DANIEL G. LOUCKS, P.E.
GEOTECHNICAL ENGINEERING

Geotechnical Report
For
Wallace Campus Buildings
Catherine & Main Street, Poughkeepsie, NY

File No. 3691

Prepared For:

Wallace Partners LLC

Prepared By:

Daniel G Loucks, PE
NYSPE 068389

8 September 2020

P.O. BOX 163, BALLSTON SPA, NY 12020 ■ 518-371-7622 ■ FAX 518-383-2069 ■ E-MAIL: DGLGEOENG@GMAIL.COM

INTRODUCTION:

The subsurface investigation for the proposed Wallace Campus Buildings, Poughkeepsie, New York has been completed. Allied Drilling Inc of Sparkill, New York has completed nine (9) soil borings at the site. In addition to the soil borings three (3) test pits were excavated at the site. The logs of these borings and test pits, along with a location diagram, have been included in the appendix of this report.

It is my understanding that the proposed construction will include an eight-story building a basement adjacent to Main Street and a 6 to 8 story building adjacent to the Catherine Street side of the site. The buildings will have an upper steel frame over a lower reinforced concrete bearing-wall design.

I have estimated that the maximum column loadings will range from 450 to 500 kips for the eight story building and approximately 300 to 350 for a six story building. When the final design has been completed, I should be notified if these assumed loadings are correct. The settlement tolerances are normal. Settlement tolerances are considered to include up to 1 inch of total settlement and 3/4 inch of differential settlement between column locations.

The lower floor slab will be established at 10 feet below the existing grades at the site.

The purpose of this report is to describe the investigation conducted and the results obtained; to analyze and interpret the data obtained; and to make recommendations for the design and construction of the feasible foundation types and earthworks for the project. The recommendations contained in this report are based on the information that was provided up to the date the report was completed. Any changes in the design of the project or changes to the recommendations provided in this report should be brought to my attention to determine if there needs to be any revision of the geotechnical recommendations. I am not responsible for any changes made to the recommendations provided in this report unless I have provided written approval of the changes.

The scope of my services has been limited to coordinating the boring and laboratory investigation, analyzing the soils information, and providing a geotechnical report with foundation recommendations and seismic site classifications as per NYS Building Code. Environmental aspects of the project as well as grading and site design should be performed by qualified others.

FIELD INVESTIGATION PROCEDURES:

The borings were extended by means of 4.0 inch ID, hollow-steel casing, by using various cutting bits using circulating drilling fluid to remove the cuttings from the casing and by continuous sampling with a split-spoon sampler.

Representative samples were obtained from the boring holes by means of the split-spoon sampling procedure performed in accordance with ASTM D 1586. The standard penetration values obtained from this procedure have been indicated on the soil boring logs.

Soil samples obtained from these procedures were examined in the field, sealed in containers, and shipped to the laboratory for further examination, classification and testing, as applicable.

Representative samples of the rock materials were obtained by means of the diamond-bit sampling procedure performed in accordance with ASTM D 2113. NQ2-size core barrels were used for this sampling procedure. Rock samples obtained from this procedure were examined in the field, placed in wooden core-sample boxes and shipped to the laboratory for further examination and classification.

During the investigation, water level readings were obtained at various times where water accumulated in the boring hole. The water level readings, along with an indication of the time of the reading relative to the boring procedure, have been indicated on the soil boring logs.

In addition to the field boring investigation, the soil engineer visited the site to observe the surface conditions.

LABORATORY INVESTIGATION:

All samples were examined in the laboratory by the soil engineer and classified according to the Unified Soil Classification System. In this system, the soils are visually classified according to texture and plasticity. The appropriate group symbol is indicated on the soil boring logs.

Sieve Analyses were performed on representative samples in accordance with ASTM Specification D 422. These tests were performed to verify the visual soil classifications. Results of the tests can be found in the appendix of the report.

SITE CONDITIONS:

At the time of my site visit the ground surface at the proposed Catherine Street building was fairly level and covered with asphalt pavement and some grass around the perimeter. I understand that there used to be an old market building at this location in the past.

At the proposed building site along Main Street, there are existing 2 to 3 story buildings adjacent to the road and to the north of the buildings is a paved level parking lot area.

SUBSURFACE CONDITIONS:

The specific subsurface conditions encountered at each boring and test pit location are indicated on the individual soil boring and test pit logs. However, to aid in the evaluation of this data, I have prepared a generalized description of the soil conditions based on the boring and test pit data.

The borings for the Catherine Street building (borings 1 thru 5) encountered an upper layer of fill that extends to between approximately 1 and 7 feet below the existing ground surface. These fill soils consist of sand with varying amounts of gravel and silt and a trace of organics. This material is loose to dense. Beneath the fill are sandy soils with varying amounts of silt and gravel. These virgin soils are loose to dense and extend to the bottom of the shallower borings (B-4 and B-5) at 17 feet, to approximately 13 feet in boring B-3 and to approximately 18 feet in the deeper borings. Below the virgin sand with silt and gravel is a layer of silt with a trace to some fine sand. This silty layer is medium dens to dense and extends to between approximately 23 and 48 feet below the existing ground surface. A layer of clayey silt with occasional thin clay layers was encountered under the silt. These layered soils extended to between approximately 33 and 54 feet below the existing ground surface and are medium dense to dense. A layer of weathered shale with sand and silt was encountered underlying the clayey silt soils. This very dense layer extended to split spoon refusal on shale bedrock at between 41 and 56 feet below the existing ground surface. A rock core was taken between 57 and 62 feet, in boring B-22. The coring recovered highly fractured shale with an RQD of 0 percent.

Two test pits were attempted to be excavated adjacent to the north side of the building on Catherine Street. Both test pits encountered an upper layer of sand with a trace to some gravel, clayey silt and building debris. These test pits were stopped at between 2 and 3 feet, below the existing ground surface, because utilities were encountered. No test pit was performed on the east side of the adjacent building because of existing utilities.

The borings for the Main Street Building (borings 6 thru 9) also encountered an upper layer of fill that extended to between approximately 5 and 9 feet below the existing ground surface. This fill is comprised of a mixture of sand and gravel with lesser amount of silt, brick and asphalt pavement. Below this fill is a layer of sand with varying amounts of gravel and a trace to some silt. This sandy layer is medium dense to dense and extends to between approximately 17 to 23 feet below the existing ground surface. Underlying the sandy soils is a layer of clayey silt with a trace of fine sand occasional thin clay layers. This layered clayey silt is generally medium dense to dense/soft and it extends to between approximately 27 and 51 feet below the existing ground surface. Beneath this clayey silt is a layer weathered shale and clayey silt. This layer is dense to very dense and extended to split spoon refusal on weathered shale bedrock at the bottom of the borings at between approximately 41 and 62 feet below the existing ground surface.

One test pit was excavated along the western side of the adjacent taller building at approximately the intersection of the building change in height. The test pit encountered an upper layer of fill under the asphalt pavement that extended to the top of the building footing at a depth of 10 feet below the existing ground surface. The footing extended approximately 2 feet out from the foundation wall. The thickness of the footing was not able to be determined because the excavator could not dig deeper.

GROUNDWATER CONDITIONS:

Accurate groundwater levels are difficult to determine in clayey silt soils with only short term readings or observations. Clayey silt soils typically do not allow an adequate amount of water to flow through the soil to produce a water level reading during the drilling operation. I have indicated where water was observed on the boring logs.

The drilling procedure requires the use of drilling fluid during the boring process. This makes it difficult to determine ground water levels during the boring investigation.

Based on the groundwater levels observed during the boring investigation, the moisture condition of the samples recovered from the boring holes and coloration of the soil samples, I judge that the groundwater level was located below depth of 15 feet at each building site.

Perched groundwater tables may occur at higher elevations in the soil profile due to groundwater being retained by layers or lenses of silt or clay soils.

Some fluctuation in hydrostatic groundwater levels and perched water conditions should be anticipated with variations in the seasonal rainfall and surface runoff.

It should be noted that the groundwater levels were obtained during the drilling procedure. Actual water levels may vary at the time of construction. Some groundwater could be encountered in soil layers labeled moist to wet on the boring logs.

ANALYSIS AND RECOMMENDATIONS:

The borings indicate that the uncontrolled fill extends to between approximately 1 and 9 feet below the existing ground surface. I understand that the proposed basements will extend to at least 10 feet below the existing ground surface. This would extend the new structures through the existing uncontrolled fill soils. Generally medium dense sandy soils with varying amounts of gravel and silt were encountered below the uncontrolled fill and then medium dense to dense silt/clayey silt soils. Split spoon refusal on bedrock was encountered at between approximately 41 and 62 feet below the existing ground surface. The column loading has been estimated to be between approximately 450 to 500 kips for an eight story building and between 300 and 350 for a six story building. This should be verified. Assuming this loading and a net allowable soil bearing pressure of 2500 psf, I estimate that footings would be approximately 15 feet square for the eight story building and 12 foot square if the building is six stories, but given the existing building and property line constraints, it is likely that the footings will have to be eccentrically loaded and would extend further into the building footprint. If there are and interior columns the spacing between footings could be very small. Because of this and to limit settlements, at this time I recommend that the proposed eight story building(s) be supported on a mat foundation. If the building loads are lower or spacing of possible footings greater, then spread footing foundation could be considered. If one of the buildings is six stories, with the loading that was assumed being correct, then in my opinion the six story building could be designed to rest on spread footing foundations. Both foundations should rest on firm virgin soils or a minimum of 8 inches of controlled uniform crushed stone, over a layer of geotextile that in turn rests on firm virgin soils.

