Revised Geotechnical Engineering Report

Training Camps Revitalization at West Point
Camp Buckner, West Point Military Reservation, New York

June 11, 2020

Terracon Project No. JD195203

Prepared for:

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June 11, 2020

Ms. Barbara Kolonauski, RA, LEED AP
EwingCole
100 N. 6th Street
Philadelphia, PA

Subject: Revised Geotechnical Engineering Report
Training Camps Revitalization at West Point
Camp Buckner, West Point Military Reservation, New York
(Our JD195203)

Dear Ms. Kolonauski:

GeoConcepts Engineering, Inc. (GeoConcepts) is pleased to present the following revised geotechnical engineering report prepared for the Training Camps Revitalization at West Point, at Camp Buckner, West Point Military Reservation, New York.

We appreciate the opportunity to serve as your geotechnical consultant on this project. Please do not hesitate to contact me if you have any questions or want to meet to discuss the findings and recommendations contained in the report.

Sincerely,

GEOCONCEPTS ENGINEERING, INC., A Terracon Company

Katherine N. Fordney, PE
Project Engineer
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Table of Contents

1.0 Scope of Services

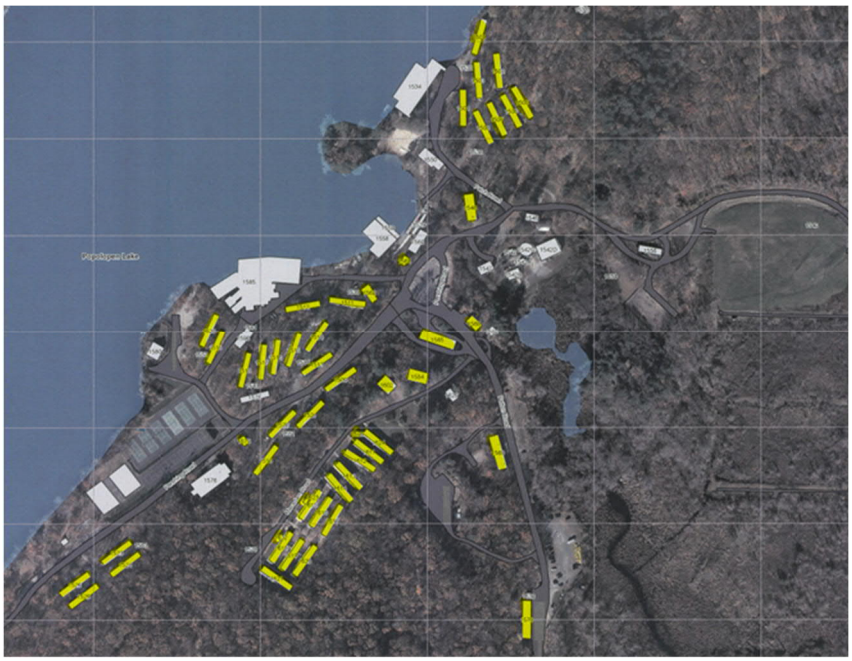
This geotechnical engineering report presents the results of the field investigation, soil laboratory testing, and engineering analysis of the geotechnical data. This report specifically addresses the following:

- An evaluation of subsurface conditions within the area of the proposed site development, including a seismic site classification per the International Building Code.
- Foundation recommendations for support of the proposed buildings.
- Lateral earth pressures for use in design of site retaining walls, including recommended backfill and subdrainage requirements.
- Earthwork recommendations for construction of load-bearing fills, including an assessment of on-site soils to be excavated for re-use as fill.
- Rock excavation requirements for the site development, including methods of rock excavation.
- Results of compressive strength testing of concrete cores obtained from the Barracks buildings.

Services not specifically identified in the contract for this project are not included in the scope of services.

2.0 Site Description and Proposed Construction

The site associated with the revitalization project is located at Camp Buckner on the West Point Military Reservation in New York. The site currently consists of existing barracks and support facilities, surrounded by wooded areas, with Popolopen Lake to the northeast. The elevation at the site ranges from approximately elevation (EL) 785 to EL 695, sloping downward towards the northeast.



Camp Buckner

Based on the Revised Statement of Work provided by the Department of the Army dated September 17, 2019 and Field Investigation Report dated January 20, 2019, the proposed construction consists of the repair and revitalization of the existing Camp Buckner Facilities to address immediate structural, health,

and safety concerns. We understand that all barracks buildings at Camp Buckner will be repaired and revitalized utilizing the existing foundations. We understand that the largest service level foundation loads for the proposed revitalized structures are expected to be approximately 15 to 20 kips. Some command buildings may also be selected for repair and revitalization. The subject buildings are highlighted in the map above. We also understand new foundations and retaining walls may be constructed at the site.

3.0 Subsurface Conditions

Subsurface conditions were investigated by drilling a total of 13 Standard Penetration Test (SPT) borings at various locations throughout Camp Buckner. The SPT borings were completed by Unitech Drilling of Franklinville, New Jersey under our observation from December 11 through 13, 2019, utilizing 3-¼-inch inside diameter hollow stem auger with automatic hammer. The sampler was advanced by driving the spoon into undisturbed soil under the impact of a 140-lbf hammer free-falling from 30 inches height per ASTM D1586-11.

Test pits were also completed by Unitech Drilling under our observation on December 16 and 18, 2019. Test pits were excavated adjacent to the existing buildings to document the depth and dimension of the existing foundations.

Test boring and test pit logs, and subsurface exploration plans are presented in Appendix A of this report.

Additionally, 38 slab cores were obtained from the barracks from December 3 to 6, 2019 to be tested for compressive strength. Concrete slab coring was performed by Unitech Drilling using a core machine and 2-inch diameter core barrel.

3.1 Geology

The project site lies within the Hudson Highlands Province of New York. The Hudson Highlands is bordered to the north by the Hudson-Mohawk Lowlands and by the Atlantic Costal Plain to the South. The Hudson Highlands typically consist of crystalline rocks eroded from very rugged terrain.

The geologic map of New York indicates that bedrock beneath the site consists primarily of one rock formation from the Middle Proterozoic Geologic Period:

> qpg – quartz plagioclase gneiss; may contain pyroxenes, hornblende, biotite; locally interlayered with amphibolite; subordinate biotite mesoperthite gneiss (Middle Proterozoic)

The surficial geologic map of New York indicates that surficial deposits at the site consist of:

> t – Till; variable texture, usually poorly sorted diamict, deposition beneath glacier ice, relatively impermeable, variable clast context, thickness variable, generally 1-50 meters (Pleistocene)

However, till was not encountered in the test boring and test pit locations. Accordingly, a stratification designation was not assigned.

3.2 Stratification

The subsurface materials encountered have been stratified for purposes of our discussions herein. These stratum designations do not imply that the materials encountered are continuous across the site. Stratum designations have been established to characterize similar subsurface conditions based on material gradations and parent geology. The generalized subsurface materials encountered in the test borings completed at the site have been assigned to the following strata:

Stratum A (Existing Fill)	generally medium dense or firm, WELL GRADED GRAVEL WITH CLAY AND SAND, SILTY SAND WITH GRAVEL, SANDY SILT WITH GRAVEL, FILL, moist, brown, gray
Stratum B1 (Residual)	generally stiff to hard, SANDY SILTY CLAY (CL-ML), SANDY SILT WITH GRAVEL (ML), SANDY LEAN CLAY WITH GRAVEL (CL) moist, brown, gray
Stratum B2 (Residual)	generally medium dense, CLAYEY GRAVEL WITH SAND (GC), SILTY GRAVEL WITH SAND (GM), SILTY SAND WITH GRAVEL (SM), moist, gray, brown
Stratum B3 (Weathered Rock)	generally very dense or very hard, SILTY SAND WITH GRAVEL (SM), CLAYEY GRAVEL WITH SAND (GC), SANDY SILT (ML), moist, gray, brown

The two letter designations included in the strata descriptions presented above and on the test boring logs represent the Unified Soil Classification System (USCS) group symbol and group name for the samples based on laboratory testing per ASTM D2487 and visual classifications per ASTM D2488. It should be noted that visual classifications per ASTM D2488 may not match classifications determined by laboratory testing per ASTM D2487.

3.3 Test Pit Investigation

Eight test pits were excavated adjacent to eight of the existing buildings to document the depth and dimension of the existing foundations. The results of these test pits are presented below in Table 3.3-1, and photographs of the test pits are provided in Appendix A at the end of this report.

Table 3.3-1: Test Pit Investigation Results

Test Pit No./Barrack Building No.	Depth to Bottom of Footing from Ground Surface (inch)	Footing Thickness (inch)	Footing Width (inch)	Footing Description	Bearing Soils
TP-1/1570	19	10.5	23.5	Square spread footing	FILL - SANDY SILT, moist, gray-brown
TP-2/1616	24	1	17	Thin circular concrete layer between pier and bedrock	Weathered Rock - SILTY SAND (SM) with boulders, moist, light brown
TP-3/1575	29	18	-	Irregular shaped concrete cylinder around bottom of pier	Residual – SILTY SAND (SM) with cobbles, wet, yellow brown
TP-4/1522	23	7	37	Square spread footing	Residual – SANDY SILT (ML) with cobbles, moist, yellow brown
TP-5/1516	9	7	24	Oval spread footing	FILL – SANDY SILT WITH GRAVEL, moist, yellow brown
TP-6/1564	11	9	23	Irregularly shaped, stepped spread footing	FILL – SANDY SILT (ML) with cobbles, moist, gray brown
TP-7[1]/1548	-	-	-	-	-
TP-8/1503	37	12	24	Highly eroded, square spread footing	FILL – SANDY SILT (ML) with cobbles, moist, gray brown

1. Test pit abandoned due to rapid groundwater infiltration.

3.4 Groundwater

Groundwater level observations were made in the field during excavation of the test pits and during drilling of the test borings and one day after the completion of the test borings. A summary of the water level readings rounded off to the nearest 0.5 feet is presented below in Table 3.4-1.

Table 3.4-1: Groundwater Readings

Test Boring No.	Depth to Groundwater (ft)	Groundwater Elevation (ft)
TB-5	1.5	EL 701.5
TB-7	2.0	EL 689
TB-11	1.5	EL 666.5
TP-3	1.1	EL 693
TP-7	2.7	EL 665.5

The groundwater observations presented herein are considered to be an indication of the groundwater levels at the dates and times indicated. Where groundwater was encountered, we believe it was perched groundwater conditions. The groundwater information presented herein should be used with caution as fluctuations in groundwater levels should be expected with seasons of the year, construction activity, changes to surface grades, precipitation, or other similar factors.

3.5 Soil Laboratory Test Results

Selected soil samples obtained from the field investigation were tested for grain size distribution, Atterberg limits, and natural moisture contents. A summary of soil laboratory test results is presented below in Table 3.5-1, and the results of natural moisture content tests are presented on the test boring logs in Appendix A.

Table 3.5-1: Summary of Soil Laboratory Test Results

Test Boring No.	Depth (ft)	Sample Type	Stratum	Description of Soil Specimen	Sieve Results		Atterberg Limits			Natural Moisture Content (%)
					Percent Retained #4 Sieve	Percent Passing #200 Sieve	LL	PL	PI	
TB-1	0.5-2.0	Jar	A	WELL GRADED GRAVEL (GW-GC) WITH CLAY AND SAND	47.5	7.2	21	14	7	4.6
TB-1	4.0-6.0	Jar	B2	CLAYEY GRAVEL (GC) WITH SAND	49.6	28.8	36	22	14	19.0
TB-2	2.0-4.0	Jar	B1	SANDY SILT (ML)	9.4	57.0	22	18	4	20.8
TB-3	0.0-2.0	Jar	B2	SILTY GRAVEL (GM) WITH SAND	57.0	17.1	31	25	6	9.8
TB-5	2.0-4.0	Jar	B1	SANDY SILTY CLAY (CL-ML)	6.1	55.4	21	15	6	14.9
TB-5	4.0-6.0	Jar	B1	SANDY LEAN CLAY (CL)	7.8	55.0	24	15	9	13.7
TB-5	8.0-10.0	Jar	B1	SANDY LEAN CLAY (CL) WITH GRAVEL	20.6	51.6	23	13	10	11.6
TB-7	4.0-5.5	Jar	B2	SILTY SAND (SM)	1.1	49.3	NP	NP	NP	18.4
TB-8	0.0-2.0	Jar	B1	GRAVELLY LEAN CLAY (CL) WITH SAND	28.2	54.7	31	22	9	30.6

Test Boring No.	Depth (ft)	Sample Type	Stratum	Description of Soil Specimen	Sieve Results		Atterberg Limits			Natural Moisture Content (%)
					Percent Retained #4 Sieve	Percent Passing #200 Sieve	LL	PL	PI	
TB-11	0.0-2.0	Jar	A	SILY SAND (SM) WITH GRAVEL	16.6	18.8	NP	NP	NP	10.7
TB-11	4.0-6.0	Jar	A	SILTY GRAVEL (GM) WITH SAND	47.0	14.1	NP	NP	NP	26.3
TB-11	6.0-8.0	Jar	B2	SILTY CLAYEY GRAVEL (GC-GM) WITH SAND	51.5	18.2	27	20	7	15.6
TB-13	0.0-2.0	Jar	B2	SILTY SAND (SM) WITH GRAVEL	23.2	20.0	22	18	4	10.6

Notes:
1. Soil tests are in accordance with applicable ASTM standards
2. Soil classification symbols are in accordance with Unified Soil Classification System
3. Visual identification of samples is in accordance with ASTM D2488
4. Key to abbreviations: LL = liquid limit; PL = plastic limit; PI = plasticity index; NP = nonplastic

3.6 Seismic Site Classification

Based on the results of the subsurface investigation and our knowledge of local geologic conditions, the site soils have been assigned to a site class C per the International Building Code (IBC).

3.7 Metal Corrosion/Concrete Attack Test Results

In addition to standard geotechnical soil laboratory testing, ten samples were submitted to an analytical laboratory for metal corrosion and concrete attack testing. Corrosion testing consisted of analysis for moisture content (EPA), pH (CA-643), resistivity (ASTM G187), sulfides (EPA 376.2), reduction-oxidation potential (Electrode), sulfates (EPA 375.4), and chloride (CA-422). The results of these tests are presented below in Table 3.7-1:

Table 3.7-1: Analytical Laboratory Test Results

Test Boring No.	Sample Depth (ft)	Moisture Content (%)	pH	Resistivity (ohm – cm)	Sulfides (ppm)	Red-ox Potential (mV)	Point Total
TB-1	0-5	16	7.8	2,200	<1.2	+21	7
TB-2	0-5	13	6.4	47,000	<1.2	+20	5
TB-4	0-5	20	7.3	16,000	<1.2	+26	5
TB-5	0-5	24	6.6	10,000	<1.2	+26	5
TB-7	0-5	19	6.6	11,000	<1.2	+33	5
TB-8	0-5	27	7.0	15,000	<1.2	+29	5
TB-11	0-5	16	7.0	10,000	<1.2	+9	5
TB-13	0-5	11	7.3	21,000	<1.2	+13	5
TP-1	0-5	9.4	7.2	54,000	<1.2	+33	5
TP-5	0-5	28	5.5	82,000	<1.2	+115	1

For each test, points are assigned based on the range of the test results. If the total points from the five tests completed for a particular sample are 10 or more, the soil is considered to be corrosive. The methods described herein are based on information from the American Water Works Association (AWWA) for ductile iron pipes. Using the methods described by AWWA, the point total for the samples tested averaged approximately 5. Accordingly, the site soils are considered non-corrosive to ductile iron pipes.

Sulfate (EPA 375.4) tests were performed on the soil samples to determine the severity of a sulfate attack on concrete structures. The results of the sulfate and chloride testing are presented below in Table 3.7-2.

Table 3.7-2: Analytical Laboratory Test Results

Test Boring No.	Sample Depth (ft)	Sulfates (ppm)	Chloride (ppm)
TB-1	0.0-5.0	19	86
TB-2	0.0-5.0	18	12
TB-4	0.0-5.0	13	8.6
TB-5	0.0-5.0	22	11
TB-7	0.0-5.0	84	28
TB-8	0.0-5.0	48	12
TB-11	0.0-5.0	27	10
TB-13	0.0-5.0	19	9.7
TP-1	0.0-5.0	30	11
TP-5	0.0-5.0	36	12

Based on the results of the sulfate tests, the severity of concrete attack is calculated to be negligible.

3.8 Concrete Slab Cores

A total of 38 concrete cores were collected from buildings across the site. Encountered concrete floor slab thicknesses ranged from approximately 4.0 to 7.0 inches. Each core was tested for compressive strength per ASTM C39, and results of these tests are presented in Appendix B. Core ID for these tests correspond to the associated building numbers.

4.0 Engineering Analysis

Recommendations regarding soil design parameters, foundations, lateral earth pressures, subdrainage, earthwork, and rock excavation are presented herein.

4.1 Soil Design Parameters

We recommend the following soil design parameters as presented on the following page in Table 4.1-1 be used for this project:

Table 4.1-1: Soil Design Parameters

Stratum	Total Unit Weight (pcf)	Angle of Internal Friction (degrees)	Lateral Earth Pressure Coefficients			Coefficient of Sliding Friction
			Active (Ka)	At-Rest (Ko)	Passive (Kp)	
A	125	30	0.33	0.50	3.00	0.35
B1	120	28	0.36	0.53	2.77	0.30
B2	125	32	0.31	0.47	3.25	0.40
B3	130	36	0.26	0.41	3.85	0.55

4.2 Spread Footings

Firm natural soils, firm existing fill, or new compacted fill should be encountered at typical spread footing elevations. Spread footings founded in these materials are considered suitable for support of proposed buildings, and may be designed with a net allowable soil bearing pressure of 3,000 psf. Fill material and compaction requirements are presented in Section 4.7 of this report. Exterior footing subgrades should be located at least 4.0 feet below final exterior grades for frost considerations.

Individual column footings and continuous wall footings should be at least 30 inches and 18 inches wide, respectively, for local or punching shear considerations. A maximum slope of one horizontal to one vertical (1H:1V) should be maintained between the bottom edges of adjacent footings. Settlement of spread footings should not exceed about 1-inch, and differential settlement between adjacent foundation elements should not exceed about one-half this amount, including not exceeding an angular distortion of 0.002 inch/inch along continuous wall footings.

Footing subgrades should be observed and approved by the Geotechnical Engineer of Record or his/her representative prior to placement of concrete, to ascertain that footings are placed on suitable bearing soils as recommended herein. Footings should be excavated and concrete placed the same day in order to avoid disturbance from water or weather. Disturbance of footing subgrades by exposure to water seepage or weather conditions should be avoided. Any unsuitable existing fill, disturbed, frozen, or soft subgrade soils should be removed prior to placing footing concrete. It may be desirable to place a 3 to 4-inch thick “mud mat” of lean concrete immediately on the approved footing subgrade to avoid softening of the exposed subgrade. Forms may be used if necessary, but less subgrade disturbance is anticipated if excavations are made to the required dimensions and concrete placed against the soil. If footings are formed, the forms should be removed and the excavation backfilled as soon as possible. Water should not be allowed to pond along the outside of footings for long periods of time.

4.3 Slabs on Grade

Slabs on grade supported by natural soils or new compacted fill are considered feasible at the site. Where floor subgrades consist of existing fill, we recommend undercutting the existing fill to a depth of at least 2 feet and backfilling with new compacted fill. After undercutting the existing fill and prior to placement of any new compacted fill, the undercut subgrade should be observed during proofrolling by the geotechnical engineer to confirm that the new subgrade is suitable to receive new compacted fill.

All debris and soft soils near the final floor slab subgrade as a result of construction operations should be stripped and removed prior to placement of underfloor stone. A 4-inch minimum thickness of washed gravel or crushed stone meeting the requirement of AASHTO No. 57 should be placed below floor slabs on grade to serve as a capillary break. An impermeable plastic membrane should be placed on top of the crushed stone layer to assist as a moisture barrier. Special attention should be given to the surface curing of the slab in order to minimize uneven drying of the slab and associated cracking.

We recommend that mesh (fiber or welded wire fabric) reinforcement be included in the design of the floor slab to minimize the development of any shrinkage cracks near the surface of the slab. If welded wire fabric is used, the mesh should be located in the top half of the slab.

4.4 Lateral Earth Pressures

Site retaining walls should be designed to withstand lateral earth pressures. An equivalent fluid pressure of 40H (psf) should be used for design of site retaining walls, where H refers to the height of the wall. The design should account for any surcharge loads within a 45 degree slope from the base of the wall. Retaining walls may be designed to include a passive equivalent fluid pressure of 360D (psf), where D represents the depth of wall embedment below the exposed wall face. The upper 1.5 feet of soil at the base of retaining walls should not be included in the design of passive soil resistance. A coefficient of friction of 0.35 may be used for sliding resistance at the soil/concrete interface. A recommended lateral earth pressure diagram for use in the design of site retaining walls is presented as Figure 2 at the end of this report.

