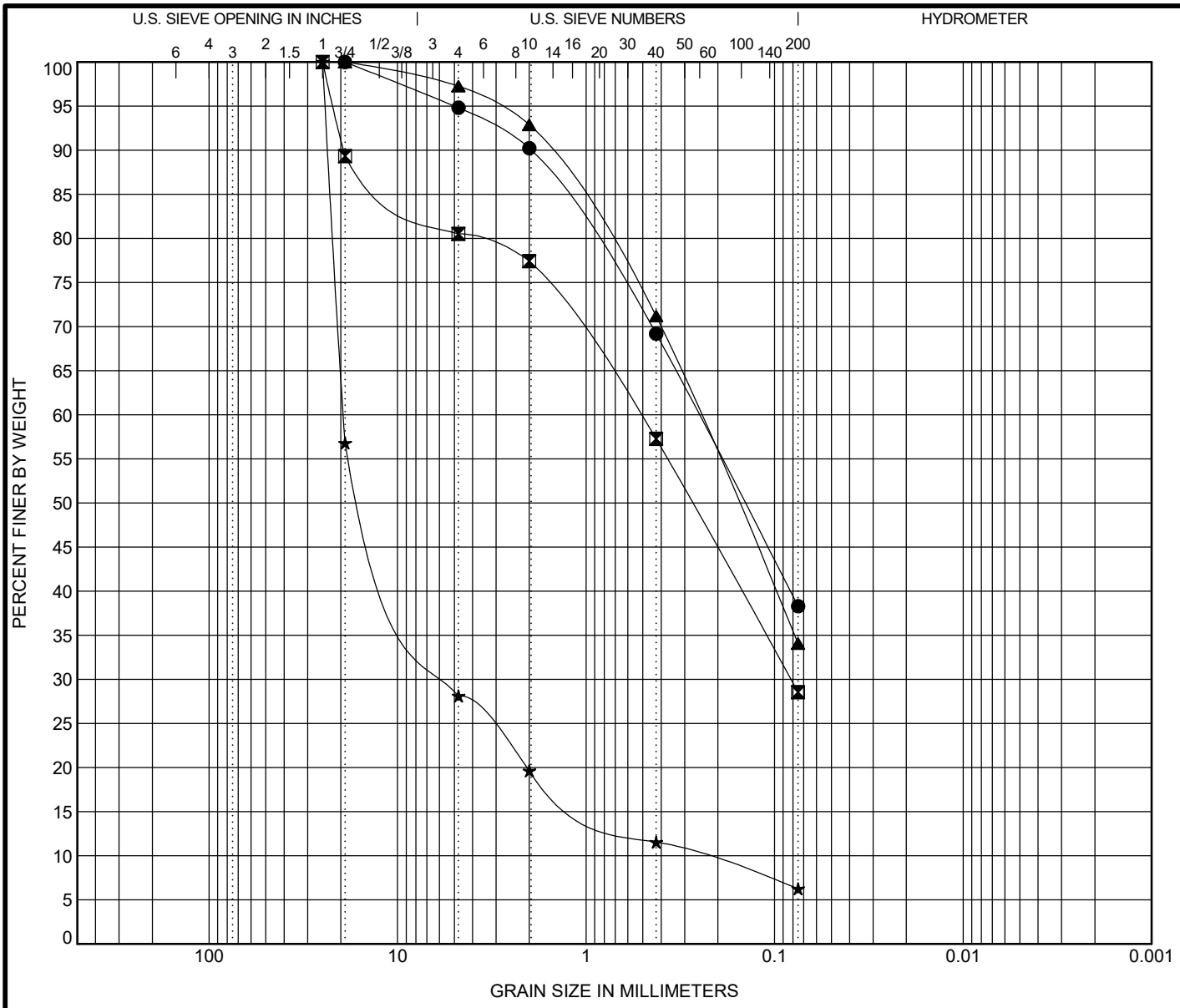
S - Split Spoon Soil Sample
U - Undisturbed Tube Sample
C - Core Sample
B - Bulk Soil Sample
NR - No Recovery of Sample

WOC - Weight of Casing
WOR - Weight of Rods
WOH - Weight of Hammer
PPR - Compressive Strength based on Pocket Penetrometer
TV - Shear Strength (tsf) based on Torvane

ADDITIONAL CLASSIFICATIONS

New York City Building Code soil classifications are given in parentheses at the end of each description of material, if applicable. See sections 1804.2 of the 2008 Building Code for further details.

APPENDIX II



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Identification			Classification	WC%	LL	PL	PI	Cc	Cu
●	B-1	2.0	S-2	Bwn-gy c-f SAND, and Silt, trace f Gravel	8.8					
⊠	B-3	4.0	S-3	Gy-bwn c-f SAND, some Silt, little c-f Gravel	6.1					
▲	B-5	6.0	S-4	Bwn c-f SAND, some Silt, trace f Gravel	9.0					
★	B-6	2.0	S-2	Gy-bwn c-f GRAVEL, some c-f Sand, trace Silt	2.5				5.44	75.65

	Sample Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	Source of Material
●	B-1	2.0	S-2	19	0.254			5.2	56.5	38.3		Boring
⊠	B-3	4.0	S-3	25	0.524	0.082		19.5	52.0	28.6		Boring
▲	B-5	6.0	S-4	19	0.252			2.7	63.2	34.1		Boring
★	B-6	2.0	S-2	25	19.39	5.202	0.256	71.9	21.9	6.3		Boring

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Newburgh, NY 12550
Telephone: (845) 563-9081 Fax:

GRAIN SIZE DISTRIBUTION

Project No: **9617.01** Date: **12/11/18**

Project: **PS-16**

Location: **Yonkers, NY**

Our Story

For the past 30 years, Tectonic has delivered quality professional services in a timely and cost effective manner by pooling its talented staff into project teams that think, act, and perform as one integral unit. By carefully listening and collaborating with its clients, the firm is able to identify the key issues and assure stakeholder objectives are met in the final deliverables. Through innovating and adopting technological advances, the firm is able to generate unique solutions to improve our nation's deteriorating infrastructure and build safe sustainable communities.

As the world evolves, and its challenges grow more complex, Tectonic continues to innovate and provide the practical solutions and exceptional customer service its clients have trusted since its founding.

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Tectonic

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