In my opinion this approach would be less expensive then deep foundations such as driven piles or caissons. Also there would be less vibration, then if driven piles were used.

Site Work:

The proposed construction areas should be cleared and grubbed and all organic topsoil and vegetation along with any uncontrolled fill and debris. The subgrade should be proof-rolled with a 10-ton static roller and the proof rolling should be observed by the soil engineer. This proof rolling will compact the subgrade and reveal the presence of soft spots. If saturated subgrade conditions exist, I recommend that the subgrade be observed and probed by the soil engineer in place of proof rolling. Any soft spots should be excavated and backfilled with controlled fill material.

The removal of any uncontrolled fill should extend to a minimum horizontal distance past the edge of the footings equal to half the depth that the fill extends under the footing. This is equal to a 1:2 (H:V) slope down from the outer edge of the footing to the virgin soil. All uncontrolled fill within the proposed building area should also be removed.

A way to stabilize a spongy, but suitable, virgin, subgrade would be to spread a reinforcement or separation type of geotextile (Mirafi 600X or approved equal) on the subgrade and follow with a lift of clean, granular fill or uniform crushed stone. The thickness of the controlled fill can range from 1.0 to 2.5 feet, as necessary, to achieve a working mat upon which to construct the remainder of the controlled fill or to place footings. If uniform crushed stone is used as controlled fill a layer of geotextile should be placed between the crushed stone and any sand/gravel controlled fill or virgin soil.

A third method for stabilizing spongy areas of the subgrade would be to improve the drainage by use of properly designed drain tiles or by using properly designed sump pit and pump dewatering systems. Using these methods, the local groundwater table maybe able to be lowered sufficiently to aid in stabilizing the subgrade surface. If large quantities of water are encountered vacuum well point dewatering maybe required. The need of a well point or any other type of dewatering program should be evaluated by the contractor before starting construction and be designed by a qualified dewatering contractor or hydrologist.

Controlled Fill:

Before any controlled fill is placed the site should be inspected to verify that the site has been prepared according to the recommendations contained in this report as required by the NYS Building Code Section 1704.7.1.

Controlled fill can consist of non-organic, imported soils free of debris and having a maximum particle size of 4 inches. A gradation and proctor should be performed on the proposed soil and submitted to me for approval. Approved, properly placed and compacted material can be used as controlled fill within the proposed building footprint. Free draining controlled fill material should be placed as recommended in this report. Approved on-site or imported soils should not be used in these locations where free draining controlled fill is recommended unless approved by me.

Controlled, relatively clean, granular fill can be spread in lifts not exceeding 12 inches in loose thickness. These materials should be compacted to a minimum of 95 percent of the maximum ASTM Specification D 1557-91 density, modified proctor.

On-site, silty soils, will be difficult to compact during wet weather or poor drying conditions. Given good drying conditions, the on-site soils with more than 10 percent silt/clayey silt may be able to be properly compacted. These types of soils are sensitive to moisture content and weather conditions. During freezing or wet weather conditions these soils should not be used as controlled fill.

If crushed stone is used as controlled fill it should have a layer of geotextile with a minimum tensile strength of 200 lbs should be placed between the stone and existing soils. The stone should be placed in lifts not exceeding 12 inches in thickness and should be compacted with a minimum of 5 passes of a vibratory roller rated at 5 tons or larger. Weathered shale or crushed shale should not be used as controlled fill within the proposed building area.

Free Draining Controlled Fill Material: Naturally or artificially graded mixture of sand, natural or crushed stone or gravel conforming to NYS DOT Item 304.12 or 304.14, Type 2 or 4 as follows:

U.S. Sieve No.	Percent Passing by Weight
2 inch	100
1/4 inch	30-65
No. 40	5-40
No. 200	0-10

NYS DOT Table 703-4, Size 2 crushed stone, clean, durable, angular, and of uniform quality throughout:

U.S. Sieve No.	Percent Passing by Weight
1 ½ inch	100
1 inch	90-100
1/2 inch	0-15

All controlled fill should be free of organic and/or frozen material.

Free-draining controlled fill should have less than 10 percent fines passing the #200 sieve.

I recommend performing one field density test for every 2,000 square feet of controlled fill placed, within the overlaying building footprint, but in no case fewer than three tests per lift.

I recommend that for foundation wall and footing backfill that in each compacted backfill layer have at least one field in place density test for each 50 feet or less of wall or footing length, but not fewer than two tests along a wall face or footing be performed per lift.

Proper placement and compaction of backfill along exterior portions of foundation walls should be provided, especially in locations where there are sidewalks or building entries. Proper placement of backfill materials can reduce possible settlements and the use of properly designed backfill and drainage can reduce possible frost heave movements.

Results of the field compaction test results should be sent to my office for review. Copies of the results of soil gradation tests should also be provided to me for review and approval.

Building Foundations:

I recommend that the proposed structure be supported by a mat or possibly spread footing foundations resting on firm virgin, inorganic, soils or on controlled fill which, in turn, rests on these virgin materials, Depending on the building loading and column spacing. The mat or footings can be designed for a maximum, net, allowable soil bearing pressure of 2500 psf.

The soil engineer should observe the mat/footing subgrade at the beginning of the project or if soil conditions change to verify the allowable bearing pressure of the soil encountered.

Loads from adjacent footings or structures should be assumed to distribute based on the elastic theory. Typical Boussinesq charts can be used to approximate loads at various depths and locations due to adjacent structures.

A minimum footing width of 2.0 feet is recommended for load bearing strip footings. Isolated footings should be at least 3.0 feet wide.

Exterior footings or footings in unheated areas should have a minimum of 4.0 feet of embedment for protection from frost action. Interior footings should have a minimum embedment of 1.5 ft below final grade to develop the bearing value of the soils.

All walls that retain soil on only one side should have a drain tile placed along the base of the wall. The drain tile should be a minimum of 4 inches in diameter, surrounded by a minimum of 6 inches of properly graded washed sand or crushed stone wrapped with a non-woven filter fabric with a maximum apparent opening size of 70 and a minimum trapezoid tearing strength of 100 lbs. The drain tile should drain to a stormwater sewer, daylight, or a sump equipped with a pump.

The wall should then be backfilled with a controlled, well graded, free-draining granular material. The material should extend away from the wall a horizontal distance of two-thirds the height of the fill being placed. The upper 1 foot of material should be a fairly impermeable material to shed surface water and should be pitched away from the building to provide proper drainage.

If these procedures are used, a static lateral soil pressure of 40 psf per foot of retained soil can be used for design of the wall. This static, active lateral soil pressure is based on a moist unit weight of 125 pcf and an angle of internal friction of 32 degrees. A wall soil friction angle of 18 degrees and a coefficient of base sliding of 0.45 can also be used for design.

If the retaining wall is braced or if the deflection is limited prior to backfilling so the active soil pressure is not achieved, a static, at-rest lateral soil pressure of 63 psf per foot of retained soil can be used for design.

To resist overturning and sliding a static lateral passive pressure of 250 psf per foot of embedment can be used, provided foundations are backfilled with controlled fill. This static, passive pressure resistance value has been reduced from the calculated full passive pressure because of stress/strain characteristics of the soil. To develop the full, calculated resistance a certain amount of movement or deflection in the structure is required. The amount of movement required to generate this resistance generally greater than is acceptable for structures. I therefore recommend that the full passive pressure not be used.

The passive resistance of the upper two feet of soil, not in floor slab areas, should be ignored due to surface effects of frost and moisture.

Any surcharge loading of existing adjacent building foundations or other adjacent structures/utilities should be addressed by the structural engineer using Boussinesq charts.

Floor Slabs:

Mat foundations or concrete floor slabs can be designed to rest on controlled fills resting on virgin materials. A 6-inch layer of well-graded, free-draining, granular material should be placed beneath the floor slab to provide drainage, act as a capillary break, and to provide better and more uniform support.

Exterior concrete pavements will experience some frost heave movements during the winter and spring. If these movements are not acceptable then a minimum of 4.0 feet of approved subbase material and properly designed drains would be required below the concrete pavements or sidewalks. The use of properly designed footing drains can also be used to reduce possible frost heave movements adjacent to the proposed structure.

If the moisture levels of floor slab areas are critical additional drainage materials and vapor barriers will be required beneath the floor slab. Also, the moisture content of the subbase soils should be carefully monitored to prevent excess water from saturating these subbase soils before the floor slab is poured. This aspect of the design should be performed by qualified others.

Seismic Conditions:

The potential seismic conditions at the proposed site have been investigated using the information provided in the NYS Building Code Section 1613, the boring information obtained during my investigation and past experience with soils in the area.