Hydrostatic pressures are not included in the lateral earth pressure diagram assuming the use of relatively granular or free draining backfill, and perimeter subdrainage (weepholes) at the base of walls below grade. Recommended subdrainage for site retaining walls is presented on Figure 2 at the end of this report. Recommendations for backfill against walls below grade are presented in Section 4.7 of this report.

4.5 Temporary Construction Dewatering

Groundwater was encountered at depths of about 1.1 to 2.7 feet below the existing ground surface. Based on the groundwater observations, temporary construction dewatering may be required during excavations for foundations. We recommend that the dewatering consist of both an aggressive system of individual sumps and pumps during excavation. To help maintain bottom stability of excavations, groundwater levels should be drawn-down a minimum of 3 feet below the lowest portion of the excavation.

It is critical that as soon as water seepage is observed, the contractor should excavate surface trenches from the observed water seepage to a sump pit and sump pump. If the water is allowed to saturate subgrades, softening of the subgrade will occur very quickly and extra costs will be incurred. However, if the contractor can channel the water to a sump pit and keep the majority of the subgrade from getting saturated, extra costs due to water softening should be significantly reduced.

4.6 Utility Installations

We have assumed that the underground utilities will be placed up to 10 feet below proposed grades. We generally expect that firm existing fill of Stratum A, natural soils of Strata B and B2, and weathered rock of Stratum B3 will be encountered at utility subgrades, which should be suitable for support of utilities. Accordingly, we do not recommend that any special bedding be specified, and that construction of utility trenches is performed in accordance with the proposed pipe type and specifications. Rock excavation methods may be required to install utilities on weathered rock subgrade.

The excavations may be constructed by laying back the earth with temporary slopes. Based on the on-site soils, an OSHA type C soil classification should be used for design of earth slopes. A type C classification requires a maximum allowable slope of 1.5H:1V for excavations less than 20 feet in depth. Any benching of excavations should be performed in accordance with OSHA requirements.

Temporary excavations may extend below groundwater levels at some locations. Groundwater will decrease the stability of open cuts. Accordingly, construction dewatering will be necessary to excavate and maintain temporary slopes, and to preserve the integrity of the bearing materials.

4.7 Earthwork

Fill may be required for site grading in building areas. Unsuitable existing fill, soft or loose natural soils, organic material, and rubble should be stripped to approved subgrades as determined by the geotechnical engineer. Topsoil and asphalt depths presented on the boring logs should not be considered as stripping depths, as these depths may vary widely across the site. Stripping depths will probably extend to greater depths than the topsoil depths indicated herein due to the presence of minor amounts of organics, roots, and other surficial materials that will require removal as a part of the stripping operations. In addition, seasonal soil moisture variations can affect stripping depths. In general, less stripping may occur during summer months when drier weather conditions can be expected. The depth of required stripping should be determined prior to construction by the excavation contractor using test pits, probes, or other means that the contractor wishes to employ, and this determination should be the responsibility of the excavation contractor. All subgrades should be proofrolled with a minimum 20 ton, loaded dump truck or suitable rubber tire construction equipment approved by the geotechnical engineer, prior to the placement of new fill.

Fill material should be placed in lifts not exceeding 8 inches loose thickness, with fill materials compacted by hand operated tampers or light compaction equipment placed in maximum 4-inch thick loose lifts. Fill should be compacted at +/- 2% of the optimum moisture content to at least 95 percent of the maximum dry density per ASTM D1557.

Materials used for compacted fill for support of footings, floor slabs, and pavements should consist of soils classifying SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D2487, with less than 10% passing the No. 200 sieve. Materials used for backfill against walls below grade should consist of soils classifying SM, SP, SW, GM, GP, or GW, with a liquid limit and plasticity index less than 40 and 15, respectively. It is expected that the majority of soils excavated at the site will be suitable for re-use as fill based on classification. In addition, drying of excavated soils by spreading and aerating may be necessary to obtain proper compaction. This may not be practical during the wet period of the year. Accordingly, earthwork operations should be planned for early spring through late fall, when drier weather conditions can be expected.

Fill materials should not be placed on frozen or frost-heaved soils, and/or soils that have been recently subjected to precipitation. All frozen or frost-heaved soils should be removed prior to continuation of fill operations. Borrow fill materials should not contain frozen materials at the time of placement.

Compaction equipment that is compatible with the soil type used for fill should be selected. Theoretically, any equipment type can be used as long as the required density is achieved; however, sheepsfoot roller equipment are best suited for fine-grained soils and vibratory smooth drum rollers are best suited for granular soils. Ideally, a smooth drum roller should be used for sealing the surface soils at the end of the day or prior to upcoming rain events. In addition, compaction equipment used adjacent to walls below grade should be selected so as to not impose undesirable surcharge on walls. All areas receiving fill should be graded to facilitate positive drainage of any water associated with precipitation and surface run-off.

After completion of compacted fill operations in building or pavement areas, construction of building elements or asphalt should begin immediately, or the finished subgrade should be protected from exposure to inclement weather conditions. Exposure to precipitation and freeze/thaw cycles will cause the finished subgrade to soften and become excessively disturbed. If development plans require that finished subgrades remain exposed to weather conditions after completion of fill operations, additional fill should be placed above finished grades to protect the newly placed fill. Alternatively, a budget should be established for reworking of the upper 1 to 2 feet of previously placed compacted fill.

4.8 Rock Excavation

Rock excavation methods such as hoe-ramming may be required for site development. The depths and elevations where rock excavation methods may be required for removal of bedrock at the test boring locations are estimated below in Table 4.8-1, and are based on materials equal to or harder than an SPT resistance of 50/4":

Table 4.8-1: Estimated Depth Where Rock Excavation Methods May be Required

Test Boring No.	Estimated Depth Below Ground Surface Where Rock Excavation Methods May be Required (ft)	Estimated Elevation Where Rock Excavation Methods May be Required (ft)
TB-1	8.0	EL 658
TB-2	6.5	EL 727.5
TB-3	2.0	EL 773
TB-4	4.0	EL 714
TB-5	14.5	EL 685.5
TB-6	0.5	EL 714.5
TB-7	5.5	EL 685.5
TB-8	2.5	EL 700.5
TB-9	2.0	EL 720
TB-10	0.5	EL 683.5
TB-11	8.0	EL 658
TB-12	1.0	EL 682
TB-13	3.5	EL 708.5

The elevations given above are based upon the use of normal earth excavation equipment including up to a Caterpillar 330 hydraulic backhoe or equivalent, for mass excavation. Project specifications should include the following as a definition of rock excavation for mass excavation: "Rock is defined as any material which cannot be dislodged by a Caterpillar 330 hydraulic backhoe without the use of hoe-ramming. This classification does not include material such as loose rock, concrete or other materials that can be removed by means other than hoe-ramming, but which for reasons of economy in excavating, the contractor chooses to remove by hoe-ramming." Variations in rock conditions should be expected from the elevations presented in the table above, since the rock surface can vary over the site. Also, the extent of rock excavation will depend on Contractor's methods, rock jointing, and rock foliation/bedding.

5.0 General Limitations

Recommendations contained in this report are based upon the data obtained from the relatively limited number of test borings and test pits. This report does not reflect conditions that may occur between the points investigated, or between sampling intervals in test borings. The nature and extent of variations between test borings and test pits and sampling intervals may not become evident until the course of construction. Therefore, it is essential that on-site observations of subgrade conditions be performed during the construction period to determine if re-evaluation of the recommendations in this report must be made.

It is critical to the successful completion of this project that Terracon be retained during construction to observe the implementation of the recommendations provided herein.

This report has been prepared to aid in the evaluation of the site and to assist your office and the design professionals in the design of this project. It is intended for use with regard to the specific project as described herein. Changes in proposed construction, grading plans, structural loads, etc. should be brought to our attention so that we may determine any effect on the recommendations presented herein.

An allowance should be established for additional costs that may be required for foundation and earthwork construction as recommended in this report. Additional costs may be incurred for various reasons including wet fill materials, soft subgrade conditions, unexpected groundwater problems, rock excavation, etc.

This report should be made available to bidders prior to submitting their proposals to supply them with facts relative to the subsurface conditions revealed by our investigation and the results of analyses and studies that have been performed for this project. In addition, this report should be given to the successful contractor and subcontractors for their information only.

We recommend the project specifications contain the following statement: “A geotechnical engineering report has been prepared for this project by Terracon Consultants, Inc. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed in this report are those of the geotechnical engineer and represent their interpretation of the subsoil conditions, tests and results of analyses that they performed. Should the data contained in this report not be adequate for the contractor’s purposes, the contractor may make their own investigations, tests and analyses prior to bidding.”

This report was prepared in accordance with generally accepted geotechnical engineering practices. No warranties, expressed or implied, are made as to the professional services included in this report.

We appreciate the opportunity to be of service for this project. Please contact the undersigned if you require clarification of any aspect of this report.

Sincerely,

TERRACON CONSULTANTS, INC.

for Paul E. Burkart (VA)
Senior Principal

Michele A. [illegible] (NY)
Geotechnical Department Manager

RKS/KF/RSZ/PEB/clm
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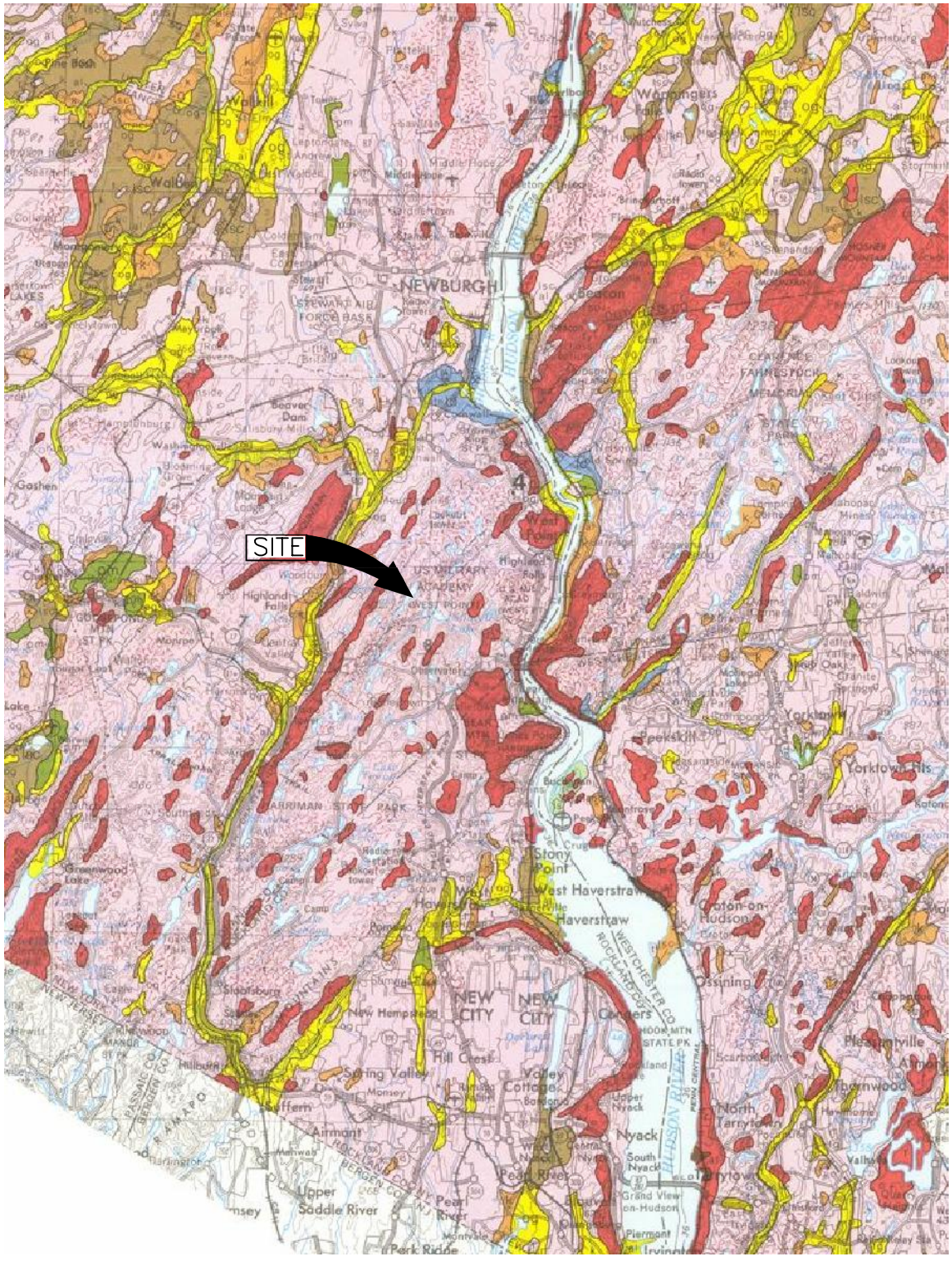

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TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

GEOLOGY MAP

Scale:	Fig.
N.T.S.	1

Date:	Drawn By:	Checked By:	Project No.:
JUNE 2020	R.K.S.	P.E.B.	JD195203

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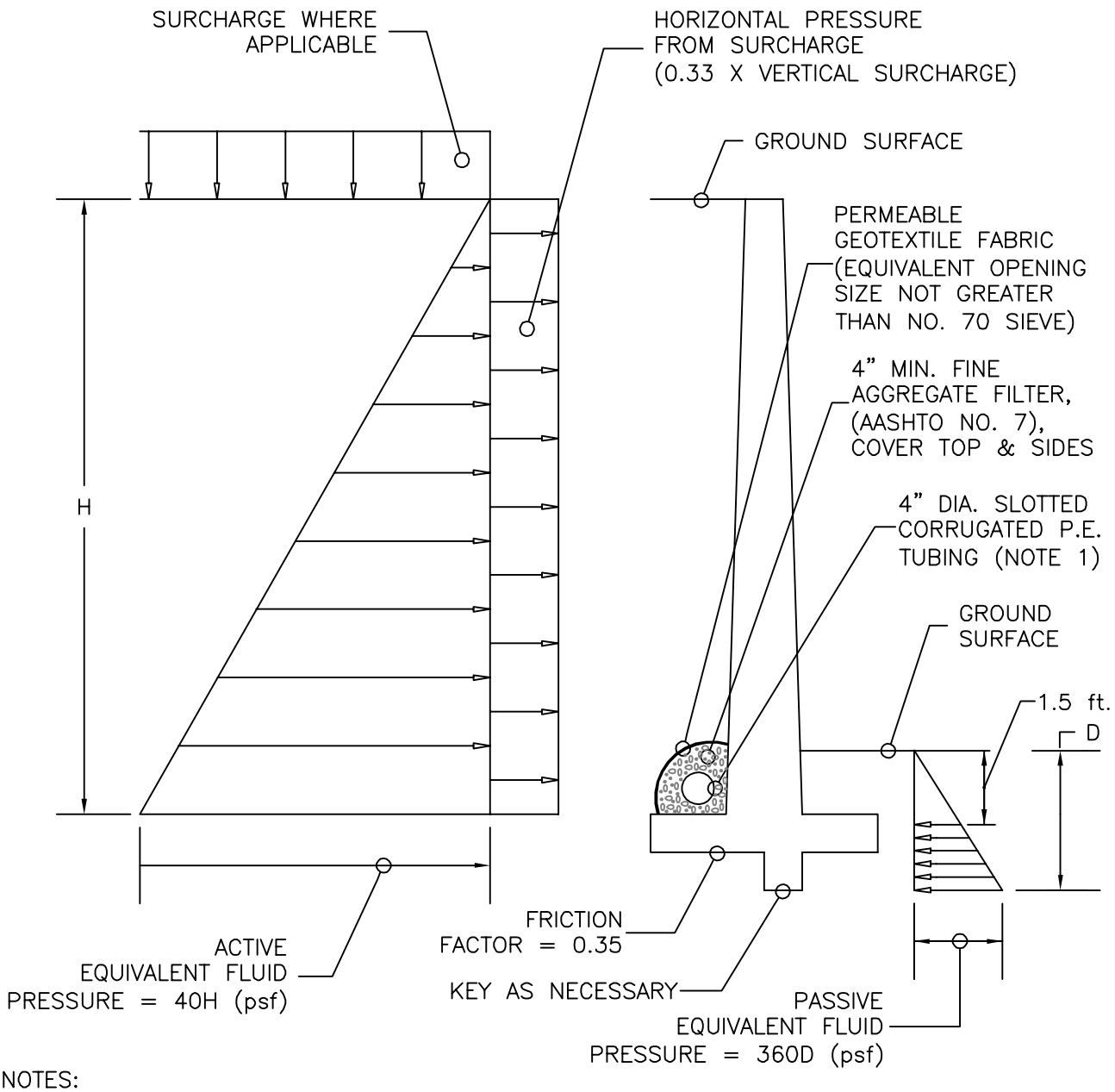

NOTES:

1) WEEPHOLES CONSISTING OF 3–INCH DIA. PVC PIPE AT 10 FEET INTERVALS CAN BE SUBSTITUTED FOR SUBDRAINAGE PIPE.

2) PRESSURE DIAGRAM SHOWN ASSUMES HORIZONTAL GROUND BEHIND WALL AND FULL DRAINAGE OF HYDROSTATIC PRESSURES.

3) BACKFILL SHOULD CONSIST OF MATERIAL CLASSIFIED AS SM, SP, SW, GM, GP, OR GW PER ASTM D–2487. THE LIQUID LIMIT AND PLASTICITY INDEX OF BACKFILL MATERIAL SHOULD NOT EXCEED 40 AND 15, RESPECTIVELY.

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TRAINING CAMP REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NY

DESIGN EARTH PRESSURES FOR SITE RETAINING WALLS

Scale:	Fig.
N.T.S.	2

Date:	Drawn By:	Checked By:	Project No.:
JUNE 2020	M.J.J.	P.E.B.	JD195203

Appendix A
Subsurface Investigation

Subsurface Investigation Procedures (1 page)

Identification of Soil (1 page)

Figures 3 to 6, Subsurface Investigation Plans (4 pages)

Test Boring and Test Pit Notes (1 page)

Test Boring Logs (14 pages)

Test Pit Logs (8 pages)

Figures 7 to 9, Subsurface Diagrams A-A', B-B', C-C' (3 pages)

Test Pit Photo Log (4 pages)

Subsurface Investigation Procedures

1. Test Borings – Hollow Stem Augers

The borings are advanced by turning an auger with a center opening of 3-¼ inches. A plug device blocks off the center opening while augers are advanced. Cuttings are brought to the surface by the auger flights. Sampling is performed through the center opening in the hollow stem auger, by standard methods, after removal of the plug. Usually, no water is introduced into the boring using this procedure.

2. Standard Penetration Tests

Standard penetration tests are performed by driving a 2 inch O.D., 1-⅜ inch I.D. sampling spoon with a 140-pound hammer falling 30 inches, according to ASTM D1586. After an initial 6 inches penetration to assure the sampling spoon is in undisturbed material, the number of blows required to drive the sampler an additional 12 inches is generally taken as the N value. In the event 30 or more blows are required to drive the sampling spoon the initial 6 inch interval, the sampling spoon is driven to a total penetration resistance of 100 blows or 18 inches, whichever occurs first.

3. Dynamic Cone Penetration Tests

Testing is performed by driving a 1-¾ inch diameter penetration cone with a 15-pound hammer free falling 20 inches. The number of blows required to drive the cone for an interval of 1-¾ inches is recorded. The cone was generally driven for three intervals at each test depth, with the first interval considered a seating interval.

4. Test Pits

Test pits were excavated using a mini-excavator. Test pits were excavated to a maximum depth of about 3 feet below the existing ground surface. On completion of the test pit observations, test pits were backfilled with excavated soil material to existing grades. It should be noted that although some effort to compact backfill soils in test pit excavations was made during the field investigation, some settlement of test pit backfill materials should be expected.

5. Test Boring and Test Pit Stakeout

The test boring and test pit stakeout was provided by Terracon personnel using available site plans. Ground surface elevations were estimated from topographic information contained on the site plan provided to us and should be considered approximate. If the risk related to using approximate boring locations and elevations is unacceptable, we recommend an as-drilled survey of boring locations and elevations be completed by a licensed surveyor.