Based on the soil boring information and my experience it is my opinion that the Site Soil Classification (Table 1615.1.1) could be assumed to be D. Using data from Reference Document ASCE41-17, Hazard level BSE-2N, I estimate that the MCE spectral acceleration (S_{xs}) at short periods is 31.0 and the MCE spectral acceleration (S_{x1}) at 1 s period is 13.1. I have included a copy of the spectral accelerations for other Hazard Levels in the appendix of this report.

The probabilistic ground motion values are expressed in %g for rock site class B. Peak ground accelerations in the upper soil profile may vary. If specific peak ground accelerations or shear wave velocities are required for the upper soil profile additional testing would be required. If it is determined by the structural engineer that the Seismic Design Category is D, E or F additional geotechnical recommendations can be provided.

The soil borings and my analysis do not indicate any significant potential seismic hazards such as liquefaction, sensitive clays, weakly cemented soil or surface rupture.

CONSTRUCTION PROCEDURES AND PROBLEMS:

The NYS Building Code Section 17 requires special inspections and follow up reports. These inspections should be performed to verify compliance with the recommendations contained in this report.

All excavations of more than a few feet should be sheeted and braced or laid back to prevent sloughing in of the sides.

Excavations should not extend below adjacent footings or structures unless properly designed sheeting and bracing or underpinning is installed.

Mat, footing and floor slab subgrades should be tamped to compact any soil disturbed during the excavation process. A flat plate should be placed on the end of the excavator or backhoe bucket to reduce disturbance of the footing subgrade.

A layer of geotextile (min. tensile strength of 200 lbs) and 8 to 16 inches of crushed stone may be required in footing excavations to prevent disturbance of the virgin subgrade during wet weather. The stone and fabric should be placed as described in the *Controlled Fill* section of this report.

Sump-pit and sump-pump-type dewatering may be required in excavations or low areas during wet weather or if groundwater is encountered. If large quantities of groundwater are encountered vacuum wells maybe required to stabilize the subgrade soils. All excavations should be dewatered to a minimum of 1 foot below the bottom of the excavation. All dewatering programs should be designed to prevent bottom heave. Any dewatering program should be performed with properly designed filtration protection on all pumps to prevent loss of ground.

As previously noted, the on-site soils contain clayey silt which will make the soils sensitive to moisture content. If the material becomes wet or saturated, it will become spongy and easily disturbed. Imported well draining sand and gravel or possibly crushed stone may be required to prevent disturbance of the subgrade soils during construction.

Temporary paving using coarse fill material or separation/ reinforcement geotextile and coarse fill material may be required for moving about the site during wet or thaw weather.

Subgrades should be kept from freezing during construction.

Water, snow, and ice should not be allowed to collect and stand in excavations or low areas of the subgrade.

Some obstacles, including foundations and utilities may be encountered in excavations.

Design and construction procedures should include measures to limit the potential for slab curl and vapor transmission. The shrinkage properties of the concrete should be controlled and the curing of the concrete controlled. Differential shrinkage between the top and bottom of the slabs could otherwise result in curling of the slabs. The control of vapor transmission through the slab should also be addressed. These phenomena may be only indirectly related to soil conditions. The architect/ structural engineer should address this aspect of the design.

Current American Concrete Institute recommendations for the design and construction of floor slabs and the control of shrinkage, slab curl and vapor transmission can be referred to.

Wallace Campus Buildings
Catherine & Main Street, Poughkeepsie, NY
File No.3691

CONTENTS OF APPENDIX:

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS

SS : Split-Spoon — 1¾ " I.D., 2" O.D., except where noted
S : Shelby Tube — 2" O.D., except where noted
PA : Power Auger Sample
DB : Diamond Bit — NX: BX: AX:
CB : Carboloy Bit — NX: BX: AX:
OS : Osterberg Sampler — 3" Shelby Tube
HS : Housel Sampler
WS : Wash Sample
FT : Fish Tail
RB : Rock Bit
WO : Wash Out

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted

WATER LEVEL MEASUREMENT SYMBOLS

WL : Water Level
WCI : Wet Cave In
DCI : Dry Cave In
WS : While Sampling
WD : While Drilling
BCR : Before Casing Removal
ACR : After Casing Removal
AB : After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils the accurate determination of ground water elevations is not possible in even several day's observation, and additional evidence on ground water elevations must be sought.

CLASSIFICATION

COHESIONLESS SOILS

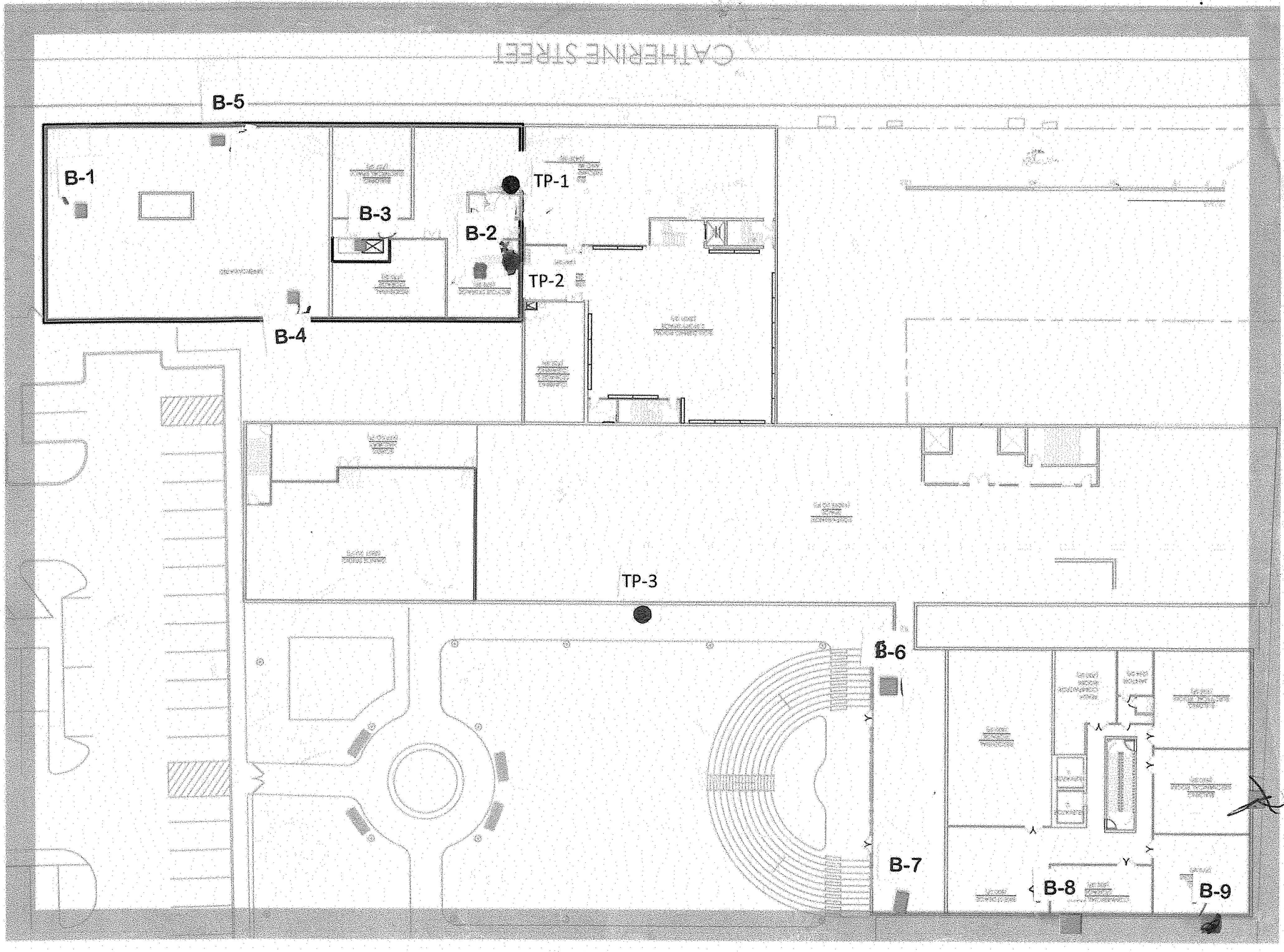
"Trace" : 1% to 10%
"Trace to some" : 10% to 20%
"Some" : 20% to 35%
"And" : 35% to 50%
Loose : 0 to 9 Blows
Medium Dense : 10 to 29 Blows
Dense : 30 to 59 Blows
Very Dense : ≥60 Blows

} or equivalent

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, then clay becomes the principle noun with the other major soil constituent as modifiers: i.e., silty clay. Other minor soil constituents may be added according to classification breakdown for cohesionless soils; i.e., silty clay, trace to some sand, trace gravel.

Soft : 0.00 — 0.59 tons/ft^2
Medium : 0.60 — 0.99 tons/ft^2
Stiff : 1.00 — 1.99 tons/ft^2
Very Stiff : 2.00 — 3.99 tons/ft^2
Hard : ≥ 4.00 tons/ft^2


CATHERINE STREET
B-5
B-1
B-3
B-2
TP-1
TP-2
B-4
TP-3
B-6
B-7
B-8
B-9

BORING LOG

BORING NO: B-1
SHEET 1 of 3

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: at 16.0 Ft. **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1 2	1	SS	7-8-16-8	24		Topsoil Fine to Coarse Sand, some Gravel, Silt, Brown, Moist, Medium Dense, (SM) FILL
3 4	2	SS	7-8-6-5	14		Fine to Coarse Sand, trace to some Gravel, Silt, trace Organics, Brown, Moist, Medium Dense, (SM) FILL
5 6	3	SS	3-3-3-5	6		
7 8	4	SS	9-10-11-15	21		Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist, Medium Dense, (SM)
9 10	5	SS	12-12-11-12	23		
11 12	6	SS	9-13-11-10	24		
13 14	7	SS	7-11-10-13	21		Fine to Coarse Sand and Gravel, trace to some Silt, Brown, Moist to Wet, Medium Dense, (SM-GM)
15		RB				
16 17	8	SS	10-9-8-10	17		
18 19 20		RB				Silt, trace to some Fine Sand, Brown/Gray, Wet, Medium Dense, (ML)
21 22	9	SS	10-14-14-16	28		
23 24 25		RB				
26 27	10	SS	9-10-9-12	19		

BORING LOG

BORING NO: B-1

SHEET 2 of 3

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: at 16.0 Ft. **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28 29		RB				Silt, trace to some Fine Sand, Gray, Wet, Medium Dense to Dense, (ML)
30 31	11	SS	14-18-18-17	36		
32 33 34		RB				
35 36	12	SS	8-11-13-12	24		
37 38 39		RB				
40 41	13	SS	6-8-10-14	18		
42 43 44		RB				
45 46	14	SS	6-8-10-11	18		
47 48 49		RB				Clayey Silt, trace to some Clay, trace Fine Sand, Gray, Wet, Medium Dense to Dense, (ML)(CL) Occasional Thin Clay Layers
50 51	15	SS	5-6-8-11	14		
52 53 54		RB				

BORING LOG

BORING NO: B-1
SHEET 3 of 3

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: at 16.0 Ft. **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
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Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
55	16	SS	78-100/.3	100+		Weathered Shale, trace to some Clayey Silt, trace Sand, Gray, Wet, Very Dense, (GM)
56		RB				
57	RUN 1	DB				ROCK CORE Highly Weathered Shale RQD=0
58						
59						
60						
61						
62						End of Boring at 62.0 Ft.
63						
64						
65						
66						
67						
68						
69						
70						
71						
72						
73						
74						
75						
76						
77						
78						
79						
80						
81						

BORING LOG

BORING NO: B-2

SHEET 1 of 2

PROJECT NAME: Wallace Campus
FILE NUMBER: 3691
LOCATION: Poughkeepsie, NY
OFFSET: None
DATE STARTED/COMPLETED: June 2020
SURFACE ELEV.: N/A
ENGINEER/ARCHITECT:
DRILL CONTRACTOR: Allied Drilling, Inc.
DRILLING METHOD: Rotary Wash
DRILL RIG TYPE: Truck
HAMMER WEIGHT: 140 Lbs
DROP: 30 Inches
CASING DIAMETER: OD/ID: 4 inch ID
WATER LEVEL DEPTH: at 17.0 Ft. **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Asphalt
						Subbase
1						
2	1	SS	9-13-15-14	28		Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist, Medium Dense, (SM) FILL
3						
4	2	SS	8-11-11-14	22		
5						
6	3	SS	10-12-11-12	23		
7						
8	4	SS	8-7-4-4	11		Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Medium Dense, (SM)
9						
10	5	SS	4-5-5-5	10		
11						
12	6	SS	8-10-11-12	21		
13						
14		RB				
15						
16	7	SS	9-10-9-9	19		
17						Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Wet, Medium Dense, (SM)
18		RB				Silt, trace to some Fine Sand, Gray, Wet, Medium Dense, (ML)
19						
20						
21	8	SS	8-7-8-6	15		
22						
23						
24		RB				Clayey Silt, trace to some Clay, Gray, Wet, Loose, Soft, (ML) (CL) Occasional Thin Layers
25						
26	9	SS	4-5-4-6	9		
27						

BORING LOG

BORING NO: B-2
SHEET 2 of 2

PROJECT NAME: Wallace Campus
LOCATION: Poughkeepsie, NY
DATE STARTED/COMPLETED: June 2020
ENGINEER/ARCHITECT:
DRILLING METHOD: Rotary Wash
DRILL RIG TYPE: Truck
HAMMER WEIGHT: 140 Lbs
DROP: 30 Inches
CASING DIAMETER: OD/ID: 4 inch ID
WATER LEVEL DEPTH: at 17.0 Ft. **TIME:** WS

FILE NUMBER: 3691
OFFSET: None
SURFACE ELEV.: N/A
DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28 29		RB				Clayey Silt, Gray, Wet, Medium Dense, (ML)
30 31	10	SS	7-7-9-7	16		
32 33 34		SS				Weathered Shale, trace to some Clayey Silt, trace Sand, Gray, Wet, Very Dense, (GM)
35 36	11	SS	65-62-62-72	100+		
37 38 39		RB				
40	12	SS	88-100	100+		
41 42 43 44 45 46 47 48 49 50 51 52 53 54						End of Boring at 41.0 Ft. Split Spoon Refusal

BORING LOG

BORING NO: B-3

SHEET 1 of 1

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: at 15.0 Ft. **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Asphalt
1						Subbase
2	1	SS	23-21-20-13	41		Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Medium Dense to Dense, (SM) Possible FILL
3						
4	2	SS	13-13-13-15	26		
5						Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Medium Dense, (SM)
6	3	SS	13-10-8-8	18		
7						
8	4	SS	5-5-5-4	10		
9						Fine to Medium Sand, trace to some Silt, trace Gravel, Brown, Moist to Wet, Loose, (SM-SP)
10	5	SS	6-5-4-3	9		
11						Fine to Medium Sand, trace to some Silt, Brown, Moist, Medium Dense, (SM)
12	6	SS	6-7-8-6	15		
13						Silt and Fine Sand, Brown, Wet, Dense, (ML) (SM)
14		RB				
15						
16	7	SS	11-16-24-22	40		
17						End of Boring at 17.0 Ft.
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						

BORING LOG

BORING NO: B-4
SHEET 1 of 1

PROJECT NAME: Wallace Campus
LOCATION: Poughkeepsie, NY
DATE STARTED/COMPLETED: June 2020
ENGINEER/ARCHITECT:
DRILLING METHOD: Rotary Wash
DRILL RIG TYPE: Truck
HAMMER WEIGHT: 140 Lbs
DROP: 30 Inches
CASING DIAMETER: OD/ID: 4 inch ID
WATER LEVEL DEPTH: Not Noted **TIME:** WS

FILE NUMBER: 3691
OFFSET: None
SURFACE ELEV.: N/A
DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1 2	1	SS	6-16-10-11	26		Topsoil Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist, Medium Dense, (SM) FILL
3 4	2	SS	8-11-9-9	20		Fine to Medium Sand, trace to some Silt, Brown, Moist, Medium Dense, (SM) Possible FILL
5 6	3	SS	9-13-10-13	23		Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist, Medium Dense, (SM)
7 8	4	SS	15-12-12-11	24		Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Medium Dense, (SM)
9 10	5	SS	5-9-9-9	18		
11 12 13 14 15		RB				
16 17	6	SS	10-11-12-11	23		
18 19 20 21 22 23 24 25 26 27						End of Boring at 17.0 Ft.

BORING LOG

BORING NO: B-5

SHEET 1 of 1

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: None **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1 2	1	SS	16-13-15-14	28		Topsoil Fine to Coarse Sand, trace to some Silt, trace Gravel, Brown, Moist, Medium Dense, (SM)
3 4	2	SS	14-14-8-8	22		
5 6	3	SS	11-10-9-9	19		
7 8	4	SS	12-10-12-15	22		
9 10	5	SS	14-20-30-32	50		Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist, Dense, (SM)
11 12	6	SS	11-10-8-7	18		Fine to Coarse Sand, trace to some Silt, trace Gravel, Brown, Moist, Medium Dense, (SM-SP)
13 14 15		RB				
16 17	7	SS	12-10-12-15	22		
18 19 20 21 22 23 24 25 26 27						End of Boring at 17.0 Ft.