Identification of Soil

I. DEFINITION OF SOIL GROUP NAMES

		ASTM D2487	Symbol	Group Name
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines	*GW*	WELL GRADED GRAVEL
			GP	POORLY GRADED GRAVEL
		Gravels with Fines More than 12% fines	*GM*	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines	*SW*	WELL GRADED SAND
			SP	POORLY GRADED SAND
		Sands with fines More than 12% fines	*SM*	SILTY SAND
			SC	CLAYEY SAND
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	Inorganic	*CL*	LEAN CLAY
			ML	SILT
		Organic	*OL*	ORGANIC CLAY
				ORGANIC SILT
	Silts and Clays Liquid Limit 50 or more	Inorganic	*CH*	FAT CLAY
			MH	ELASTIC SILT
		Organic	*OH*	ORGANIC CLAY
				ORGANIC SILT
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		*PT*	PEAT

II. DEFINITION OF MINOR COMPONENT PROPORTIONS

Minor Component	Approximate Percentage of Fraction by Weight
Gravelly, Sandy (adjective)	30% or more coarse grained
Sand, Gravel	15% to 29% coarse grained
Silt, Clay	5% to 12% fine grained

III. GLOSSARY OF MISCELLANEOUS TERMS

SYMBOLS	Unified Soil Classification Symbols are shown above as group symbols. Use “A” Line Chart for laboratory identification. Dual symbols are used for borderline classification.
BOULDERS & COBBLES	Boulders are considered pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inches.
WEATHERED ROCK	Residual rock material with a standard penetration test (SPT) resistance of at least 50 blows per 6 inches.
ROCK/SPOON REFUSAL	Rock material with a standard penetration test (SPT) resistance of 50 blows for 1 inch.
ROCK FRAGMENTS	Angular pieces of rock which have separated from original vein or strata and are present in a soil matrix. Only used in residual soils
QUARTZ	A hard silicate mineral often found in residual soils. Only used when describing residual soils.
CEMENTED SAND	Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate, iron oxide, or other minerals. Commonly encountered in Coastal Plain sediments, primarily in the Potomac Group sands (Kps).
MICACEOUS	A term used to describe soil that “glitters” or is shiny. Most commonly encountered in fine-grained soils.
ORGANIC MATERIALS (Excluding Peat)	Topsoil - Surface soils that support plant life and contain organic matter. Lignite - Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).
FILL	Man-made deposit containing soil, rock, and other foreign matter.
CONTAINS	This is used when a soil contains a secondary component that does not apply to a USCS classification.
WITH	This is used when a residual soil contains a secondary component that is included in the USCS classification.
PROBABLE FILL	Soils which contain no visually detected foreign matter but which are suspect with regard to origin.
LAYERS	½ to 12 inch seam of minor soil component.
COLOR	Two most predominant colors present should be described.
MOISTURE CONDITIONS	Wet, moist, or dry to indicate visual appearance of specimen.
GRAIN SIZE	Fine-medium-coarse

N

L E G E N D

TB-1 TEST BORING LOCATION

TP-1 TEST PIT LOCATION

GRAPHICAL SCALE

100' 0 100' 200'

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TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

SUBSURFACE EXPLORATION PLAN

Scale:	Fig.
AS SHOWN	3

Date:	Drawn By:	Checked By:	Project No.:
JUNE 2020	R.K.S.	P.E.B.	JD195203

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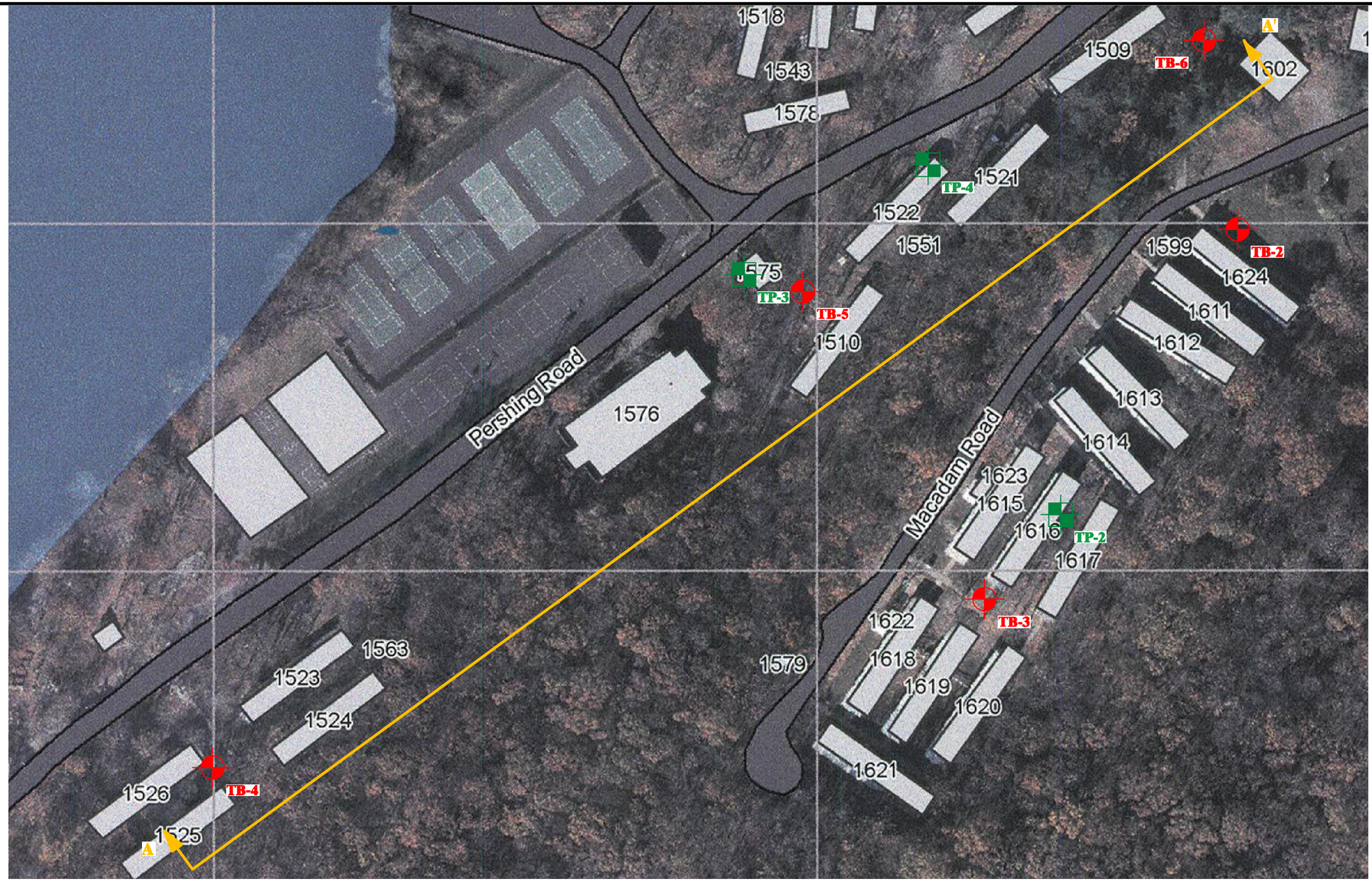

N

L E G E N D

A A' SUBSURFACE DIAGRAM

TB-2 TEST BORING LOCATION

TP-2 TEST PIT LOCATION

GRAPHICAL SCALE

100' 0 100' 200'

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TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

SUBSURFACE EXPLORATION PLAN			Scale: AS SHOWN	Fig. 4
Date: JUNE 2020	Drawn By: R.K.S.	Checked By: P.E.B.	Project No.: JD195203	

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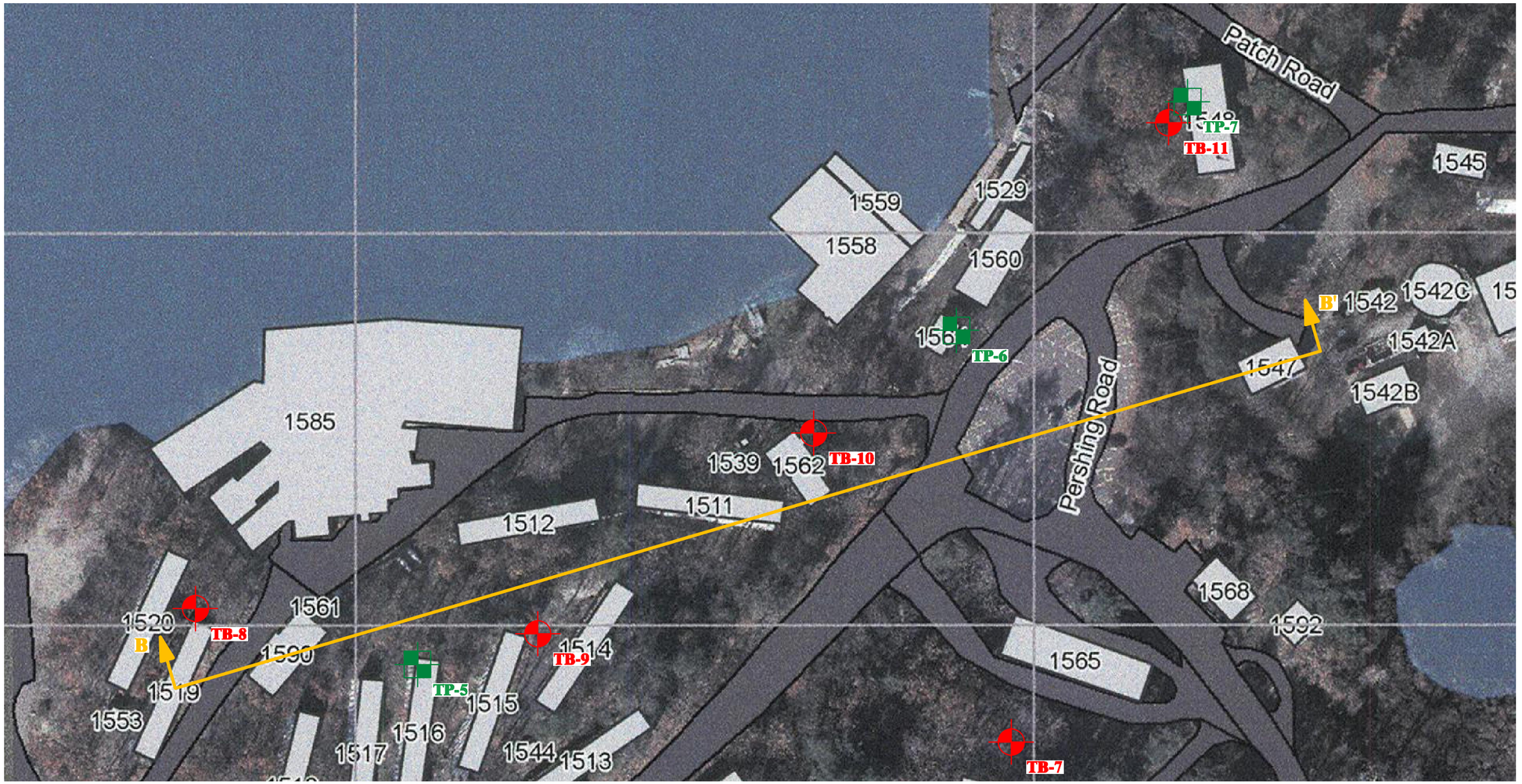

L E G E N D

B B' SUBSURFACE DIAGRAM

TB-7 TEST BORING LOCATION

TP-5 TEST PIT LOCATION

GRAPHICAL SCALE

100' 0 100' 200'

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TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

SUBSURFACE EXPLORATION PLAN

Scale:	Fig.
AS SHOWN	5

Date:	Drawn By:	Checked By:	Project No.:
JUNE 2020	R.K.S.	P.E.B.	JD195203

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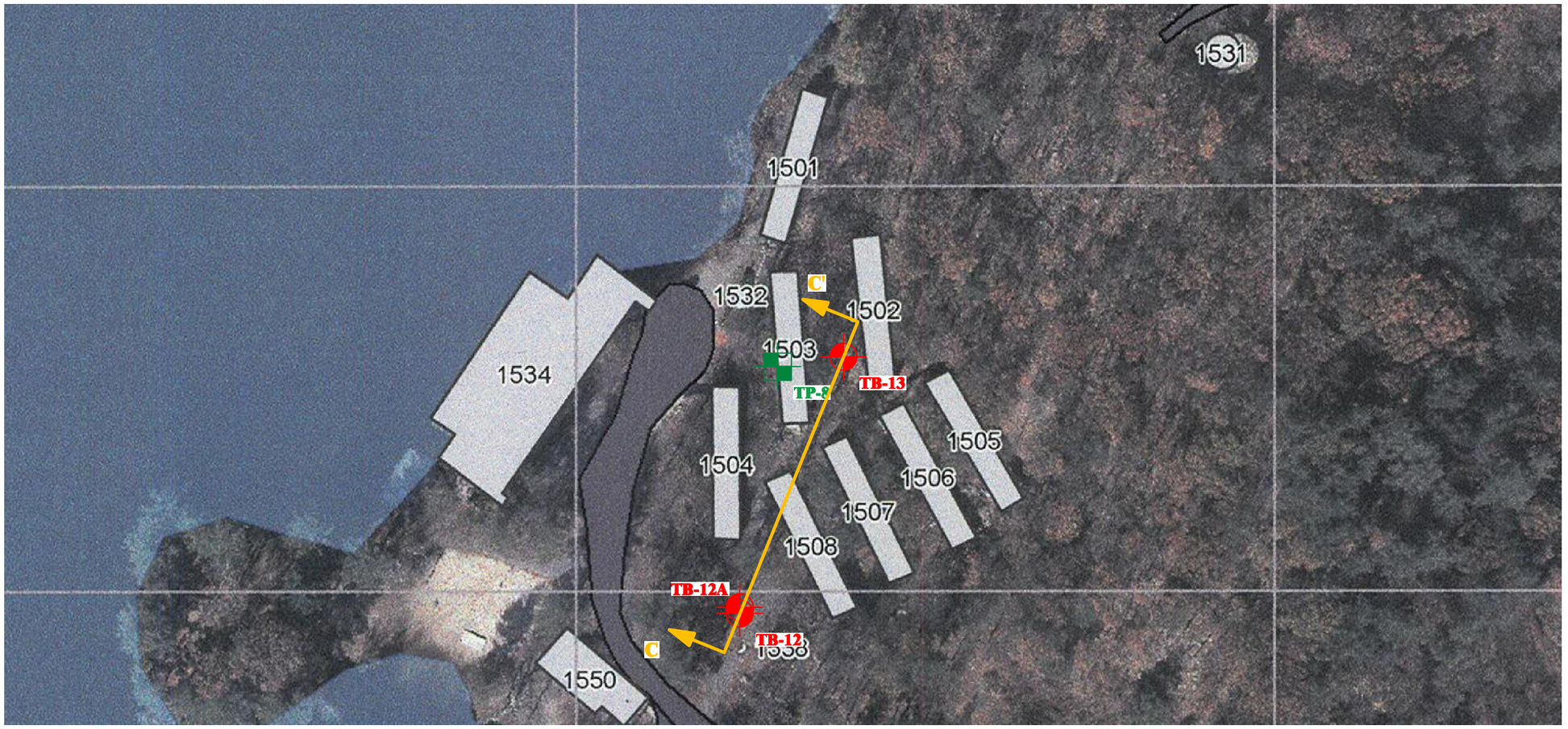

L E G E N D

C C' SUBSURFACE DIAGRAM

TB-12 TEST BORING LOCATION

TP-8 TEST PIT LOCATION

GRAPHICAL SCALE

100' 0 100' 200'

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TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

SUBSURFACE EXPLORATION PLAN

Scale:	Fig.
AS SHOWN	6

Date:	Drawn By:	Checked By:	Project No.:
JUNE 2020	R.K.S.	P.E.B.	JD195203

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Test Boring and Test Pit Notes

1. Classification of soil is by visual inspection and is in accordance with the Unified Soil Classification System.

2. Estimated groundwater levels are indicated on the logs. These are only estimates from available data and may vary with precipitation, porosity of soil, site topography, etc.

3. Sampling data presents standard penetrations for 6-inch intervals or as indicated with graphic representations adjacent to the sampling data.

4. The energy applied to the split-spoon sampler using the automatic hammer is about 33 percent greater than the applied energy using the standard safety hammer. The hammer blows shown on the boring logs are uncorrected for the higher energy. The N_{60} values are also presented on the test boring logs.

5. The logs and related information depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at the test locations. Also, the passage of time may result in a change in the subsurface conditions at the test locations.

6. The stratification lines represent the approximate boundary between soil types as determined in the sampling operation. Some variation may be expected vertically between samples taken. The soil profile, groundwater level observations and penetration resistances presented on the logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.

7. Test pit excavations are logged to provide a record for geotechnical evaluation, construction inspection or other specialized purpose. Any significant features such as existing fill conditions, underground structures, groundwater or water seepage conditions, etc. are recorded.

8. Weathered rock is defined as residual earth material with a penetration resistance between 50 blows per 6 inches and refusal. Spoon refusal at the surface of rock, boulders, or obstructions is defined as a penetration resistance of 50 blows for 1 inch penetration. Auger refusal is taken as the depth at which further penetration of the auger is not possible without risking significant damage to the drilling equipment.

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-1**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/13/19 - 12/13/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **666.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	SOIL: MC (%)
666.0					Asphalt = 6 in.					
665.5					*Fill*, brown-gray, fine to coarse, WELL GRADED GRAVEL WITH CLAY AND SAND, medium dense, moist, **GW-GC**	19	8+7+7	12		4.6
664.0			A		Dense	39	7+9+20+37	16		
662.0					*Residual*, brown-gray, fine to coarse, CLAYEY GRAVEL WITH SAND, medium dense, moist, **GC**	25	50+12+7+9	12		19.0
	5		B2			21	7+7+9+16	10		
658.0			B3		*Weathered rock*, brown-gray, fine to coarse, CLAYEY GRAVEL WITH SAND, very dense, moist, **GC**		10+50/2	8	>>	
657.3					Auger and Spoon Refusal at 8.7 ft.		50/0	0	>>	
	10									
	15									

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/18/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35317°N, -74.05141°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-2**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/11/19 - 12/11/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **732.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	SOIL: MC (%)
732.0					Topsoil = 3 in.					
731.8					*Residual*, gray-brown, SANDY SILT WITH GRAVEL, stiff, moist, **ML**	15	3+6+5+12	5		
730.0					Without gravel					
			B1			9	7+4+3+3	7		20.8
728.0					Very stiff					
	5					19	5+6+8+12	15		
726.0					*Weathered rock*, gray-brown, SANDY SILT, very hard, moist, **ML**		12+27+50/1	6	>>	
			B3				50/0	0	>>	
724.9					Auger and Spoon Refusal at 7.1 ft.					
	10									
	15									

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/12/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35333°N, -74.05307°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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Ashburn, Virginia 20147

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(703) 726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-3**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/11/19 - 12/11/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **775.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	SOIL: MC (%)
775.0 / 774.8	0				Topsoil = 2 in.					
		X	B2		*Residual*, gray-brown, fine to coarse, SILTY GRAVEL WITH SAND, medium dense, moist, **GM**	13	2+3+7+4	5		9.8
773.0		X	B3		*Weathered rock*, gray-brown, fine to coarse, SILTY GRAVEL WITH SAND, very dense, moist, **GM**		50/4	4	>>	
772.7					Auger Refusal at 2.3 ft.					
	5									
	10									
	15									

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/12/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35241°N, -74.05397°W
One offset boring was attempted. Offset boring refused at a depth of approximately 1.0 ft.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-4**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/12/19 - 12/12/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **718.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
718.0					Topsoil = 2 in.				
717.8			A		*Fill*, brown-gray, fine to coarse, SANDY SILT WITH GRAVEL, stiff, moist, **ML**	17	2+4+4+9	6	
716.0			B2		*Residual*, gray-brown, fine to coarse, SILTY SAND WITH GRAVEL, medium dense, moist, **SM**	11	7+3+4+4	0	
714.0			B3		*Weathered rock*, gray-brown, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist, **SM**		50/2	2	
713.8					Auger and Spoon Refusal at 4.2 ft.		50/0	0	
	5								
	10								
	15								

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/12/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35199°N, -74.05660°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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Ashburn, Virginia 20147

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-5**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/12/19 - 12/12/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **703.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	SOIL: MC (%)
703.0					Topsoil = 3 in.					
702.8					*Residual*, brown-gray, SANDY SILTY CLAY, stiff, moist, **CL-ML**	17	3+11+2+2	5		
						16	4+5+7+8	18		14.9
699.0 ▽					*Residual*, brown-gray, SANDY LEAN CLAY, hard, moist, **CL**					
	5					35	8+10+16+18	18		13.7
697.0 ▽					Very stiff, with gravel					
			B1			31	6+9+14+17	24		
695.0										
						20	7+7+8+9	24		11.6
	10									
						23	9+9+8+8	14		
691.0										
						59	14+17+27+32	8		
689.0					*Weathered rock*, brown-gray, SANDY LEAN CLAY WITH GRAVEL, very hard, moist, **CL**		27+35+50/3	15	>>	
			B3							
	15						50/0	0	>>	
687.8					Auger and Spoon Refusal at 15.3 ft.					