BORING LOG

BORING NO: B-6

SHEET 1 of 3

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: at 15.0 Ft. **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Asphalt
1						Subbase
2 3	1	SS	4-2-2-1	4		Fine to Coarse Sand and Gravel, trace to some Clayey Silt, trace Brick, Dark Brown, Moist to Wet, Loose, (SM-GM) FILL
4 5	2	SS	3-1-2-2	3		
6 7	3	SS	1-2-1-2	3		No Recovery
8 9	4	SS	5-3-8-9	11		Fine to Coarse Sand, some Gravel, trace to some Silt, trace Brick, Brown, Moist, Medium Dense, (SM) FILL
10 11	5	SS	3-4-3-7	7		Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Loose to Medium Dense, (SM)
12 13	6	SS	9-10-9-15	19		
14 15		RB				Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist to Wet, Medium Dense to Dense, (SM-SP)
16 17	7	SS	15-18-17-15	35		
18 19 20		RB				
21 22	8	SS	11-10-9-7	19		
23 24 25		RB				Clayey Silt, trace Fine Sand, Gray, Wet, Dense, (ML)
26 27	9	SS	16-26-24-72	50		

BORING LOG

BORING NO: B-6

SHEET 2 of 3

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: at 15.0 Ft. **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28		RB				Clayey Silt, trace to some Clay, Gray, Wet, Dense, Medium, (ML-CL) Occasional Thin Layers
29						
30						
31	10	SS	16-18-17-18	35		
32						
33		RB				Clayey Silt, trace Fine Sand, Gray, Wet, Medium Dense, (ML)
34						
35						
36	11	SS	13-14-13-13	27		
37						
38		RB				
39						
40						
41	12	SS	8-12-15-15	27		
42						
43		RB				
44						
45						
46	13	SS	10-10-10-12	20		
47						
48		RB				Silt, some Clay, Gray, Wet, Loose, Soft, (ML) (CL) Layered
49						
50						
51	14	SS	4-5-70-54	75		Weathered Shale, trace to some Clayey Silt, trace Sand, Gray, Wet, Dense to Very Dense, (GM)
52						
53		RB				
54						

BORING NO: B-6
SHEET 3 of 3

PROJECT NAME: Wallace Campus
LOCATION: Poughkeepsie, NY
DATE STARTED/COMPLETED: June 2020
ENGINEER/ARCHITECT:
DRILLING METHOD: Rotary Wash
DRILL RIG TYPE: Truck
HAMMER WEIGHT: 140 Lbs
DROP: 30 Inches
CASING DIAMETER: OD/ID: 4 inch ID
WATER LEVEL DEPTH: at 15.0 Ft. **TIME:** WS

FILE NUMBER: 3691
OFFSET: None
SURFACE ELEV.: N/A
DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
55						Weathered Shale, trace to some Clayey Silt, trace Sand, Gray, Wet, Very Dense, (GM)
56	15	SS	38-33-21-100	54		
57						
58		RB				
59						
60						
61	16	SS	50-42-55-64	97		
62						End of Boring at 62.0 Ft.
63						
64						
65						
66						
67						
68						
69						
70						
71						
72						
73						
74						
75						
76						
77						
78						
79						
80						
81						

BORING LOG

BORING NO: B-7

SHEET 1 of 1

PROJECT NAME: Wallace Campus

FILE NUMBER: 3691

LOCATION: Poughkeepsie, NY

OFFSET: None

DATE STARTED/COMPLETED: June 2020

SURFACE ELEV.: N/A

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Allied Drilling, Inc.

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: None **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
0-1						Asphalt
1						Subbase
2	1	SS	21-8-7-5	15		Fine to Coarse Sand, some Gravel, trace to some Silt, trace Asphalt, Black, Moist, Medium Dense, (SM) FILL
4	2	SS	7-4-4-3	8		Fine Sand, trace to some Silt, Brown, Moist, Loose, (SM) FILL
6	3	SS	4-3-3-4	6		Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Loose, (SM) Possible FILL
8	4	SS	6-7-8-6	15		Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist, Medium Dense, (SM-SP)
10	5	SS	6-7-7-7	14		Fine to Coarse Sand, trace to some Silt, trace Gravel, Brown, Moist, Medium Dense to Dense, (SM-SP)
12	6	SS	12-16-16-11	32		
14		RB				
16	7	SS	10-8-7-8	15		
17						End of Boring at 17.0 Ft.

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27

BORING LOG

BORING NO: B-8

SHEET 1 of 1

PROJECT NAME: Wallace Campus

LOCATION: Poughkeepsie, NY

DATE STARTED/COMPLETED: June 2020

ENGINEER/ARCHITECT:

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: Not Noted **TIME:** WS

FILE NUMBER: 3691

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Concrete
1						Fine to Medium Gravel, some Sand, trace Silt, Brown, Moist, Medium Dense, (GM-GP) FILL
2	1	SS	8-12-5-3	17		
3						Fine to Coarse Sand and Gravel, trace to some Silt, trace Brick, Brown, Moist to Wet, Loose to Dense, (SM-GM) FILL
4	2	SS	4-4-5-5	9		
5						
6	3	SS	11-21-18-8	39		
7						Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist to Wet, Medium Dense, (SM-SP) Possible FILL
8	4	SS	8-10-14-14	24		
9						Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Medium Dense to Dense, (SM-SP)
10	5	SS	17-18-16-15	34		
11						
12	6	SS	15-16-17-17	33		
13						
14		RB				
15						
16	7	SS	7-15-12-11	27		
17						End of Boring at 17.0 Ft.
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						

BORING LOG

BORING NO: B-9

SHEET 1 of 2

PROJECT NAME: Wallace Campus

FILE NUMBER: 3691

LOCATION: Poughkeepsie, NY

OFFSET: None

DATE STARTED/COMPLETED: June 2020

SURFACE ELEV.: N/A

ENGINEER/ARCHITECT:

DRILL CONTRACTOR: Allied Drilling, Inc.

DRILLING METHOD: Rotary Wash

DRILL RIG TYPE: Truck

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 4 inch ID

WATER LEVEL DEPTH: at 16.0 Ft. **TIME:** WS

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Concrete
1						Fine to Coarse Sand and Gravel, trace to some Silt, Brown, Moist, Medium Dense, (SM-SP) (GM-GP) FILL
2						
3	1	SS	13-3-8-7	11		
4						
5	2	SS	15-14-14-11	28		
6						
7	3	SS	9-13-15-15	28		
8						Fine to Coarse Sand and Gravel, trace to some Silt, Brown, Wet, Medium Dense, (SM-GM)
9	4	SS	19-18-7-5	25		
10						
11	5	SS	8-7-5-6	12		
12						
13		RB				Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Wet, Medium Dense, (SM)
14						
15						
16	6	SS	11-8-5-6	13		
17						Clayey Silt, trace Fine Sand, Gray, Wet, Medium Dense, (ML)
18		RB				
19						
20						
21	7	SS	8-10-9-8	19		
22						
23		RB				Clayey Silt, some Clay, Gray, Wet, Medium Dense, Soft, (ML-CL) Occasional Clay Layers
24						
25						
26	8	SS	8-9-2-3	11		
27						

BORING LOG

BORING NO: B-9
SHEET 2 of 2

PROJECT NAME: Wallace Campus
LOCATION: Poughkeepsie, NY
DATE STARTED/COMPLETED: June 2020
ENGINEER/ARCHITECT:
DRILLING METHOD: Rotary Wash
DRILL RIG TYPE: Truck
HAMMER WEIGHT: 140 Lbs
DROP: 30 Inches
CASING DIAMETER: OD/ID: 4 inch ID
WATER LEVEL DEPTH: at 16.0 Ft. **TIME:** WS

FILE NUMBER: 3691
OFFSET: None
SURFACE ELEV.: N/A
DRILL CONTRACTOR: Allied Drilling, Inc.

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28		RB				Clayey Silt and Weathered Shale, Gray, Wet, Dense to Very Dense, (ML-SM)
29						
30						
31	9	SS	15-26-25-25	51		
32						
33		RB				
34						
35						
36	10	SS	31-36-56-78	92		
37						
38		RB				Weathered Shale, trace to some Clayey Silt, Gray, Wet, Very Dense, (GM)
39						
40	11	SS	89-100/.3	100+		
41						End of Boring at 40.8 Ft. Split Spoon Refusal
42						
43						
44						
45						
46						
47						
48						
49						
50						
51						
52						
53						
54						

Test Pit Logs
Wallace Campus Project
Catherine & Main St, Poughkeepsie, NY
File No. 3691

Test Pit # 1
0.0 – 0.5 ft Dark Brown Sand, trace to some Silt, trace Gravel, Roots (SM) Topsoil
0.5 – 2.5 ft Brown Sand, trace to some Silt, Gravel, trace Ash (SM) FILL
Pipe Encountered
No Water Observed

Test Pit # 2
0.0 – 0.5 ft Dark Brown Sand, trace to some Silt, trace Gravel, Roots (SM) Topsoil
0.5 – 3.0 ft Brown Sand, trace to some Silt, Gravel, Brick, trace Ash (SM) FILL
Wire Encountered
No Water Observed

Test Pit # 3
0.0 – 0.3 ft Asphalt Pavement
0.3 – 1.0 ft Brown Sand and Gravel, trace to some Silt (SM-GM) FILL
1.0 – 6.0 ft Brown Sand, some Silt, trace to some Debris (SM) FILL
6.0 – 10.0 ft Brown Sand, some Clayey Silt, trace Gravel (SM) FILL
Top of Footing 10 ft, 2 ft wide
No Water Observed

Wallace Campus Project
B-1
Liquefaction Analysis

SPT No.	Depth (ft)	N field	Ce	Cr	Cs	Cb	Total Stress (psf)	Effective Stress (psf)	Cn	N1,60	FC (%)	N1,60,cs	Ksigma	Alpha	Kalpha	CRR	CSR	Safety Factor
1	1	24	.95	1	1	1	120	120	1.7	38.7	20	45.38	1	---	---	- - -	.102	- - -
2	3	14	.95	1	1	1	360	360	1.7	22.6	15	26.18	1	---	---	- - -	.1	- - -
3	5	6	.95	1	1	1	600	600	1.7	9.6	15	12.55	1	---	---	- - -	.1	- - -
4	7	21	.95	1	1	1	840	840	1.58	31.5	15	35.51	1	---	---	- - -	.1	- - -
5	9	23	.95	1	1	1	1080	1080	1.39	30.3	15	34.25	1	---	---	- - -	.099	- - -
6	11	24	.95	1	1	1	1320	1320	1.26	28.7	15	32.57	1	---	---	- - -	.099	- - -
7	13	21	.95	1	1	1	1560	1560	1.16	23.1	15	26.7	1	---	---	- - -	.099	- - -
8	16	17	.95	1	1	1	1920	1857.6	1.06	17.1	15	20.42	1	---	---	.46	.103	4.46
9	21	28	.95	1	1	1	2510	2135.6	.99	26.3	85	36.56	.996	---	---	NL	.113	- - -
10	26	19	.95	1	1	1	3060	2373.6	.94	16.9	85	25.28	.958	---	---	.595	.122	4.87
11	31	36	.95	1	1	1	3610	2611.6	.9	30.7	85	41.84	.919	---	---	NL	.128	- - -
12	36	24	.95	1	1	1	4160	2849.6	.86	19.6	85	28.52	.889	---	---	.722	.13	5.55
13	41	18	.95	1	1	1	4720	3097.6	.82	14	85	21.8	.877	---	---	.437	.129	3.38
14	46	18	.95	1	1	1	5320	3385.6	.79	13.5	85	21.2	.852	---	---	.41	.126	3.25
15	51	14	.95	1	1	1	5925	3678.6	.75	9.9	90	16.87	.845	---	---	.316	.121	2.61
16	56	100	.95	1	1	1	6555	3996.6	.72	68.4	15	74.18	.775	---	---	NL	.115	- - -

Notes:

CSR analysis using Seed & Idriss (1971)
CSR File:
CRR using SPT Data and Seed et. al. Method in 1997 NCEER Workshop
CRR File: C:\Program Files\GeoMotions\Projects\3691.CRR
Earthquake used in CSR Analysis: 6.0 Mw
Earthquake Magnitude for CRR Analysis: 6
Peak Ground Acceleration for CSR Analysis (g, from User): .157
Magnitude Scaling Factor (MSF): 2.088
Depth to Water Table for CRR Analysis (ft): 15
Depth to Water Table for Cn Calculation (ft): 15
Depth to Base Layer for CSR Analysis (ft): 57.5
MSF Option: Andrus & Stokoe (1997)
Cn Option: Liao & Whitman (1986)
Ksigma Option: Hynes & Olsen (1999)
SPT Energy Ratio: Safety Hammer(1): .95
**effective stress computed using Depth to Water Table for CRR Analysis
*value modified by user

Wallace Campus Project
B-1
Seismic Induced Settlement Analysis

SPT No.	Depth (ft)	Thickness (ft)	Soil Type	(N)1	(N1)60,cs	N(1,J)	CSR M=7.5	FSL	Ecyc (%)	Evol (%)	Settlement (in)
1	1	2		45.38	----	----	.048	----	1.0000E-03	.002	0
2	3	2		26.18	----	----	.047	----	2.1086E-03	.0044	.001
3	5	2		12.55	----	----	.047	----	3.6488E-03	.0112	.002
4	7	2		35.51	----	----	.047	----	2.9773E-03	.0026	0
5	9	2		34.25	----	----	.047	----	3.4261E-03	.0028	0
6	11	2		32.57	----	----	.047	----	3.8585E-03	.003	0
7	13	3		26.7	----	----	.047	----	4.6737E-03	.0043	.001
8	16	3.5		----	20.42		.049	4.46		----	0
9	21	5		----	----	----	----	NFSL		----	0
10	26	5		----	25.28		.058	4.87		----	0
11	31	5		----	----	----	----	NFSL		----	.06
12	36	5		----	28.52		.062	5.55		.1	.06
13	41	5		----	21.8		.061	3.38		.1	.06
14	46	5		----	21.2		.06	3.25		.1	.06
15	51	5		----	16.87		.057	2.61		.1	.06
16	56	2.5		----	----	----	----	NFSL		----	.03
										Total Settlement (in):	.334

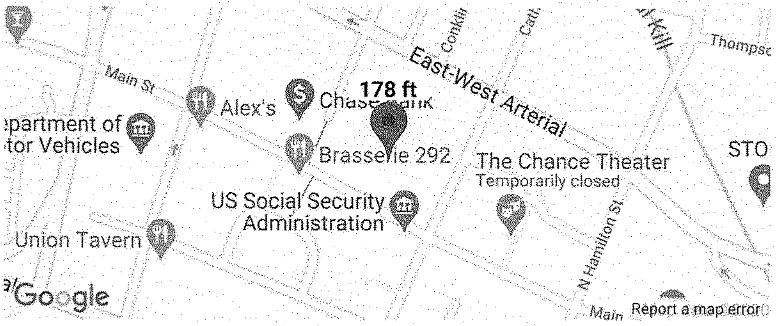
Notes:

CSR analysis using Seed & Idriss (1971)
CSR analysis on File:
Earthquake used in CSR Analysis: 6.0 Mw
CRR File: C:\Program Files\GeoMotions\Projects\3691.CRR
CRR - SPT Data & Seed et. al. Method in NCEER Workshop
CRR results on File: C:\Program Files\GeoMotions\Projects\3691.CRR
Depth to Water Table for CRR Analysis (ft): 15
Settlement of Dry Sands: Tokimatsu & Seed (1987)
Settlement of Saturated Sands: Tokimatsu & Seed (1987)

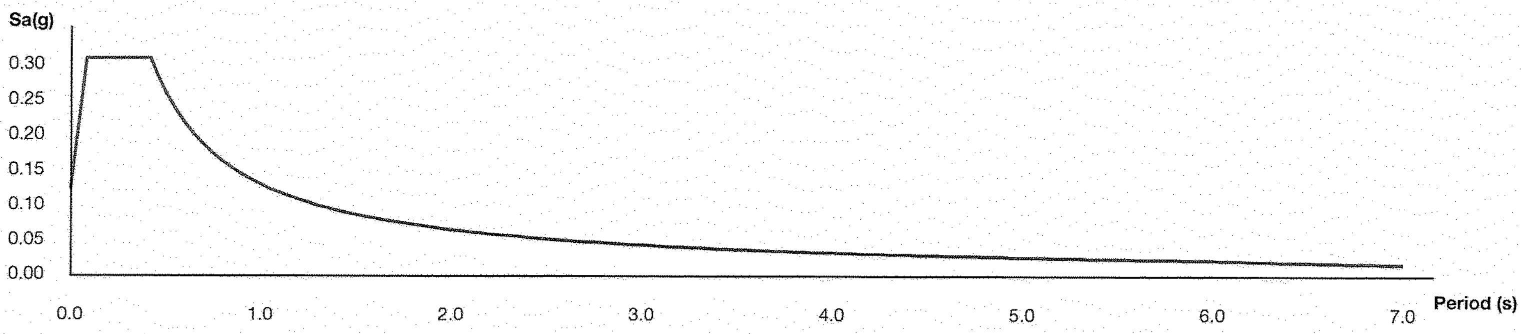
Hazards by Location

Search Information

Coordinates:	41.7035614731233, -73.92609742969972
Elevation:	178 ft
Timestamp:	2020-09-03T18:19:26.566Z
Hazard Type:	Seismic
Reference Document:	ASCE41-17
Site Class:	D
Custom Probability:	



Horizontal Response Spectrum - Hazard Level BSE-2N



Hazard Level BSE-2N

Name	Value	Description
SsUH	0.206	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
CR_S	0.942	Coefficient of risk (0.2s)
SsRT	0.194	Probabilistic risk-targeted ground motion (0.2s)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S_S	0.194	MCE_R ground motion (period=0.2s)
F_a	1.6	Site amplification factor at 0.2s
S_{XS}	0.31	Site modified spectral response (0.2s)
S1UH	0.059	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
CR_1	0.924	Coefficient of risk (1.0s)
S1RT	0.054	Probabilistic risk-targeted ground motion (1.0s)
S1D	0.6	Factored deterministic acceleration value (1.0s)
S_1	0.054	MCE_R ground motion (period=1.0s)
F_v	2.4	Site amplification factor at 1.0s
S_{X1}	0.131	Site modified spectral response (1.0s)

Hazard Level BSE-1N

Name	Value	Description
S_{XS}	0.207	Site modified spectral response (0.2s)
S_{X1}	0.087	Site modified spectral response (1.0s)

Hazard Level BSE-2E

Name	Value	Description
S_S	0.118	MCE_R ground motion (period=0.2s)
F_a	1.6	Site amplification factor at 0.2s
S_{XS}	0.189	Site modified spectral response (0.2s)
S_1	0.037	MCE_R ground motion (period=1.0s)
F_v	2.4	Site amplification factor at 1.0s
S_{X1}	0.088	Site modified spectral response (1.0s)

Hazard Level BSE-1E

Name	Value	Description
S_S	0.047	MCE_R ground motion (period=0.2s)
F_a	1.6	Site amplification factor at 0.2s
S_{XS}	0.075	Site modified spectral response (0.2s)
S_1	0.016	MCE_R ground motion (period=1.0s)
F_v	2.4	Site amplification factor at 1.0s
S_{X1}	0.037	Site modified spectral response (1.0s)