GROUND WATER LEVELS:

▽ ENCOUNTERED:	6.0	ft.	ELEV.	697.0			
▼ UPON COMPLETION:	4.0	ft.	ELEV.	699.0	CAVED: 7.0 ft.	ELEV.	696.0
▼ 12/18/2019	1.5	ft.	ELEV.	701.5	CAVED: 3.0 ft.	ELEV.	700.0

SAMPLE TYPES: ☒ SPT

REMARKS: Coordinates: 41.35327°N, -74.05458°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

GeoConcepts Engineering, Inc.

19955 Highland Vista Dr #170
Ashburn, Virginia 20147

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(703) 726-8032 fax

PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-6**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/11/19 - 12/11/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **713.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
713.0 712.8	0		B3		Topsoil = 2 in.			
					Weathered rock, gray-brown, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist, **SM**	3+3+50/4	5	>>
711.7					Auger and Spoon Refusal at 1.3 ft.	50/0	0	>>
	5							
	10							
	15							

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/12/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35381°N, -74.05307°W
One offset boring was attempted. Offset boring refused at a depth of approximately 1 inch.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-7**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/11/19 - 12/11/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **691.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	MC (%)
691.0					Topsoil = 2 in.					
690.8					*Residual*, gray-brown, fine to coarse, SILTY SAND WITH GRAVEL, loose, moist, **SM**	9	2+3+4+4	0		
			B2			8	2+2+4+4	1		
687.0					Dense, without gravel					
	5					40	1+5+25+50/0	13		18.4
685.5					Auger Refusal at 5.5 ft.					
	10									
	15									

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

▼ UPON COMPLETION: 2.0 ft. ELEV. 689.0

12/12/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35397°N, -74.05241°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-8**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/12/19 - 12/12/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **703.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	SOIL: MC (%)
703.0	0				Topsoil = 2 in.					
702.8			B1		*Residual*, gray-brown, fine to coarse, GRAVELLY LEAN CLAY WITH SAND, firm, moist, **CL**	5	3+2+2+4	15		30.6
701.0	2		B3		*Weathered rock*, gray-brown, fine to coarse, GRAVELLY LEAN CLAY WITH SAND, very hard, moist, **CL**		3+50/4	9	>>	
700.2	2.8				Auger and Spoon Refusal at 2.8 ft.		50/0	0	>>	
	5									
	10									
	15									

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/13/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35433°N, -74.05496°W
One offset boring was attempted. Offset boring refused at a depth of approximately 2.7 ft.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-9**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/12/19 - 12/12/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **722.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
722.0	0				Topsoil = 2 in.				
721.8			B1		*Residual*, brown-gray, fine to coarse, SANDY SILT WITH GRAVEL, firm, moist, **ML**	5	1+2+2+1	4	
720.0			B3		*Weathered rock*, brown-gray, fine to coarse, SANDY SILT WITH GRAVEL, very hard, moist, **ML**		50/1	1	>>
719.9					Auger and Spoon Refusal at 2.1 ft.				
	5								
	10								
	15								

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/12/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35424°N, -74.05387°W
One offset boring was attempted. Offset boring refused at a depth of approximately 1.9 ft.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-10**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/11/19 - 12/11/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **684.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
684.0	0	X	B3		Topsoil = 2 in.	3+50/1	5	>>
683.8					*Weathered rock*, brown-gray, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist, **SM**			
683.4					Auger Refusal at 0.6 ft.			
	5							
	10							
	15							

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/12/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35466°N, -74.05292°W
No offset attempted due to ground slope and utilities.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT: **Training Camps Revitalization at West Point**	LOGGED BY: **J. Von Erden**	BORING NUMBER: **TB-11**
LOCATION: **Camp Buckner, West Point Military Reservation, New York**	DRILLING CONTRACTOR: **Unitech Drilling**	SHEET 1 OF 1
OWNER/CLIENT: **EwingCole**	DRILLER: **M. Shepherd**	DATES DRILLED: **12/12/19 - 12/12/19**
PROJECT NUMBER: **JD195203** / GROUND SURFACE ELEVATION (ft.): **668.0 ±**	DRILLING METHOD: **3.25 ID HSA; Automatic Hammer**	DRILL RIG: **CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	REC (in)	STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	MC (%)
668.0	0				Topsoil = 4 in.					
667.7					*Fill*, brown-gray, fine to coarse, SILTY SAND WITH GRAVEL, medium dense, moist, **SM**	15	3+4+7+5	20		10.7
666.0 ▽					*Fill*, brown-gray, fine to coarse, SILTY GRAVEL WITH SAND, loose, wet, **GM**	5	3+2+2+5	0		
664.0			A		Medium dense	13	3+5+5+6	10		26.3
662.0	5				*Residual*, brown-gray, fine to coarse, CLAYEY GRAVEL WITH SAND, medium dense, wet, **GC**	15	3+6+5+7	15		15.6
660.0			B2				50/1	0	>>	
659.9			B3		*Weathered rock*, brown-gray, fine to coarse, CLAYEY GRAVEL WITH SAND, very dense, wet, **GC**					
	10				Auger and Spoon Refusal at 8.1 ft.					
	15									

GROUND WATER LEVELS:

▽ ENCOUNTERED:	2.0 ft.	ELEV. 666.0					
▼ UPON COMPLETION:	2.5 ft.	ELEV. 665.5	CAVED:	4.0 ft.	ELEV.	664.0
▼ 12/18/2019 ELEV.	1.5 ft.	ELEV. 666.5	CAVED:	3.0 ft.	ELEV.	665.0

SAMPLE TYPES: ☒ SPT

REMARKS: Coordinates: 41.35537°N, -74.05194°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-12**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/13/19 - 12/13/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **684.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
684.0					Topsoil = 2 in.			
683.8			B3		*Weathered rock*, brown-gray, fine to coarse, SILTY SAND WITH GRAVEL, very dense, moist, **SM**	2+2+50/2	8	>>
682.8					Auger and Spoon Refusal at 1.2 ft.	50/0	0	>>
	5							
	10							
	15							

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/16/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35594°N, -74.05193°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

GeoConcepts Engineering, Inc.

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-12A**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/13/19 - 12/13/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **684.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80
684.0 683.8		X	B3		Topsoil = 2 in. *Weathered rock*, brown-gray, fine to coarse, SILTY SAND WITH GRAVEL, dense, moist, **SM**	47	2+5+30+50/0	5	●
682.5					Auger Refusal at 1.5 ft.				
	5								
	10								
	15								

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/13/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.35594°N, -74.05192°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

GeoConcepts Engineering, Inc.

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PROJECT:	LOGGED BY:	BORING NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TB-13**
LOCATION:	DRILLING CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	DRILLER:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/12/19 - 12/12/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	DRILLING METHOD:	DRILL RIG:
JD195203 / **712.0 ±**	**3.25 ID HSA; Automatic Hammer**	**CME 55**

ELEV. (ft.)	DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	N_{60}	SOIL: SPT BLOW COUNTS	SOIL: REC (in)	SOIL: STANDARD PENETRATION TEST RESISTANCE (BPF) 20 40 60 80	SOIL: MC (%)
712.0					Topsoil = 2 in.					
711.8					*Residual*, brown, fine to coarse, SILTY SAND WITH GRAVEL, medium dense, moist, **SM**	19	5+6+8+6	8		10.6
710.0			B2		*Weathered rock*, brown, fine to coarse, SILTY SAND WITH GRAVEL, medium dense, moist, **SM**	24	5+9+9+50/4	2		
708.2					Auger Refusal at 3.8 ft.					
	5									
	10									
	15									

GROUND WATER LEVELS:

NOT ENCOUNTERED DURING DRILLING

NOT ENCOUNTERED UPON COMPLETION

12/13/2019: NOT ENCOUNTERED

SAMPLE TYPES:

☒ SPT

REMARKS: Coordinates: 41.356581°N, -74.05153°W

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TRAINING CAMPS REVITALIZATION.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

GeoConcepts Engineering, Inc.

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Ashburn, Virginia 20147

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703-726-8032 fax

PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-1**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203 / **667.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		A		*Fill*, gray-brown, fine to coarse, SANDY SILT, moist, **ML**		
				Bottom of Test Pit at 1.6 ft.	**5+8+10+10**	

GROUND WATER LEVELS:

SAMPLE TYPES:

REMARKS: Coordinates: 41.351539°N, -74.051108°W
Depth to Bottom of Footing from Ground Surface (in): 19.0
DCP Blow Counts Taken at Bottom of Footings.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TEST PITS.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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Ashburn, Virginia 20147

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PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-2**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203 / **772.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		B3		*Weathered rock*, light brown, fine to coarse, SILTY SAND, with boulders, moist, **SM**		
				Bottom of Test Pit at 2.0 ft.	**3+3+4+4**	

GROUND WATER LEVELS:

SAMPLE TYPES:

REMARKS: Coordinates: 41.352673°N, -74.053726°W
Depth to Bottom of Footing from Ground Surface (in): 24.0
DCP Blow Counts Taken at Bottom of Footings.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

GeoConcepts Engineering, Inc.

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Ashburn, Virginia 20147

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PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-3**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	

OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**

PROJECT NUMBER:	GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203	**694.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		B2		*Residual*, yellow-brown, fine to coarse, SILTY SAND, with cobbles, wet, **SM**		
				Bottom of Test Pit at 2.4 ft.	2+3+10+25	

GROUND WATER LEVELS:

▽ ENCOUNTERED: 1.1 ft.

SAMPLE TYPES:

REMARKS: Coordinates: 41.353265°N, -74.054668°W
Depth to Bottom of Footing from Ground Surface (in): 29.0
DCP Blow Counts Taken at Bottom of Footings.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

GeoConcepts Engineering, Inc.

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Ashburn, Virginia 20147

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PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-4**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203 / **709.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		B1		*Residual*, yellow-brown, fine to coarse, SANDY SILT, with cobbles, moist, **ML**		
				Bottom of Test Pit at 1.9 ft.	13+6+2+2	

GROUND WATER LEVELS:

SAMPLE TYPES:

REMARKS: Coordinates: 41.353501°N, -74.054164°W
Depth to Bottom of Footing from Ground Surface (in): 23.0
DCP Blow Counts Taken at Bottom of Footings.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TEST PITS.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-5**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203 / **720.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		A		*Fill*, yellow-brown, fine to coarse, SANDY SILT WITH GRAVEL, moist, **ML**		
				Bottom of Test Pit at 0.8 ft.	**6+10+3+2**	

GROUND WATER LEVELS:

SAMPLE TYPES:

REMARKS: Coordinates: 41.354056°N, -74.054348°W
Depth to Bottom of Footing from Ground Surface (in): 9.0
DCP Blow Counts Taken at Bottom of Footings.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TEST PITS.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

GeoConcepts Engineering, Inc.

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Ashburn, Virginia 20147

703-726-8030
703-726-8032 fax

PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-6**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203 / **672.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		A		*Fill*, gray-brown, fine to coarse, SANDY SILT, with cobbles, moist, **ML**		
				Bottom of Test Pit at 0.9 ft.	3+4+7+5	

GROUND WATER LEVELS:

SAMPLE TYPES:

REMARKS: Coordinates: 41.354932°N, -74.052604°W
Depth to Bottom of Footing from Ground Surface (in): 11.0
DCP Blow Counts Taken at Bottom of Footings.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TEST PITS.GPJ GEOCONCEPTS 20170216.GDT 1/23/20

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Ashburn, Virginia 20147

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PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-7**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203 / **668.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		A		*Fill*, brown-gray, fine to coarse, SILTY SAND, contains boulders, wet, **SM**		
▽				Bottom of Test Pit at 2.8 ft.		

GROUND WATER LEVELS:

▽ ENCOUNTERED: 2.7 ft.

SAMPLE TYPES:

REMARKS: Coordinates: 41.355348°N, -74.051743°W
Test pit abandoned due to rapid groundwater infiltration.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

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PROJECT:	LOGGED BY:	TEST PIT NUMBER:
Training Camps Revitalization at West Point	**J. Von Erden**	**TP-8**
LOCATION:	EXCAVATION CONTRACTOR:	SHEET 1 OF 1
Camp Buckner, West Point Military Reservation, New York	**Unitech Drilling**	
OWNER/CLIENT:	OPERATOR:	DATES DRILLED:
EwingCole	**M. Shepherd**	**12/16/19 - 12/16/19**
PROJECT NUMBER: / GROUND SURFACE ELEVATION (ft.):	EQUIPMENT:	DRILL RIG:
JD195203 / **691.0 ±**	**Excavator**	

DEPTH (ft.)	SAMPLE TYPE	STRATUM	GRAPHIC	MATERIAL DESCRIPTION	SOIL: DCP BLOW COUNTS	SOIL: Geoprobe Pen. (in)
				Topsoil = 2 in.		
		A		*Fill*, gray-brown, fine to coarse, SANDY SILT, with cobbles, moist, **ML**		
				Bottom of Test Pit at 3.1 ft.	5+5+6+20	

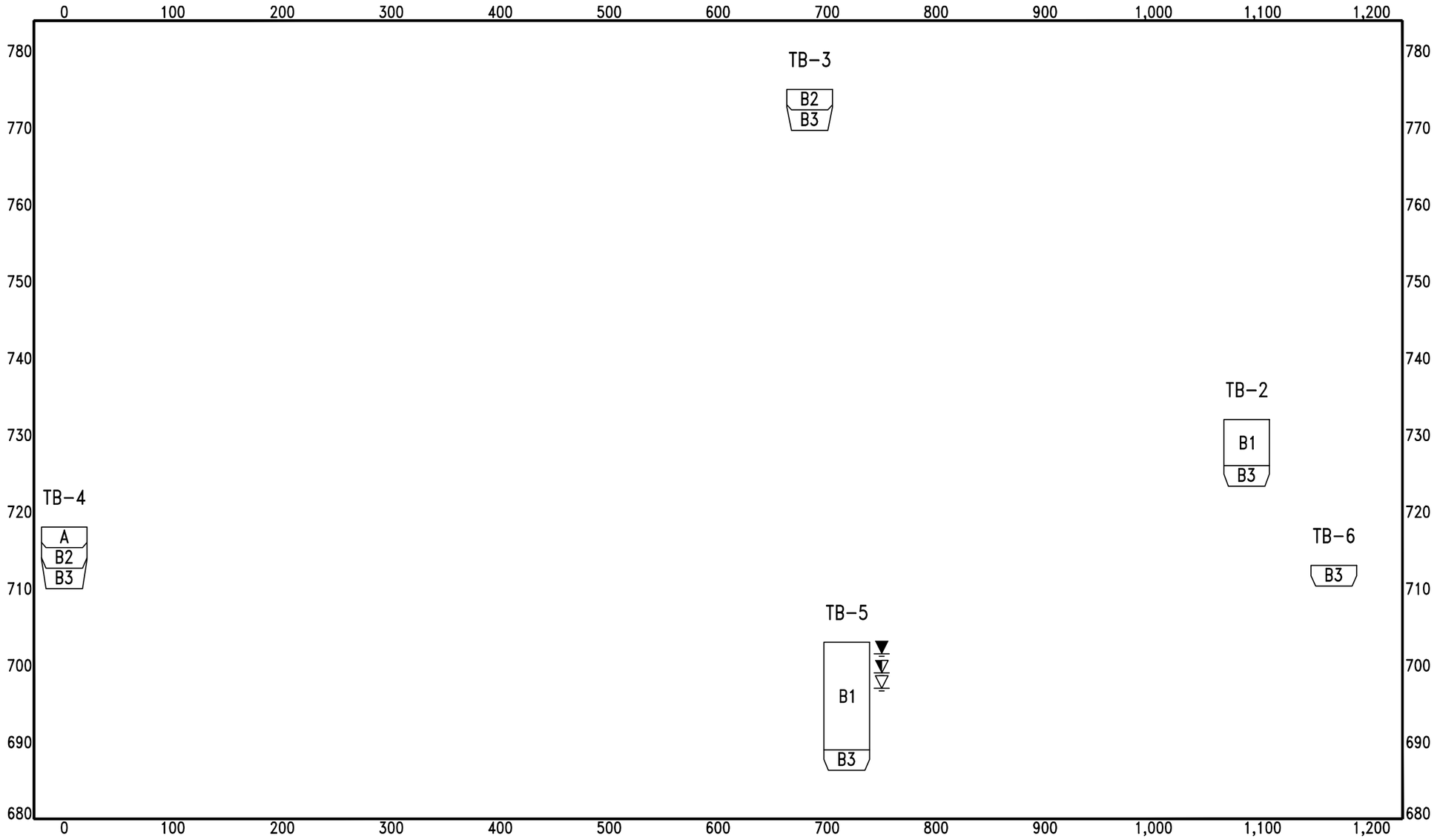
GROUND WATER LEVELS:

SAMPLE TYPES:

REMARKS: Coordinates: 41.356588°N, -74.051785°W
Depth to Bottom of Footing from Ground Surface (in): 37.0
DCP Blow Counts Taken at Bottom of Footings.

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT JD195203 TEST PITS.GPJ GEOCONCEPTS 20170216.GDT 1/23/20



L E G E N D

▽	GROUNDWATER ELEVATION DURING DRILLING
▼	GROUNDWATER ELEVATION UPON COMPLETION
▼	LONG TERM GROUNDWATER READING ELEVATION
A	STRATUM A: FILL
B1	STRATUM B1: RESIDUAL (FINE-GRAINED)
B2	STRATUM B2: RESIDUAL (COARSE-GRAINED)
B3	STRATUM B3: WEATHERED ROCK

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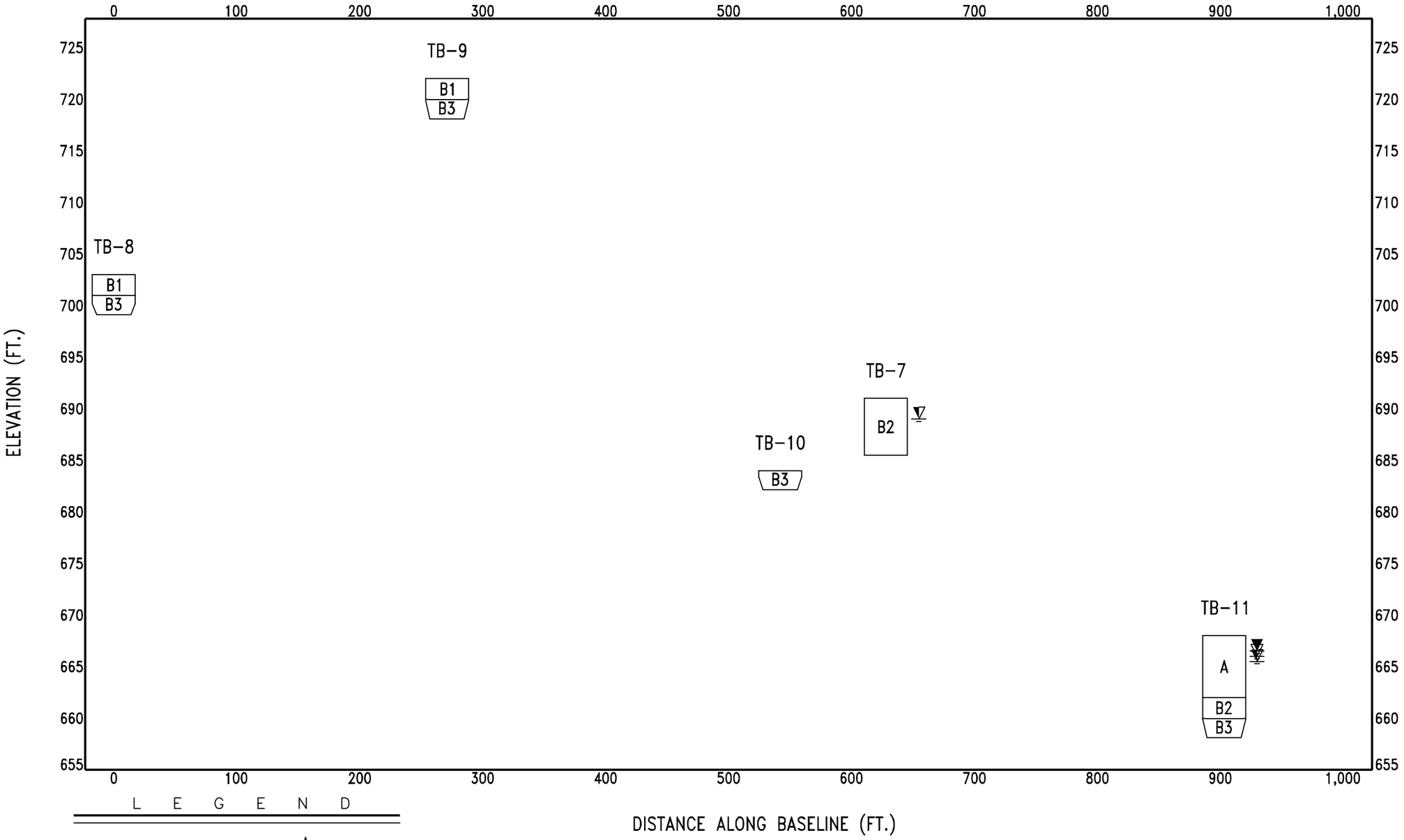
TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