T_L Data

Name	Value	Description
T_L	6	Long-period transition period (s)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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CONSTRUCTION TECHNOLOGY
INSPECTION & TESTING DIVISION, P.D.& T.S., INC.
4 William Street, Ballston Lake, New York 12019
Phone: (518) 399-1848 Email: constructiontech@live.com

CLIENT:	**DANIEL LOUCKS, P.E.** POST OFFICE BOX 163 BALLSTON SPA, NEW YORK 12020	REPORT DATE: SAMPLE NUMBER: OUR FILE NO:	06/29/20 19406 750.001
ATT'N:	MR. DANIEL LOUCKS, P.E.	REVIEWED BY:	Robert Behan ROBERT BEHAN, NICET
PROJECT:	**WALLACE CAMPUS, POUGHKEEPSIE, NEW YORK**		

ASTM C136 / C117 / D422: SIZE DISTRIBUTION OF SOIL & AGGREGATES: SIEVE ANALYSIS

MATERIAL SOURCE:	**CLIENT ID: B-5, S-7, 10'-12'**
MATERIAL DESCRIPTION:	SAND, medium/fine; little fine Gravel, little Silt/Clay
MATERIAL PROJECT USE:	PER CLIENT:
EVALUATION SPECIFICATION:	PER CLIENT:

COARSE SIEVE SERIES: US STANDARD				MEDIUM SIEVE SERIES: US STANDARD				FINE SIEVE SERIES: US STANDARD			
SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE	SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE	SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFICATION ALLOWANCE
4"				1/4"	9.8	90.2		#50	77.4	22.6	
3"				#4	13.7	86.3		#60			
2 1/2"				1/8"				#80			
2"				#8	23.9	76.1		#100	83.9	16.1	
1 1/2"				#10				#140			
1"				#16	33.9	66.1		#200	86.8	13.2	
3/4"		100.0		#20				SILT			
1/2"	2.2	97.8		#30	52.2	47.8		CLAY			
3/8"	5.4	94.6		#40	67.0	33.0		COLLOID			

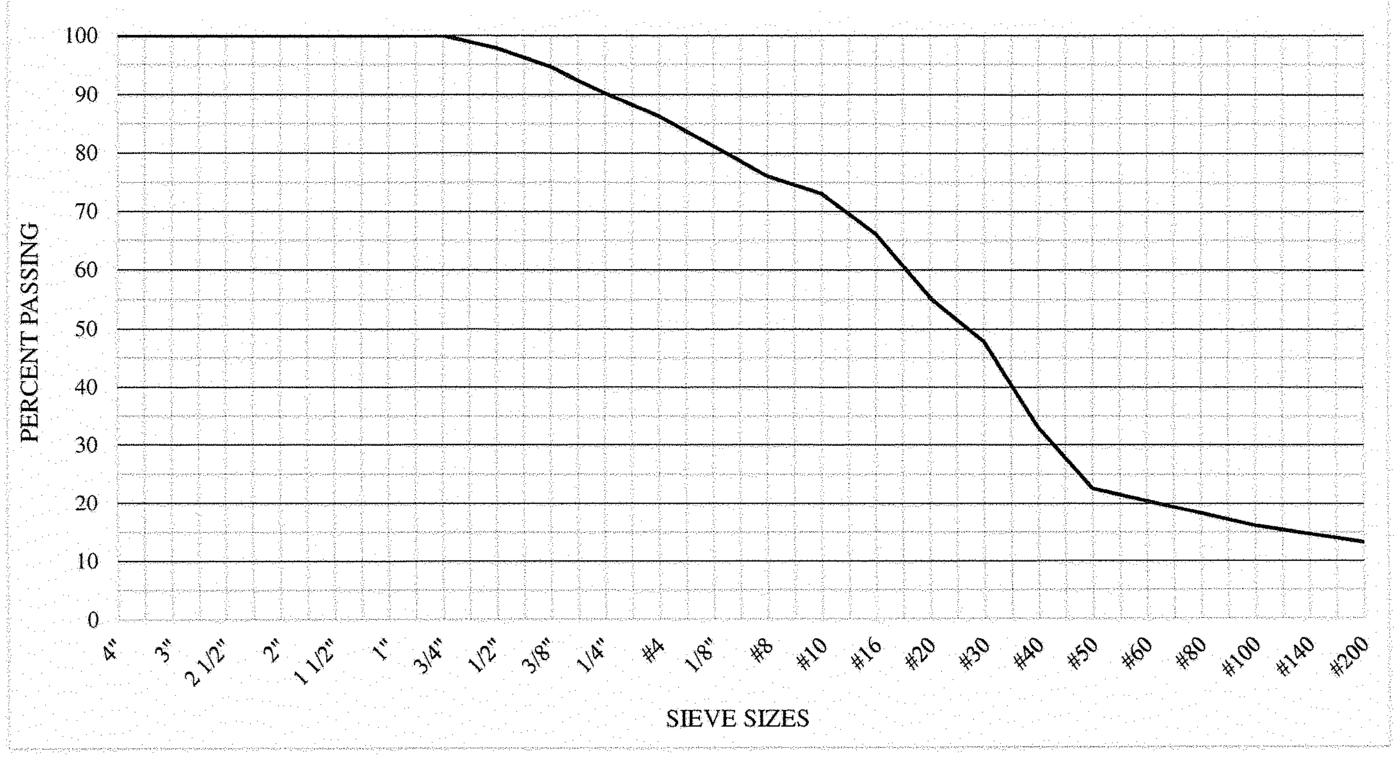
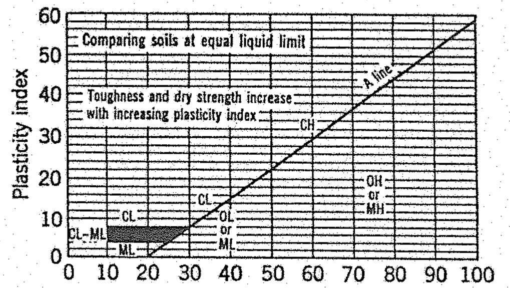


Table 3.5 Unified Soil Classification

<table>
<tr><th colspan="8">Field Identification Procedures
(Excluding particles larger than 3 in. and basing fractions on estimated weights)</th><th>Group Symbols[a]</th><th>Typical Names</th><th>Information Required for Describing Soils</th><th colspan="4">Laboratory Classification Criteria</th></tr>
<tr><td rowspan="8">Coarse-grained soils
More than half of material is *larger* than No. 200 sieve size[b]</td><td rowspan="16">(The No. 200 sieve size is about the smallest particle visible to naked eye)</td><td rowspan="4">Gravels
More than half of coarse fraction is larger than No. 4 sieve size</td><td rowspan="8">(For visual classification, the ¼ in. size may be used as equivalent to the No. 4 sieve size).</td><td rowspan="2">Clean gravels (little or no fines)</td><td colspan="3">Wide range in grain size and substantial amounts of all intermediate particle sizes</td><td>*GW*</td><td>Well graded gravels, gravel-sand mixtures, little or no fines</td><td rowspan="8">Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses
For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics
Example:
Silty sand, gravelly; about 20% hard, angular gravel particles ½-in. maximum size; rounded and subangular sand grains coarse to fine, about 15% nonplastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)</td><td rowspan="17">Use grain size curve in identifying the fractions as given under field identification</td><td rowspan="8">Determine percentages of gravel and sand from grain size curve
Depending on percentage of fines (fraction smaller than *No.* 200 sieve size) coarse grained soils are classified as follows:
Less than 5% *GW, GP, SW, SP*
More than 12% *GM, GC, SM, SC*
5% to 12% *Borderline* cases requiring use of dual symbols</td><td colspan="2">$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4
$C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3</td></tr>
<tr><td colspan="3">Predominantly one size or a range of sizes with some intermediate sizes missing</td><td>*GP*</td><td>Poorly graded gravels, gravel-sand mixtures, little or no fines</td><td colspan="2">Not meeting all gradation requirements for *GW*</td></tr>
<tr><td rowspan="2">Gravels with fines (appreciable amount of fines)</td><td colspan="3">Nonplastic fines (for identification procedures see *ML* below)</td><td>*GM*</td><td>Silty gravels, poorly graded gravel-sand-silt mixtures</td><td>Atterberg limits below "A" line, or *PI* less than 4</td><td rowspan="2">Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols</td></tr>
<tr><td colspan="3">Plastic fines (for identification procedures, see *CL* below)</td><td>*GC*</td><td>Clayey gravels, poorly graded gravel-sand-clay mixtures</td><td>Atterberg limits above "A" line, with *PI* greater than 7</td></tr>
<tr><td rowspan="4">Sands
More than half of coarse fraction is smaller than No. 4 sieve size</td><td rowspan="2">Clean sands (little or no fines)</td><td colspan="3">Wide range in grain sizes and substantial amounts of all intermediate particle sizes</td><td>*SW*</td><td>Well graded sands, gravelly sands, little or no fines</td><td colspan="2">$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6
$C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3</td></tr>
<tr><td colspan="3">Predominantly one size or a range of sizes with some intermediate sizes missing</td><td>*SP*</td><td>Poorly graded sands, gravelly sands, little or no fines</td><td colspan="2">Not meeting all gradation requirements for *SW*</td></tr>
<tr><td rowspan="2">Sands with fines (appreciable amount of fines)</td><td colspan="3">Nonplastic fines (for identification procedures, see *ML* below)</td><td>*SM*</td><td>Silty sands, poorly graded sand-silt mixtures</td><td>Atterberg limits below "A" line or *PI* less than 5</td><td rowspan="2">Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols</td></tr>
<tr><td colspan="3">Plastic fines (for identification procedures, see *CL* below)</td><td>*SC*</td><td>Clayey sands, poorly graded sand-clay mixtures</td><td>Atterberg limits below "A" line with *PI* greater than 7</td></tr>
<tr><td rowspan="8">Fine-grained soils
More than half of material is *smaller* than No. 200 sieve size</td><td colspan="6">Identification Procedures on Fraction Smaller than No. 40 Sieve Size</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td colspan="3" rowspan="9">
Plasticity chart
for laboratory classification of fine grained soils</td></tr>
<tr><td colspan="3" rowspan="4">Silts and clays liquid limit less than 50</td><td>Dry Strength (crushing characteristics)</td><td>Dilatancy (reaction to shaking)</td><td>Toughness (consistency near plastic limit)</td></tr>
<tr><td>None to slight</td><td>Quick to slow</td><td>None</td><td>*ML*</td><td>Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity</td><td rowspan="7">Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses
For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions
Example:
Clayey silt, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)</td></tr>
<tr><td>Medium to high</td><td>None to very slow</td><td>Medium</td><td>*CL*</td><td>Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays</td></tr>
<tr><td>Slight to medium</td><td>Slow</td><td>Slight</td><td>*OL*</td><td>Organic silts and organic silt-clays of low plasticity</td></tr>
<tr><td colspan="3" rowspan="3">Silts and clays liquid limit greater than 50</td><td>Slight to medium</td><td>Slow to none</td><td>Slight to medium</td><td>*MH*</td><td>Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts</td></tr>
<tr><td>High to very high</td><td>None</td><td>High</td><td>*CH*</td><td>Inorganic clays of high plasticity, fat clays</td></tr>
<tr><td>Medium to high</td><td>None to very slow</td><td>Slight to medium</td><td>*OH*</td><td>Organic clays of medium to high plasticity</td></tr>
<tr><td colspan="5">Highly Organic Soils</td><td colspan="3">Readily identified by colour, odour, spongy feel and frequently by fibrous texture</td><td>*Pt*</td><td>Peat and other highly organic soils</td></tr>
</table>