SUBSURFACE DIAGRAM A-A'			Scale: AS SHOWN	Fig. 7
Date: JUNE 2020	Drawn By: R.K.S.	Checked By: P.E.B.	Project No.: JD195203	

n:\projects\2019\jd195203\working files\diagrams-drawings-figures\a-a'\fig 6 - subsurface diagram a-a'.dwg



L E G E N D

GROUNDWATER ELEVATION DURING DRILLING

GROUNDWATER ELEVATION UPON COMPLETION

LONG TERM GROUNDWATER READING ELEVATION

A STRATUM A: FILL

B1 STRATUM B1: RESIDUAL (FINE-GRAINED)

B2 STRATUM B2: RESIDUAL (COARSE-GRAINED)

B3 STRATUM B3: WEATHERED ROCK

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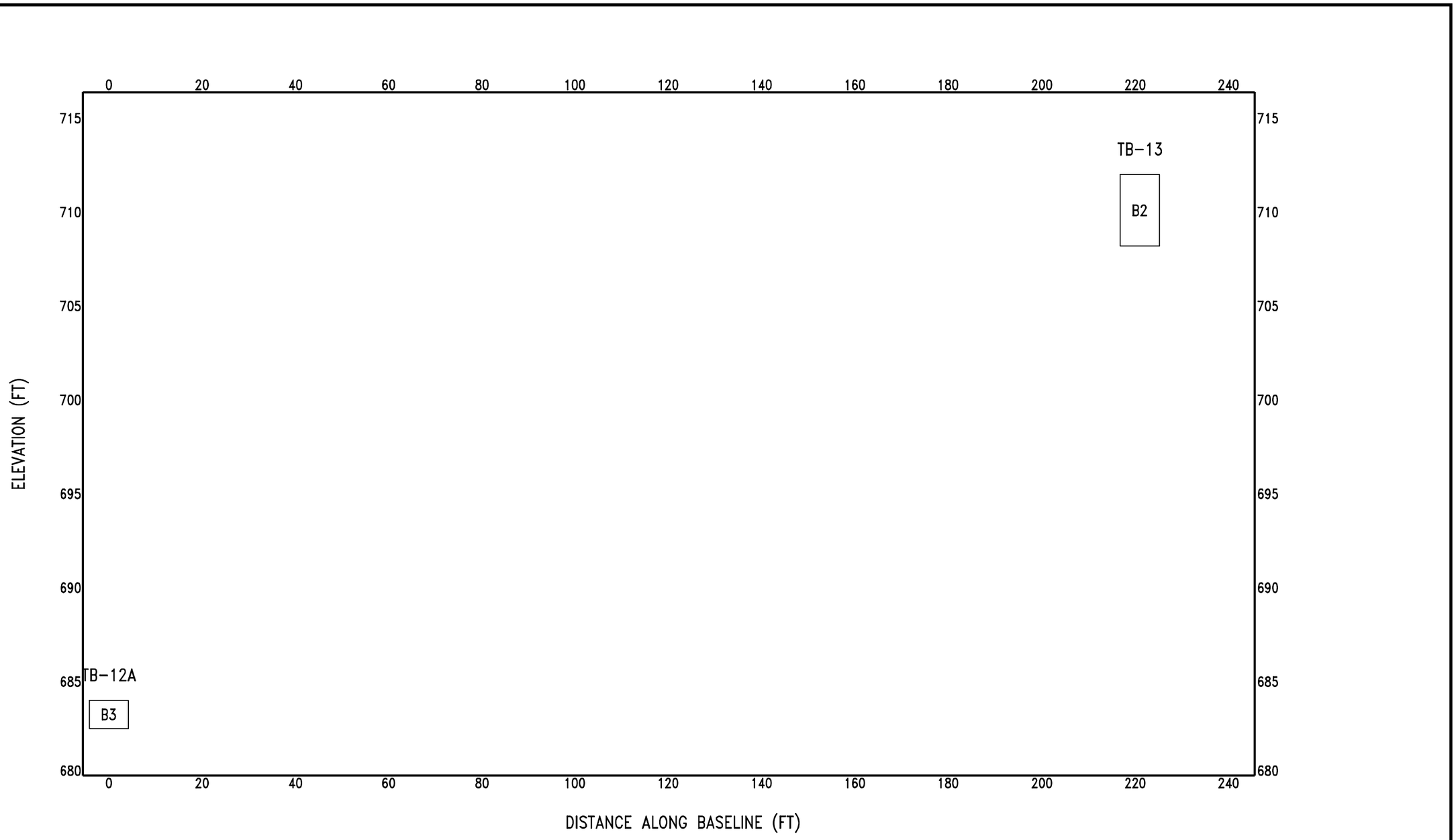
TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

SUBSURFACE DIAGRAM B-B'

Scale:	Fig.
AS SHOWN	8

Date:	Drawn By:	Checked By:	Project No.:
JUNE 2020	R.K.S.	P.E.B.	JD195203

n:\projects\2019\jd195203\working files\diagrams-drawings-figures\b-b'\fig 7.- subsurface diagram b-b'.dwg



L E G E N D

B2	STRATUM B2: RESIDUAL (COARSE-GRAINED)
B3	STRATUM B3: WEATHERED ROCK

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TRAINING CAMPS REVITALIZATION AT WEST POINT
CAMP BUCKNER, WEST POINT MILITARY RESERVATION, NEW YORK

SUBSURFACE DIAGRAM C-C'			Scale: AS SHOWN	Fig. 9
Date: JUNE 2020	Drawn By: R.K.S.	Checked By: P.E.B	Project No.: JD195203	

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Training Camps Revitalization at West Point
Camp Buckner, West Point Military Reservation, New York
Project No. JD195203
Test Pit Photo Log

Photo 1: TP-1 at Building 1570

Photo 2: TP-2 at Building 1616

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Training Camps Revitalization at West Point
Camp Buckner, West Point Military Reservation, New York
Project No. JD195203
Test Pit Photo Log

Photo 3: TP-3 at Building 1575

Photo 4: TP-4 at Building 1522

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Training Camps Revitalization at West Point
Camp Buckner, West Point Military Reservation, New York
Project No. JD195203
Test Pit Photo Log

Photo 5: TP-5 at Building 1516

Photo 6: TP-6 at Building 1564

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Training Camps Revitalization at West Point
Camp Buckner, West Point Military Reservation, New York
Project No. JD195203
Test Pit Photo Log

Photo 7: TP-7 at Building 1548

Photo 8: TP-8 at Building 1503

Appendix B
Soil Laboratory Test Results

Liquid and Plastic Limit, and Grain Size Analysis Test Data (26 pages)

Drilled Core Test Reports (5 pages)

Corrosion Series Test Data and Chain of Custody (6 pages)

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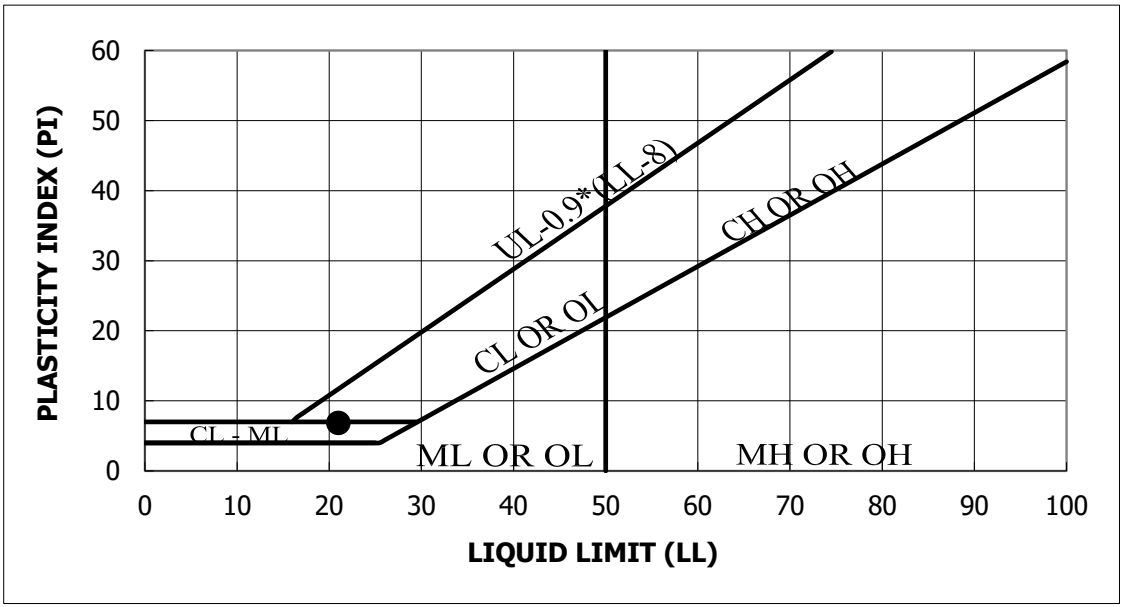
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-1	**Depth (Feet)**	0.5-2.0
Lab Order No.	4995-1	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
WELL GRADED GRAVEL with clay & sand	21	14	7	52.5	7.2	GW-GC	4.6
Color	Brown		AASHTO Classification			A-2-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by DW

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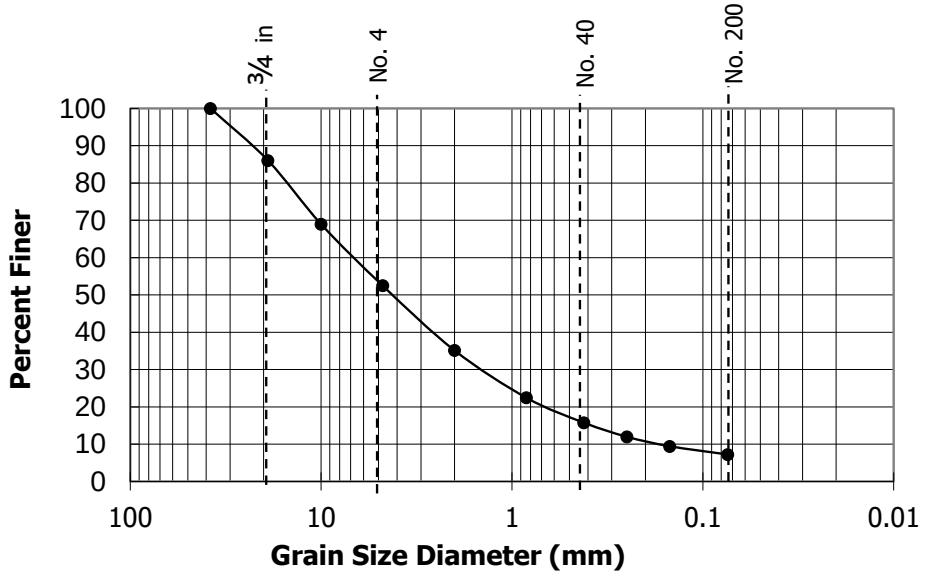
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-1	**Depth (Feet)**	0.5-2.0
Lab Order No.	4995-1	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**86**
3/8"	**69**
#4	**52**
#10	**35**
#20	**22**
#40	**16**
#60	**12**
#100	**9**
#200	**7**
Pan	**--**

USCS Group Symbol	**GW-GC**
USCS Group Name	**WELL GRADED GRAVEL with clay &**
Cu	**41.7**
Cc	**1.9**
LL	**21**
PI	**7**
Gravel	**47.5**
Sand	**45.3**
Fines	**7.2**
AASHTO Classification	**A-2-4**
Color	**Brown**

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

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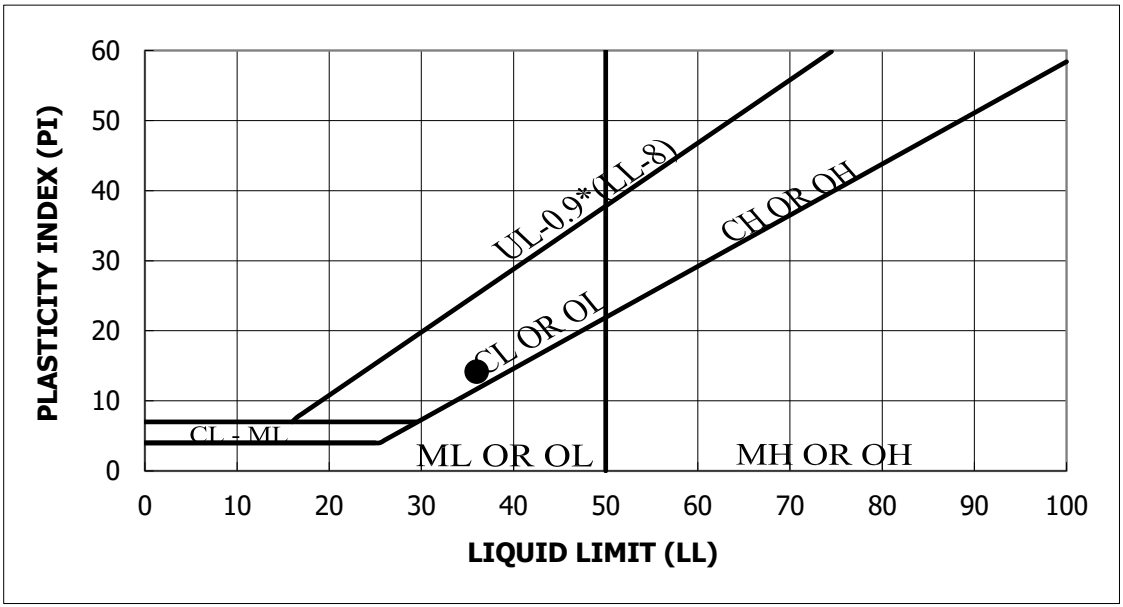
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-1	**Depth (Feet)**	4.0-6.0
Lab Order No.	4995-2	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
CLAYEY GRAVEL with sand	36	22	14	50.4	28.8	GC	19.0
Color	Gray		AASHTO Classification			A-2-6	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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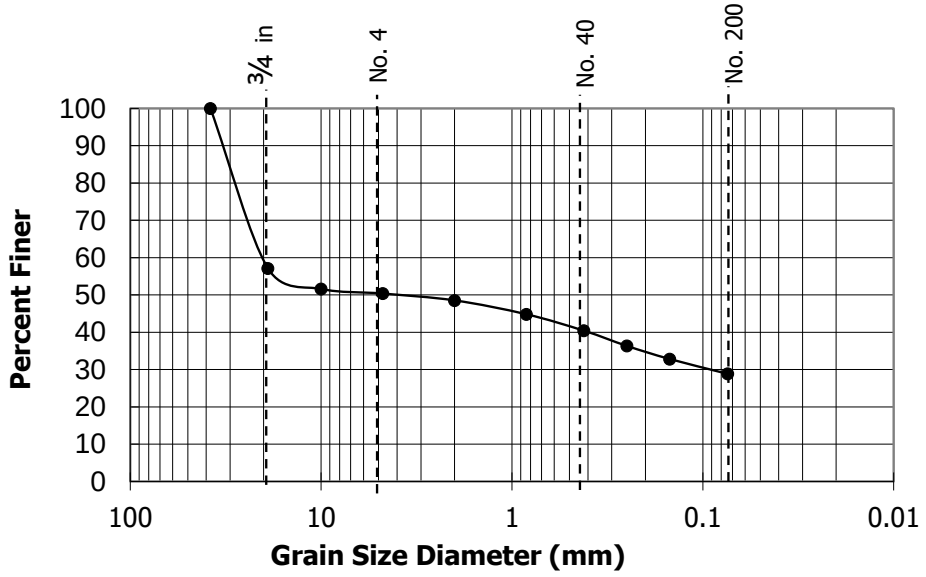
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-1	**Depth (Feet)**	4.0-6.0
Lab Order No.	4995-2	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**57**
3/8"	**52**
#4	**50**
#10	**49**
#20	**45**
#40	**40**
#60	**36**
#100	**33**
#200	**29**
Pan	**--**

USCS Group Symbol	**GC**
USCS Group Name	**CLAYEY GRAVEL with sand**
Cu	**---**
Cc	**---**
LL	**36**
PI	**14**
Gravel	**49.6**
Sand	**21.5**
Fines	**28.8**
AASHTO Classification	**A-2-6**
Color	**Gray**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

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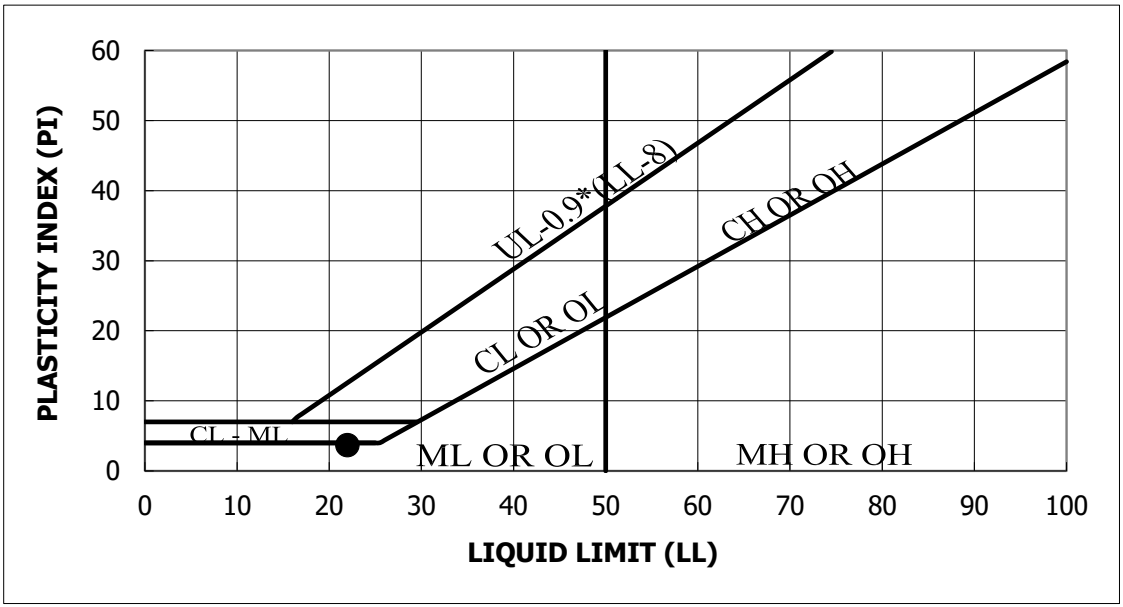
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-2	**Depth (Feet)**	2.0-4.0
Lab Order No.	4995-3	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
sandy Silt	22	18	4	90.6	57.0	ML	20.8
Color	Light Gray		AASHTO Classification			A-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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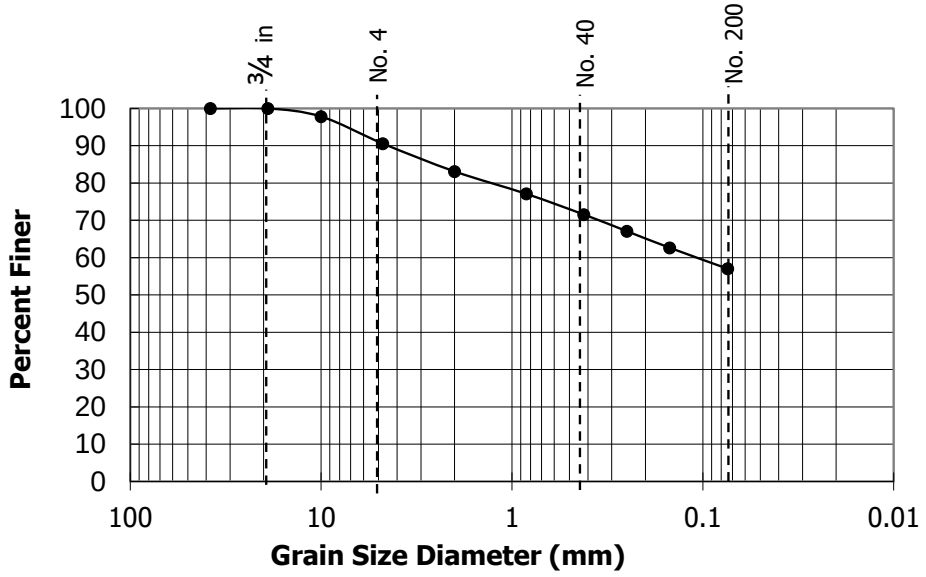
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-2	**Depth (Feet)**	2.0-4.0
Lab Order No.	4995-3	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**98**
#4	**91**
#10	**83**
#20	**77**
#40	**72**
#60	**67**
#100	**63**
#200	**57**
Pan	**--**

USCS Group Symbol	**ML**
USCS Group Name	**sandy Silt**
Cu	**---**
Cc	**---**
LL	**22**
PI	**4**
Gravel	**9.4**
Sand	**33.6**
Fines	**57.0**
AASHTO Classification	**A-4**
Color	**Light Gray**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by: DW

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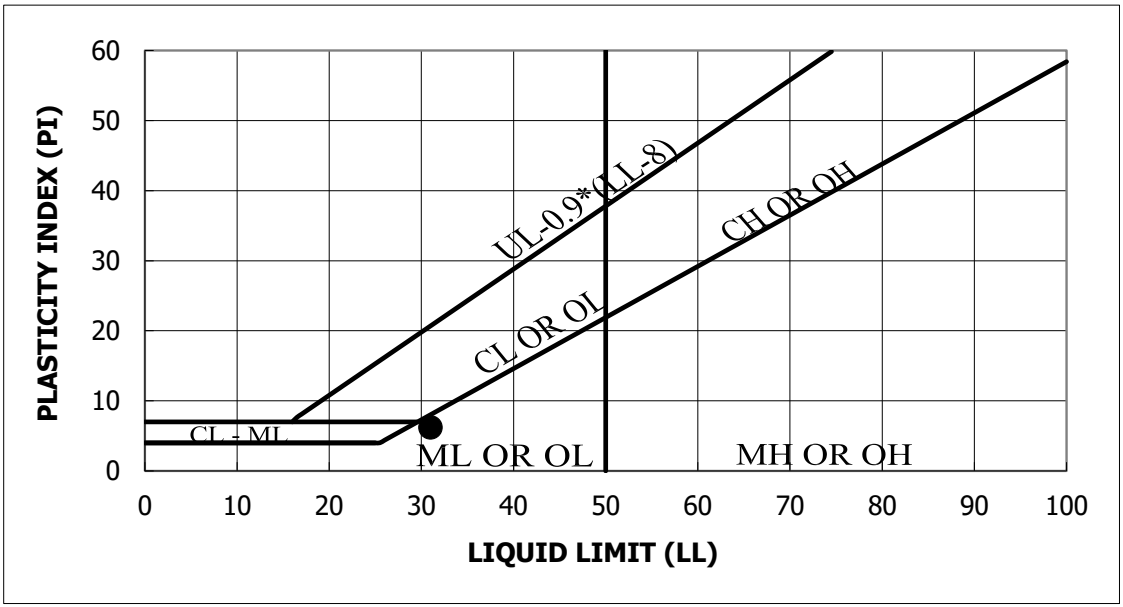
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-3	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-4	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
SILTY GRAVEL with sand	31	25	6	43.0	17.1	GM	9.8
Color	Dark Gray		AASHTO Classification			A-1-b	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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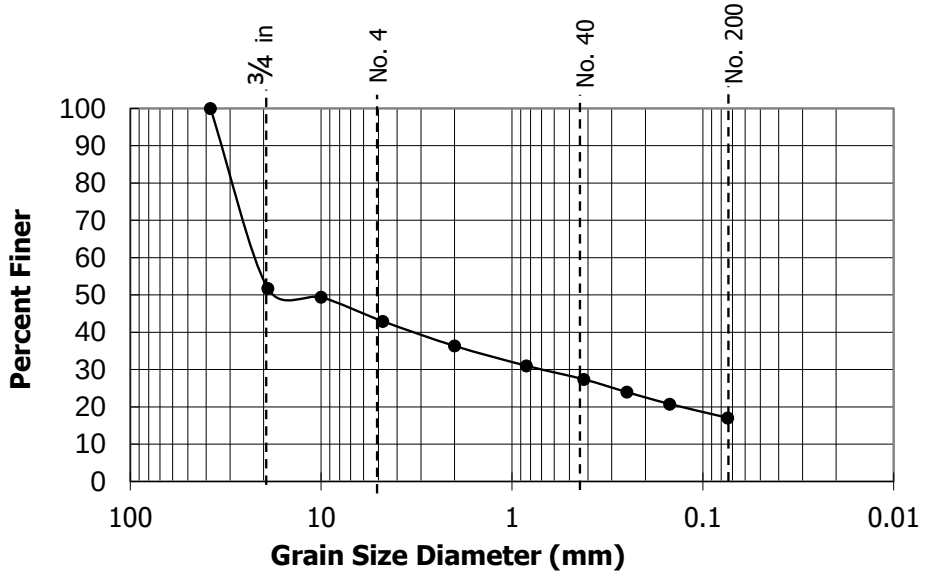
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-3	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-4	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**52**
3/8"	**49**
#4	**43**
#10	**36**
#20	**31**
#40	**27**
#60	**24**
#100	**21**
#200	**17**
Pan	**--**

USCS Group Symbol	**GM**
USCS Group Name	**SILTY GRAVEL with sand**
Cu	**---**
Cc	**---**
LL	**31**
PI	**6**
Gravel	**57.0**
Sand	**25.9**
Fines	**17.1**
AASHTO Classification	**A-1-b**
Color	**Dark Gray**

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

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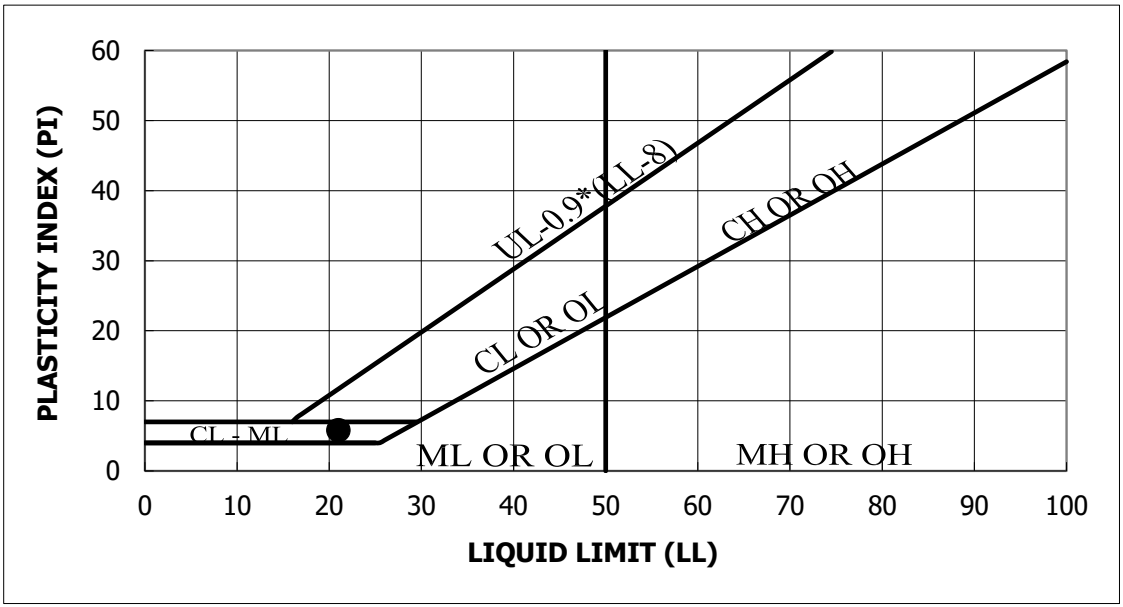
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-5	**Depth (Feet)**	2.0-4.0
Lab Order No.	4995-5	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
sandy silty Clay	21	15	6	93.9	55.4	CL-ML	14.9
Color	Brown		AASHTO Classification			A-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by DW

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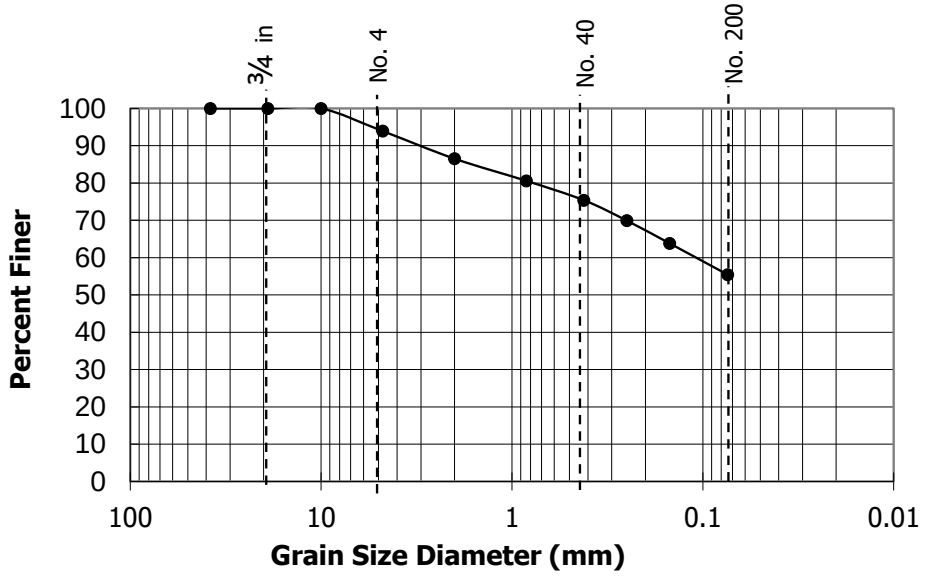
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-5	**Depth (Feet)**	2.0-4.0
Lab Order No.	4995-5	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**100**
#4	**94**
#10	**87**
#20	**81**
#40	**75**
#60	**70**
#100	**64**
#200	**55**
Pan	**--**

USCS Group Symbol	**CL-ML**
USCS Group Name	**sandy silty Clay**
Cu	**---**
Cc	**---**
LL	**21**
PI	**6**
Gravel	**6.1**
Sand	**38.5**
Fines	**55.4**
AASHTO Classification	**A-4**
Color	**Brown**

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by: DW

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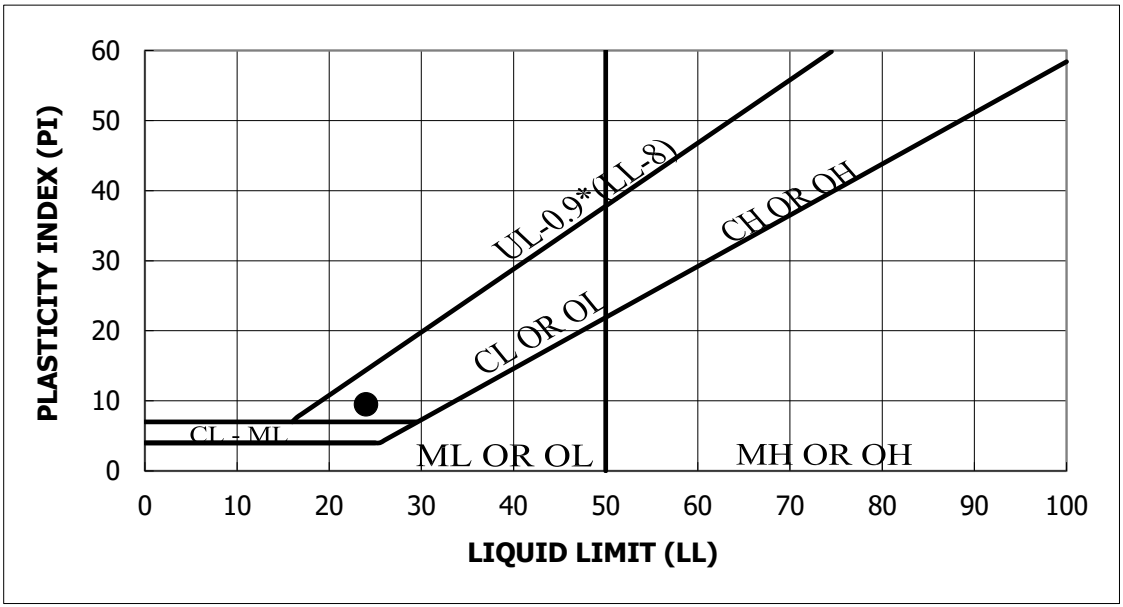
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-5	**Depth (Feet)**	4.0-6.0
Lab Order No.	4995-6	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
sandy Lean Clay	24	15	9	92.2	55.0	CL	13.7
Color	Brown		AASHTO Classification			A-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by DW

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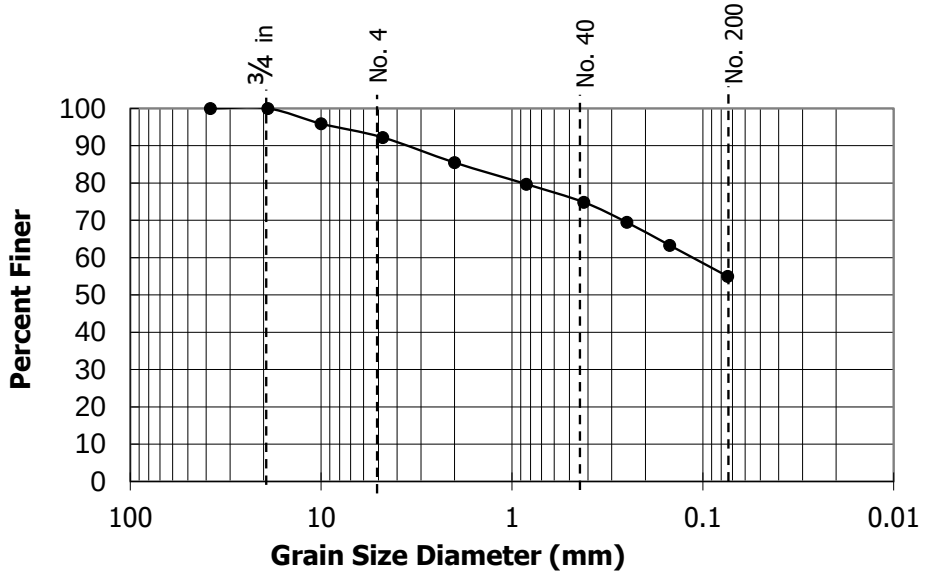
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-5	**Depth (Feet)**	4.0-6.0
Lab Order No.	4995-6	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**96**
#4	**92**
#10	**85**
#20	**80**
#40	**75**
#60	**69**
#100	**63**
#200	**55**
Pan	**--**

USCS Group Symbol	**CL**
USCS Group Name	**sandy Lean Clay**
Cu	**---**
Cc	**---**
LL	**24**
PI	**9**
Gravel	**7.8**
Sand	**37.3**
Fines	**55.0**
AASHTO Classification	**A-4**
Color	**Brown**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

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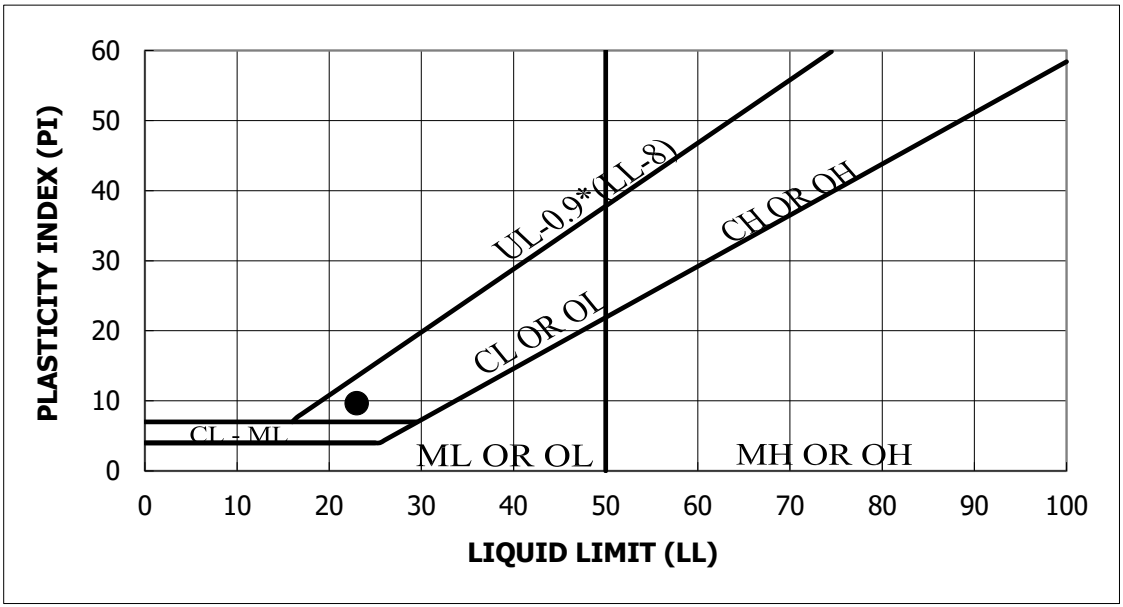
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-5	**Depth (Feet)**	8.0-10.0
Lab Order No.	4995-7	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
sandy Lean Clay with gravel	23	13	10	79.4	51.6	CL	11.6
Color	Olive Brown		AASHTO Classification			A-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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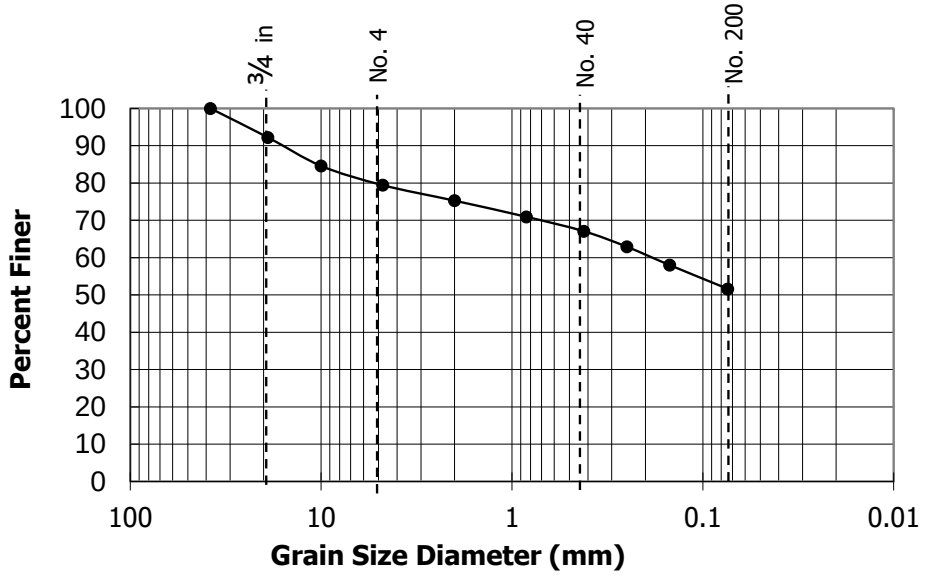
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-5	**Depth (Feet)**	8.0-10.0
Lab Order No.	4995-7	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**92**
3/8"	**85**
#4	**79**
#10	**75**
#20	**71**
#40	**67**
#60	**63**
#100	**58**
#200	**52**
Pan	**--**

USCS Group Symbol	**CL**
USCS Group Name	**sandy Lean Clay with gravel**
Cu	**---**
Cc	**---**
LL	**23**
PI	**10**
Gravel	**20.6**
Sand	**27.8**
Fines	**51.6**
AASHTO Classification	**A-4**
Color	**Olive Brown**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