From Wagner, 1957.

[a] *Boundary classifications.* Soils possessing characteristics of two groups are designated by combinations of group symbols. For example *GW–GC*, well graded gravel-sand mixture with clay binder.

[b] All sieve sizes on this chart are U.S. standard.

Field Identification Procedure for Fine Grained Soils or Fractions

These procedures are to be performed on the minus No. 40 sieve size particles, approximately $1/64$ in. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the tests.

Dilatancy (Reaction to shaking):

After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with a volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky.

Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and gloss disappear from the surface, the pat stiffens and finally it cracks or crumbles. The rapidity of appearance of water during shaking and of its disappearance during squeezing assist in identifying the character of the fines in a soil.

Very fine clean sands give the quickest and most distinct reaction whereas a plastic clay has no reaction. Inorganic silts, such as a typical rock flour, show a moderately quick reaction.

Dry Strength (Crushing characteristics):

After removing particles larger than No. 40 sieve size, mould a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun or air drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity.

High dry strength is characteristic for clays of the CH group. A typical inorganic silt possesses only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished by the feel when powdering the dried specimen. Fine sand feels gritty whereas a typical silt has the smooth feel of flour.

Toughness (Consistency near plastic limit):

After removing particles larger than the No. 40 sieve size, a specimen of soil about one-half inch cube in size, is moulded to the consistency of putty. If too dry, water must be added and if sticky, the specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eight inch in diameter. The thread is then folded and re-rolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached.

After the thread crumbles, the pieces should be lumped together and a slight kneading action continued until the lump crumbles.

The tougher the thread near the plastic limit and the stiffer the lump when it finally crumbles, the more potent is the colloidal clay fraction in the soil. Weakness of the thread at the plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line.

Highly organic clays have a very weak and spongy feel at the plastic limit.

Soil Characteristics Pertinent to Roads and Airfields

Major Divisions		Letter (1)		Name	Value as Subgrade When Not Subject to Frost Action	Value as Subbase When Not Subject to Frost Action	Value as Base When Not Subject to Frost Action	Potential Frost Action	Compressibility and Expansion	Drainage Characteristics	Compaction Equipment	Unit Dry Weight lb. per cu. ft.	Typical Design Values	
													CBR (2)	Subgrade Modulus k lb. per cu. in.
COARSE-GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW		Well-graded gravels or gravel-sand mixtures, little or no fines	Excellent	Excellent	Good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	125-140	40-80	300-500
		GP		Poorly graded gravels or gravel-sand mixtures, little or no fines	Good to excellent	Good	Fair to good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	110-140	30-60	300-500
		GM	d	Silty gravels, gravel-sand-silt mixtures	Good to excellent	Good	Fair to good	Slight to medium	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	125-145	40-60	300-500
			u		Good	Fair	Poor to not suitable	Slight to medium	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	115-135	20-30	200-500
		GC		Clayey gravels, gravel-sand-clay mixtures	Good	Fair	Poor to not suitable	Slight to medium	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	130-145	20-40	200-500
	SAND AND SANDY SOILS	SW		Well-graded sands or gravelly sands, little or no fines	Good	Fair to good	Poor	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller	110-130	20-40	200-400
		SP		Poorly graded sands or gravelly sands, little or no fines	Fair to good	Fair	Poor to not suitable	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller	105-135	10-40	150-400
		SM	d	Silty sands, sand-silt mixtures	Fair to good	Fair to good	Poor	Slight to high	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	120-135	15-40	150-400
			u		Fair	Poor to fair	Not suitable	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	100-130	10-20	100-300
		SC		Clayey sands, sand-clay mixtures	Poor to fair	Poor	Not suitable	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	100-135	5-20	100-300
FINE-GRAINED SOILS	SILTS AND CLAYS LL IS LESS THAN 50	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Poor to fair	Not suitable	Not suitable	Medium to very high	Slight to medium	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	90-130	15 or less	100-200
		CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Poor to fair	Not suitable	Not suitable	Medium to high	Medium	Practically impervious	Rubber-tired roller, sheepsfoot roller	90-130	15 or less	50-150
		OL		Organic silts and organic silt-clays of low plasticity	Poor	Not suitable	Not suitable	Medium to high	Medium to high	Poor	Rubber-tired roller, sheepsfoot roller	90-105	5 or less	50-100
	SILTS AND CLAYS LL IS GREATER THAN 50	MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Poor	Not suitable	Not suitable	Medium to very high	High	Fair to poor	Sheepsfoot roller, rubber-tired roller	80-105	10 or less	50-100
		CH		Inorganic clays of medium to high plasticity, organic silts	Poor to fair	Not suitable	Not suitable	Medium	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	90-115	15 or less	50-150
		OH		Organic clays of high plasticity, fat clays	Poor to very poor	Not suitable	Not suitable	Medium	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	80-110	5 or less	25-100
HIGHLY ORGANIC SOILS		Pt		Peat and other highly organic soils	Not suitable	Not suitable	Not suitable	Slight	Very high	Fair to poor	Compaction not practical	—	—	—

Note:

(1) Unit Dry Weights are for compacted soil at optimum moisture content for modified AASHO compaction effort. Division of GM and SM groups into subdivision of d and u are for roads and airfields only. Subdivision is basis of Atterberg limits; suffix d (e.g., GMd) will be used when the liquid limit (LL) is 25 or less and the plasticity index is 6 or less; the suffix u will be used otherwise.

(2) The maximum value that can be used in design of airfields is, in some cases, limited by gradation and plasticity requirements.

GENERAL QUALIFICATIONS

This report has been prepared in order to aid in the evaluation of this property and to assist the architect and/or engineer in the design of this project. The scope of the project and location described herein, and my description of the project represents my understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in the design or location of the proposed facilities, as outlined in this report, are planned, I should be informed so the changes can be reviewed and the conclusions of this report modified or approved in writing by myself.

It is recommended that all construction operations dealing with earthwork and foundations be inspected by an experienced soil engineer to assure that the design requirements are fulfilled in the actual construction. If you wish, I would welcome the opportunity to review the plans and specifications when they have been prepared so that I may have the opportunity of commenting on the effect of soil conditions on the design and specifications.

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings and/or test pits performed at the locations indicated on the location diagram and from any other information discussed in the report. This report does not reflect any variations which may occur between these boring and/or test pits. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is a well-known fact that variations in soil and rock conditions exist on most sites between boring locations and also such situations as groundwater conditions vary from time to time. The nature and extent of variations may may not become evident until the course of construction. If variations then appear evident, it will be necessary for a reevaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.