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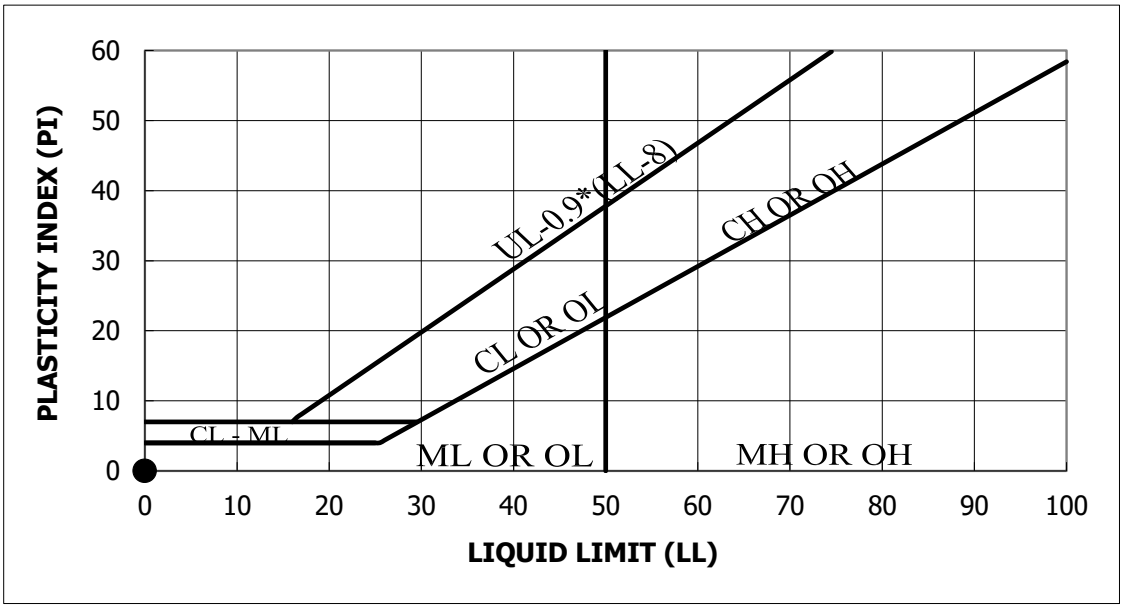
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-7	**Depth (Feet)**	4.0-5.5
Lab Order No.	4995-8	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
SILTY SAND	NP	NP	NP	98.9	49.3	SM	18.4
Color	Brown		AASHTO Classification			A-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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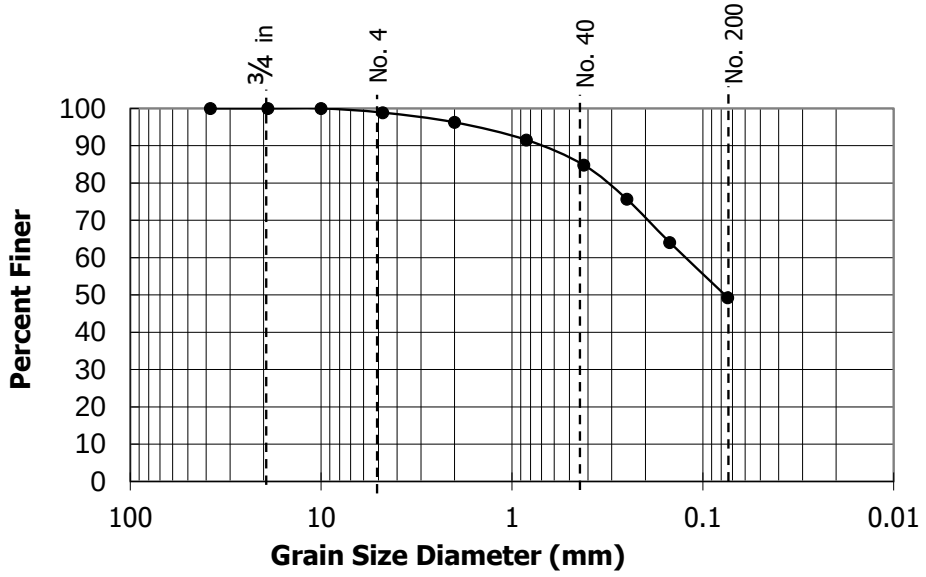
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-7	**Depth (Feet)**	4.0-5.5
Lab Order No.	4995-8	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**100**
#4	**99**
#10	**96**
#20	**92**
#40	**85**
#60	**76**
#100	**64**
#200	**49**
Pan	**--**

USCS Group Symbol	**SM**
USCS Group Name	**SILTY SAND**
Cu	**---**
Cc	**---**
LL	**NP**
PI	**NP**
Gravel	**1.1**
Sand	**49.6**
Fines	**49.3**
AASHTO Classification	**A-4**
Color	**Brown**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by: DW

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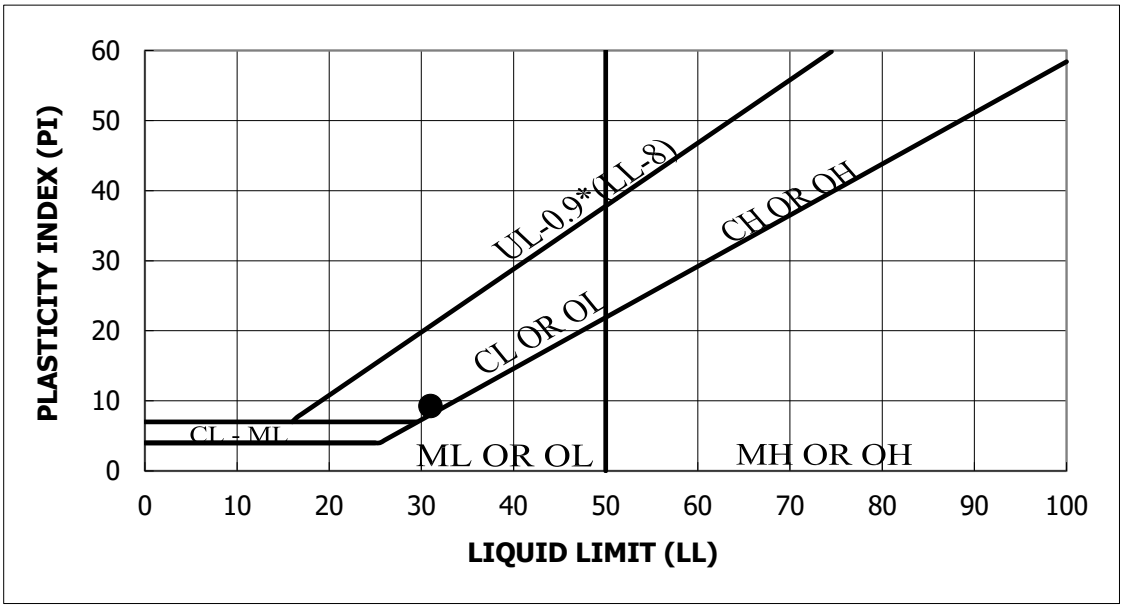
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-8	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-9	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
gravelly Lean Clay with sand	31	22	9	71.8	54.7	CL	30.6
Color	Brown		AASHTO Classification			A-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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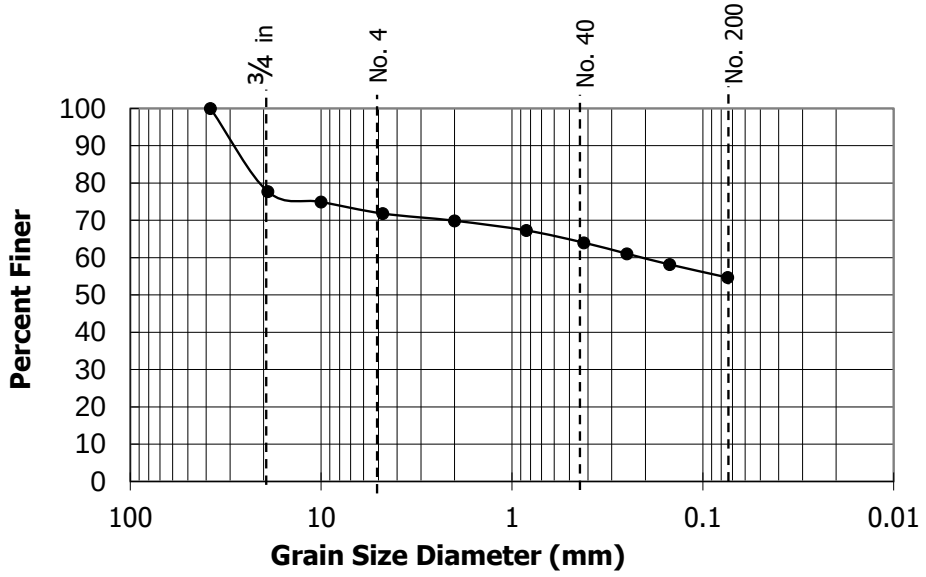
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-8	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-9	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**78**
3/8"	**75**
#4	**72**
#10	**70**
#20	**67**
#40	**64**
#60	**61**
#100	**58**
#200	**55**
Pan	**--**

USCS Group Symbol	**CL**
USCS Group Name	**gravelly Lean Clay with sand**
Cu	**---**
Cc	**---**
LL	**31**
PI	**9**
Gravel	**28.2**
Sand	**17.2**
Fines	**54.7**
AASHTO Classification	**A-4**
Color	**Brown**

Test Method: ASTM D 422
Soil Classification by ASTM D2487 and AASHTO M 145

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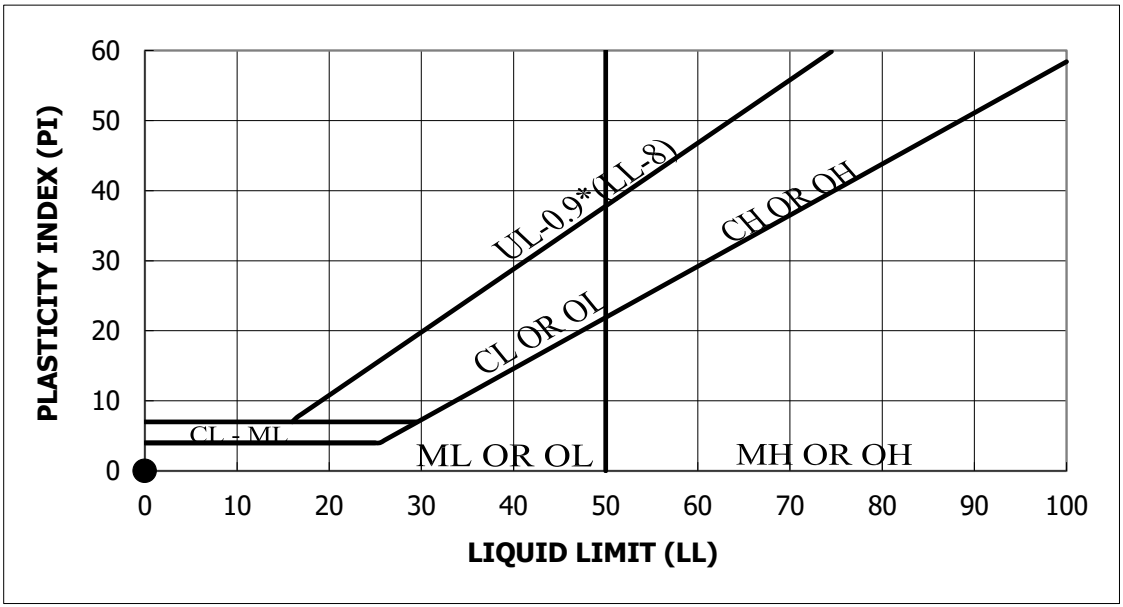
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-11	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-11	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
SILTY SAND with gravel	NP	NP	NP	83.4	18.8	SM	10.7
Color	Brown		AASHTO Classification			A-1-b	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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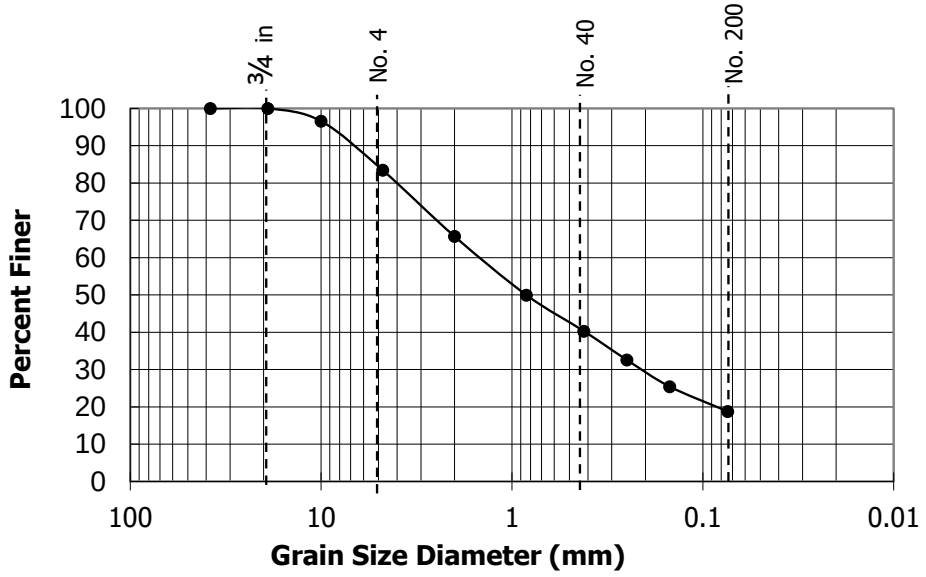
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-11	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-11	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**97**
#4	**83**
#10	**66**
#20	**50**
#40	**40**
#60	**33**
#100	**25**
#200	**19**
Pan	**--**

USCS Group Symbol	**SM**
USCS Group Name	**SILTY SAND with gravel**
Cu	**---**
Cc	**---**
LL	**NP**
PI	**NP**
Gravel	**16.6**
Sand	**64.7**
Fines	**18.8**
AASHTO Classification	**A-1-b**
Color	**Brown**

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

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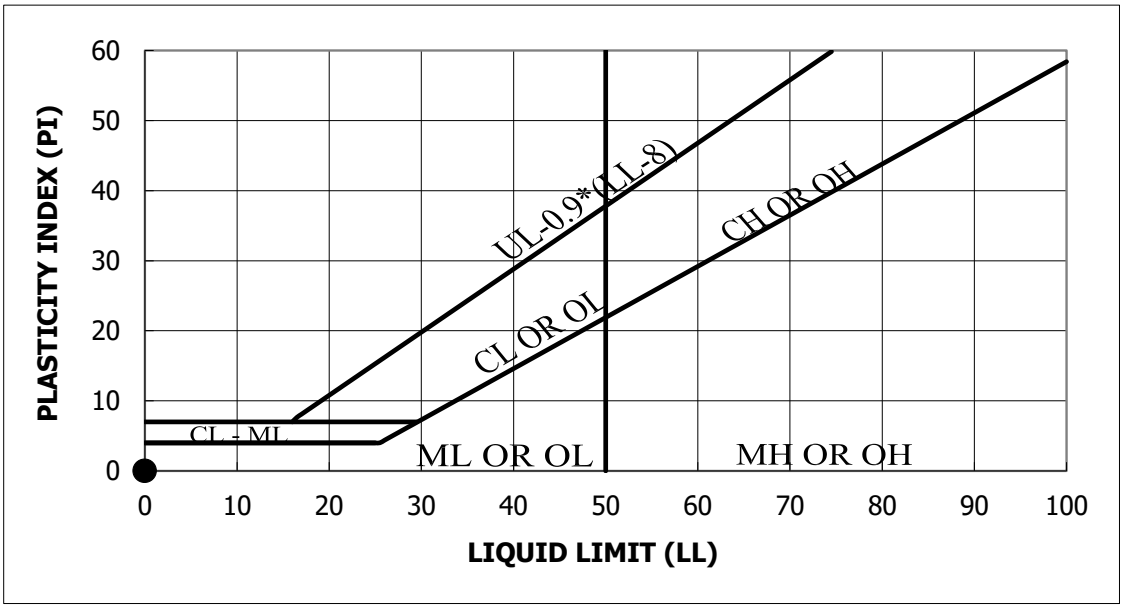
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-11	**Depth (Feet)**	4.0-6.0
Lab Order No.	4995-12	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
SILTY GRAVEL with sand	NP	NP	NP	53.0	14.1	GM	26.3
Color	Dark Gray		AASHTO Classification			A-1-a	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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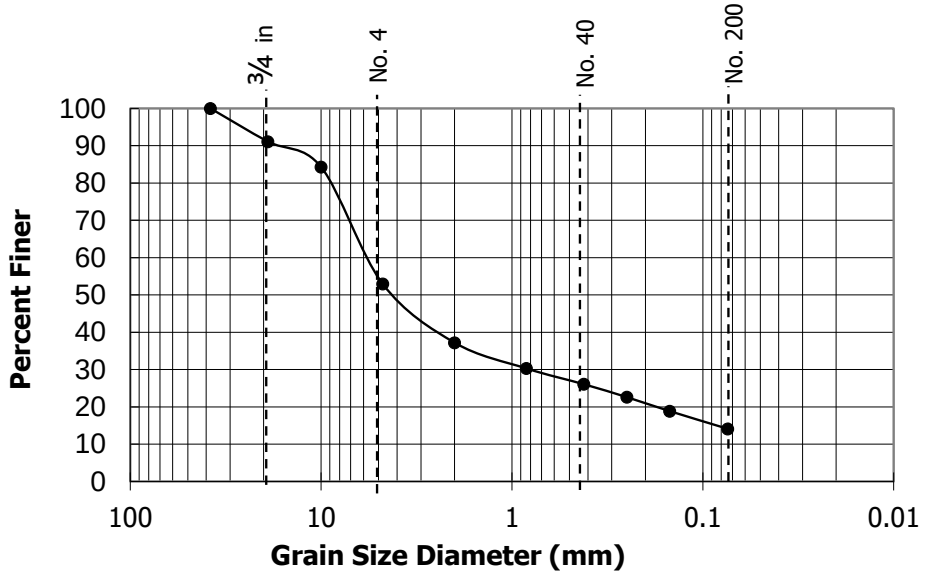
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-11	**Depth (Feet)**	4.0-6.0
Lab Order No.	4995-12	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**91**
3/8"	**84**
#4	**53**
#10	**37**
#20	**30**
#40	**26**
#60	**23**
#100	**19**
#200	**14**
Pan	**--**

USCS Group Symbol	**GM**
USCS Group Name	**SILTY GRAVEL with sand**
Cu	**---**
Cc	**---**
LL	**NP**
PI	**NP**
Gravel	**47.0**
Sand	**38.9**
Fines	**14.1**
AASHTO Classification	**A-1-a**
Color	**Dark Gray**

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

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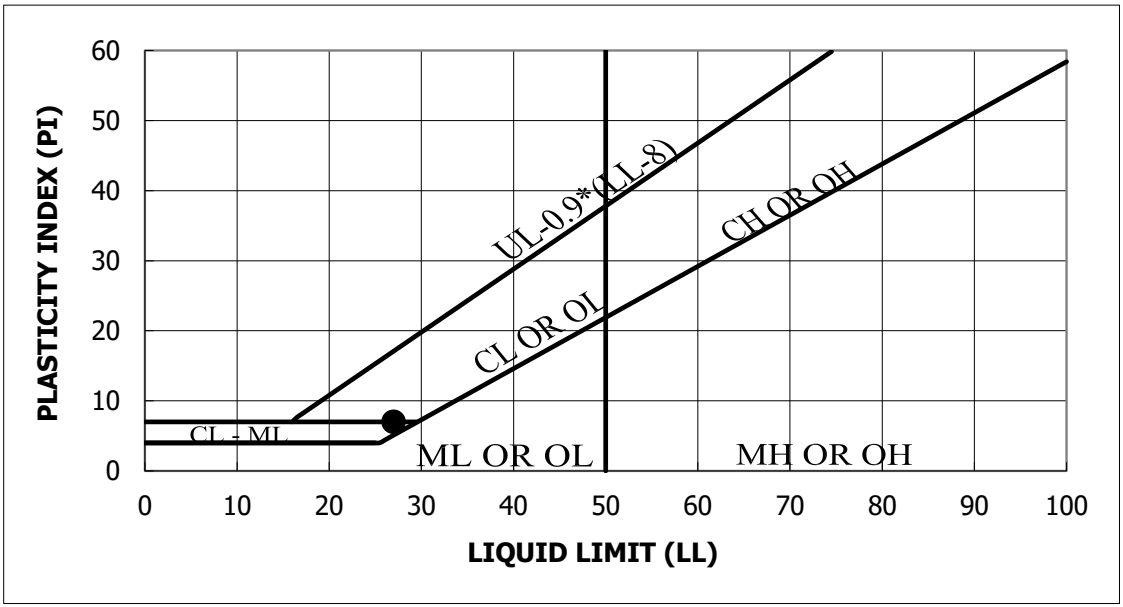
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-11	**Depth (Feet)**	6.0-8.0
Lab Order No.	4995-13	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
CLAYEY GRAVEL with sand	27	20	7	48.5	18.2	GC	15.6
Color	Dark Gray		AASHTO Classification			A-2-4	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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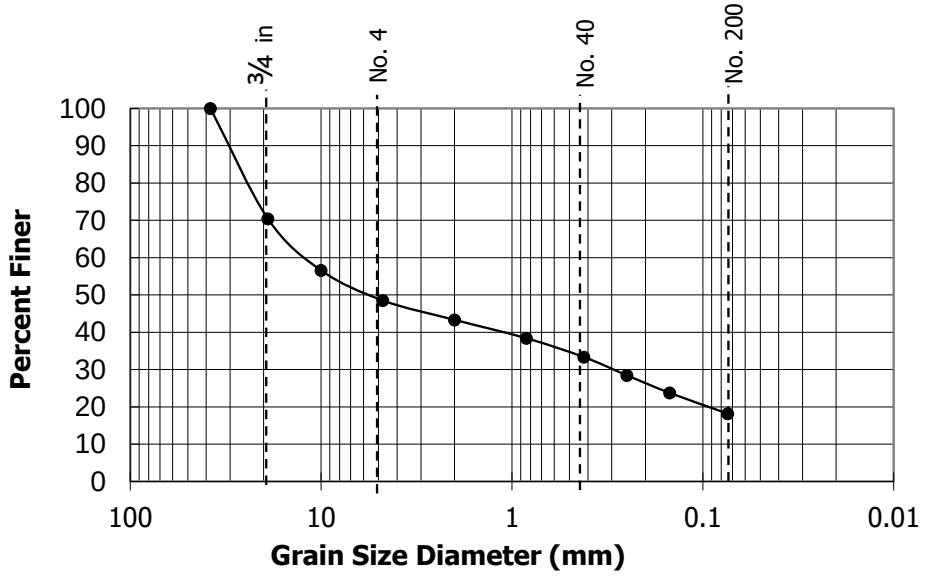
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-11	**Depth (Feet)**	6.0-8.0
Lab Order No.	4995-13	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**70**
3/8"	**57**
#4	**49**
#10	**43**
#20	**38**
#40	**33**
#60	**28**
#100	**24**
#200	**18**
Pan	**--**

USCS Group Symbol	USCS
USCS Group Name	**CLAYEY GRAVEL with sand**
Cu	**GC**
Cc	**---**
LL	**27**
PI	**7**
Gravel	**51.5**
Sand	**30.3**
Fines	**18.2**
AASHTO Classification	**A-2-4**
Color	**Dark Gray**

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

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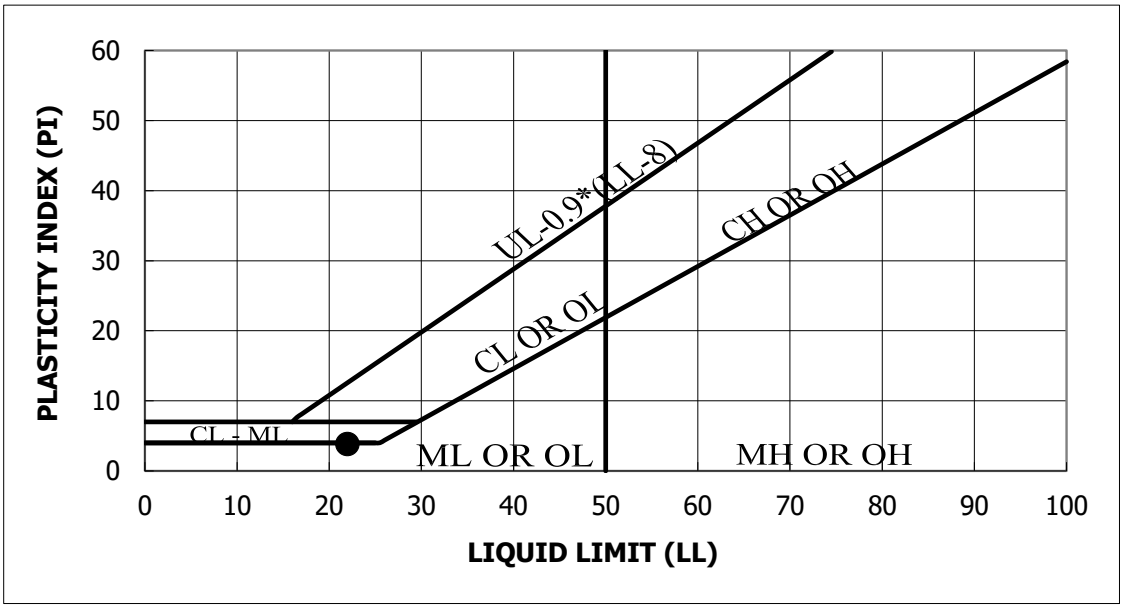
LIQUID AND PLASTIC LIMIT - ASTM D4318			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-13	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-14	**Date**	1/8/2020



Material Description	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
SILTY SAND with gravel	22	18	4	76.8	20.0	SM	10.6
Color	Dark Brown		AASHTO Classification			A-1-b	

Test Method: ASTM D 4318
Soil Classification by ASTM D2487 and AASHTO M 145

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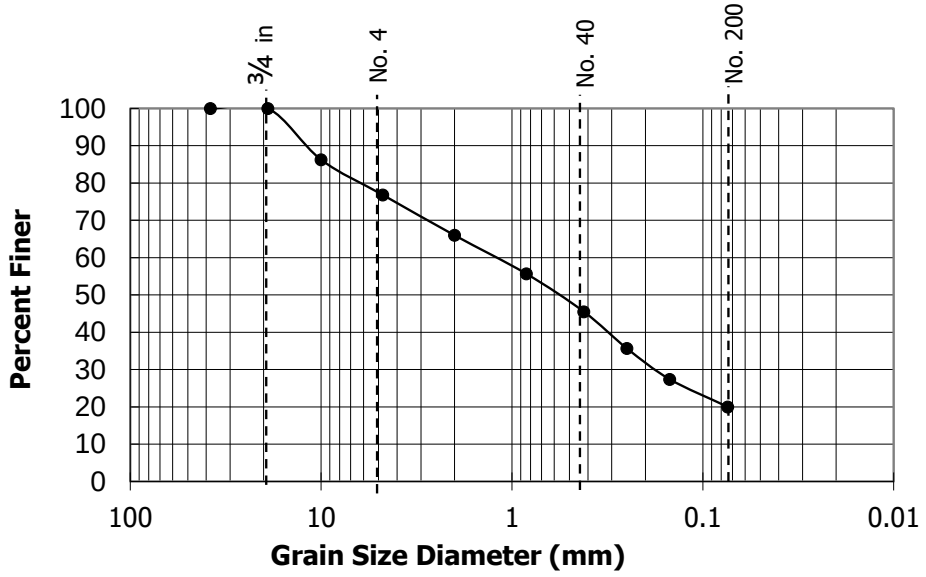
GRAIN SIZE ANALYSIS - ASTM D422			
Project No.	JD195203	**Project Name**	Training Camps Revitalization at West Point
Sample ID	TB-13	**Depth (Feet)**	0.0-2.0
Lab Order No.	4995-14	**Date**	1/8/2020



SIEVE	% Passing
1 ½ "	**100**
3/4"	**100**
3/8"	**86**
#4	**77**
#10	**66**
#20	**56**
#40	**46**
#60	**36**
#100	**27**
#200	**20**
Pan	**--**

USCS Group Symbol	**SM**
USCS Group Name	**SILTY SAND with gravel**
Cu	**---**
Cc	**---**
LL	**22**
PI	**4**
Gravel	**23.2**
Sand	**56.8**
Fines	**20.0**
AASHTO Classification	**A-1-b**
Color	**Dark Brown**

Test Method: ASTM D 422

Soil Classification by ASTM D2487 and AASHTO M 145

Reviewed by: DW

GeoConcepts Engineering, Inc.
A Terracon COMPANY

DRILLED CORE TEST REPORT (ASTM C42)

Project: Training Camps Revitalization at West Point
Client: Ewing Cole
Project No.: JD195203
Test Date: 12/30/2019
Test Time: 1:00pm

Core ID	Date Poured	Drilled Location	Date Drilled	Time Drilled	Drilled By	Length as Drilled (0.25")
1501		Elevated Concrete Pad	12/6/2019	8:00 AM	Uni-Tech	6.19
1502		Elevated Concrete Pad	12/6/2019	8:30 AM	Uni-Tech	6.06
1503		Elevated Concrete Pad	12/6/2019	9:15 AM	Uni-Tech	5.75
1504		Elevated Concrete Pad	12/6/2019	9:50 AM	Uni-Tech	5.88
1505		Elevated Concrete Pad	12/6/2019	10:20 AM	Uni-Tech	5.88
1506		Elevated Concrete Pad	12/6/2019	11:00 AM	Uni-Tech	5.94
1507		Elevated Concrete Pad	12/6/2019	12:30 PM	Uni-Tech	5.75
1508		Elevated Concrete Pad	12/6/2019	1:10 AM	Uni-Tech	6.00

Core ID	Length Before Capping (0.05")	Length After Capping (0.05")	Avg. Diameter (0.01")	Area (0.1 $in.^2$)	L/D	Load (lbs.)	Compressive Strength Uncorrected (1 psi)	Correction Factor	Compressive Strength Corrected (10 psi)	Fracture Type
1501	3.09	3.33	1.69	2.2	1.97	11280	5127	1.00	5130	2
1502	3.05	3.24	1.69	2.2	1.92	10910	4959	1.00	4960	2
1503	3.19	3.34	1.69	2.2	1.98	8980	4082	1.00	4080	2
1504	3.26	3.38	1.69	2.2	2.00	13850	6295	1.00	6300	2
1505	3.14	3.35	1.69	2.2	1.98	8100	3682	1.00	3680	4
1506	3.03	3.17	1.69	2.2	1.88	10680	4855	1.00	4860	2
1507	3.18	3.31	1.69	2.2	1.96	6840	3109	1.00	3110	4
1508	3.11	3.29	1.69	2.2	1.95	6770	3077	1.00	3080	2

Notes:
DW

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DRILLED CORE TEST REPORT (ASTM C42)

Project: Training Camps Revitalization at West Point
Client: Ewing Cole
Project No.: JD195203
Test Date: 12/30/2019
Test Time: 1:30pm

Core ID	Date Poured	Drilled Location	Date Drilled	Time Drilled	Drilled By	Length as Drilled (0.25")
1509		Elevated Concrete Pad	12/6/2019	1:50 PM	Uni-Tech	5.25
1510		Elevated Concrete Pad	12/6/2019	2:15 PM	Uni-Tech	5.88
1511		Elevated Concrete Pad	12/6/2019	2:40 PM	Uni-Tech	5.32
1512		Elevated Concrete Pad	12/6/2019	3:25 PM	Uni-Tech	5.50
1513		Elevated Concrete Pad	12/4/2019	7:50 AM	Uni-Tech	5.13
1514		Elevated Concrete Pad	12/4/2019	8:25 AM	Uni-Tech	3.88
1515		Elevated Concrete Pad	12/4/2019	9:30 AM	Uni-Tech	6.69
1516		Elevated Concrete Pad	12/4/2019	10:10 AM	Uni-Tech	5.25

Core ID	Length Before Capping (0.05")	Length After Capping (0.05")	Avg. Diameter (0.01")	Area (0.1 $in.^2$)	L/D	Load (lbs.)	Compressive Strength Uncorrected (1 psi)	Correction Factor	Compressive Strength Corrected (10 psi)	Fracture Type
1509	3.12	3.30	1.69	2.2	1.95	4150	1886	1.00	1890	4
1510	3.16	3.25	1.69	2.2	1.92	13630	6195	1.00	6200	2
1511	3.06	3.24	1.69	2.2	1.92	15730	7150	1.00	7150	2
1512	3.06	3.13	1.69	2.2	1.85	10460	4755	1.00	4760	5
1513	2.90	3.05	1.69	2.2	1.80	4950	2250	1.00	2250	4
1514	3.11	3.30	1.69	2.2	1.95	8470	3850	1.00	3850	2
1515	3.21	3.38	1.69	2.2	2.00	11010	5005	1.00	5010	2
1516	3.19	3.38	1.69	2.2	2.00	10870	4941	1.00	4940	2

Notes:
DW
Re-mat located within sample 1513.

GeoConcepts Engineering, Inc.
A Terracon COMPANY

DRILLED CORE TEST REPORT (ASTM C42)

Project: Training Camps Revitalization at West Point
Client: Ewing Cole
Project No.: JD195203
Test Date: 12/30/2019
Test Time: 1:30 AM

Core ID	Date Poured	Drilled Location	Date Drilled	Time Drilled	Drilled By	Length as Drilled (0.25")
1517		Elevated Concrete Pad	12/4/2019	10:50 AM	Uni-Tech	5.25
1518		Elevated Concrete Pad	12/4/2019	11:20 AM	Uni-Tech	4.75
1519		Elevated Concrete Pad	12/4/2019	11:50 AM	Uni-Tech	4.94
1520		Elevated Concrete Pad	12/4/2019	1:35 PM	Uni-Tech	4.75
1521		Elevated Concrete Pad	12/4/2019	2:15 PM	Uni-Tech	5.19
1522		Elevated Concrete Pad	12/4/2019	3:00 PM	Uni-Tech	5.00
1523		Elevated Concrete Pad	12/4/2019	3:25 PM	Uni-Tech	6.50
1524		Elevated Concrete Pad	12/4/2019	3:50 PM	Uni-Tech	6.25

Core ID	Length Before Capping (0.05")	Length After Capping (0.05")	Avg. Diameter (0.01")	Area (0.1 $in.^2$)	L/D	Load (lbs.)	Compressive Strength Uncorrected (1 psi)	Correction Factor	Compressive Strength Corrected (10 psi)	Fracture Type
1517	3.12	3.27	1.69	2.2	1.93	7570	3441	1.00	3440	2
1518	3.13	3.22	1.69	2.2	1.91	19820	9009	1.00	9010	2
1519	3.21	3.37	1.69	2.2	1.99	11280	5127	1.00	5130	2
1520	3.16	3.36	1.69	2.2	1.99	11250	5114	1.00	5110	2
1521	3.05	3.24	1.69	2.2	1.92	7270	3305	1.00	3310	2
1522	3.21	3.38	1.69	2.2	2.00	9930	4514	1.00	4510	2
1523	3.14	3.37	1.69	2.2	1.99	7030	3195	1.00	3200	2
1524	3.18	3.37	1.69	2.2	1.99	6560	2982	1.00	2980	2

Notes:
DW

GeoConcepts Engineering, Inc.
A Terracon COMPANY

DRILLED CORE TEST REPORT (ASTM C42)

Project: Training Camps Revitalization at West Point
Client: Ewing Cole
Project No.: JD195203
Test Date: 12/30/2019
Test Time: 2:00pm

Core ID	Date Poured	Drilled Location	Date Drilled	Time Drilled	Drilled By	Length as Drilled (0.25")
1525		Elevated Concrete Pad	12/5/2019	10:50 AM	Uni-Tech	5.13
1526		Elevated Concrete Pad	12/5/2019	11:20 AM	Uni-Tech	6.82
1611		Elevated Concrete Pad	12/5/2019	11:50 AM	Uni-Tech	5.50
1612		Elevated Concrete Pad	12/5/2019	1:35 PM	Uni-Tech	5.88
1613		Elevated Concrete Pad	12/5/2019	2:15 PM	Uni-Tech	5.75
1614		Elevated Concrete Pad	12/5/2019	3:00 PM	Uni-Tech	5.50
1615		Elevated Concrete Pad	12/5/2019	3:25 PM	Uni-Tech	5.75
1616		Elevated Concrete Pad	12/5/2019	3:50 PM	Uni-Tech	5.82

Core ID	Length Before Capping (0.05")	Length After Capping (0.05")	Avg. Diameter (0.01")	Area (0.1 $in.^2$)	L/D	Load (lbs.)	Compressive Strength Uncorrected (1 psi)	Correction Factor	Compressive Strength Corrected (10 psi)	Fracture Type
1525	3.11	3.32	1.69	2.2	1.96	9050	4114	1.00	4110	2
1526	3.22	3.37	1.69	2.2	1.99	9040	4109	1.00	4110	2
1611	3.06	3.21	1.69	2.2	1.90	10700	4864	1.00	4860	2
1612	3.05	3.15	1.69	2.2	1.86	7610	3459	1.00	3460	2
1613	3.08	3.21	1.69	2.2	1.90	12860	5845	1.00	5850	2
1614	3.10	3.26	1.69	2.2	1.93	6000	2727	1.00	2730	4
1615	3.06	3.14	1.69	2.2	1.86	12660	5755	1.00	5760	2
1616	3.13	3.30	1.69	2.2	1.95	10840	4927	1.00	4930	2

Notes:
DW

GeoConcepts Engineering, Inc.
A Terracon COMPANY

DRILLED CORE TEST REPORT (ASTM C42)

Project: Training Camps Revitalization at West Point
Client: Ewing Cole
Project No.: JD195203
Test Date: 12/30/2019
Test Time: 2:00pm

Core ID	Date Poured	Drilled Location	Date Drilled	Time Drilled	Drilled By	Length as Drilled (0.25")
1617		Elevated Concrete Pad	12/3/2019	9:25 AM	Uni-Tech	5.63
1618		Elevated Concrete Pad	12/3/2019	11:20 AM	Uni-Tech	5.38
1619		Elevated Concrete Pad	12/3/2019	11:50 AM	Uni-Tech	5.82
1620		Elevated Concrete Pad	12/3/2019	1:35 PM	Uni-Tech	5.50
1621		Elevated Concrete Pad	12/3/2019	2:15 PM	Uni-Tech	5.63
1624		Elevated Concrete Pad	12/3/2019	3:00 PM	Uni-Tech	5.75

Core ID	Length Before Capping (0.05")	Length After Capping (0.05")	Avg. Diameter (0.01")	Area (0.1 $in.^2$)	L/D	Load (lbs.)	Compressive Strength Uncorrected (1 psi)	Correction Factor	Compressive Strength Corrected (10 psi)	Fracture Type
1617	3.01	3.21	1.69	2.2	1.90	13800	6273	1.00	6270	2
1618	3.19	3.34	1.69	2.2	1.98	6680	3036	1.00	3040	4
1619	3.02	3.24	1.69	2.2	1.92	6390	2905	1.00	2910	4
1620	3.20	3.27	1.69	2.2	1.93	6930	3150	1.00	3150	4
1621	3.16	3.25	1.69	2.2	1.92	8390	3814	1.00	3810	2
1624	3.10	3.35	1.69	2.2	1.98	10790	4905	1.00	4910	2

Notes:
DW

Certificate of Laboratory Analysis

GeoConcepts Engineering, Inc.
Rachel Soper
19955 Highland Vista Dr., Suite 170
Ashburn, VA 20147

Report Number: **196379**
Date Received: 12/30/19 17:08
Date Reported: 01/08/20 14:00
Project Location: Revitalization of Camp Buckner

Client Sample No: **TB-1**
Sample Matrix: Soil
Sample Description: 0-5 ft
Lab Sample No.: 196379-01
Collection Date/Time: 12/13/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**2200**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **21**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**7.8**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**86**	mg/Kg	10	4	D	A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**19**	mg/Kg	20	4	D	A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**16**	%	N/A			A	01/07/20	JMP

Client Sample No: **TB-11**
Sample Matrix: Soil
Sample Description: 0-5 ft
Lab Sample No.: 196379-02
Collection Date/Time: 12/12/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**10000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **9**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**7.0**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**10**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**27**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**16**	%	N/A			A	01/07/20	JMP

Client Sample No: **TB-13**
Sample Matrix: Soil
Sample Description: 0-5 ft
Lab Sample No.: 196379-03
Collection Date/Time: 12/12/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**21000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **13**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**7.3**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**9.7**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**19**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**11**	%	N/A			A	01/07/20	JMP

Certificate of Laboratory Analysis

GeoConcepts Engineering, Inc.
Rachel Soper
19955 Highland Vista Dr., Suite 170
Ashburn, VA 20147

Report Number: **196379**
Date Received: 12/30/19 17:08
Date Reported: 01/08/20 14:00
Project Location: Revitalization of Camp Buckner

Client Sample No: **TB-2**
Sample Matrix: Soil
Sample Description: 0-5 ft
Lab Sample No.: 196379-04
Collection Date/Time: 12/11/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**47000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **20**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**6.4**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**12**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**18**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**13**	%	N/A			A	01/07/20	JMP

Client Sample No: **TB-4**
Sample Matrix: Soil
Sample Description: 0-5 ft
Lab Sample No.: 196379-05
Collection Date/Time: 12/12/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**16000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **26**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**7.3**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**8.6**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**13**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**20**	%	N/A			A	01/07/20	JMP

Client Sample No: **TB-5**
Sample Matrix: Soil
Sample Description: 0-5 ft
Lab Sample No.: 196379-06
Collection Date/Time: 12/12/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**10000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **26**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**6.6**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**11**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**22**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**24**	%	N/A			A	01/07/20	JMP

Certificate of Laboratory Analysis

GeoConcepts Engineering, Inc.
Rachel Soper
19955 Highland Vista Dr., Suite 170
Ashburn, VA 20147

Report Number: **196379**
Date Received: 12/30/19 17:08
Date Reported: 01/08/20 14:00
Project Location: Revitalization of Camp Buckner

Client Sample No: **TB-7**
Sample Matrix: Soil
Sample Description: 0-5 ft

Lab Sample No.: 196379-07
Collection Date/Time: 12/11/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**11000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **33**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**6.6**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**28**	mg/Kg	10	4	D	A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**84**	mg/Kg	20	4	D	A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**19**	%	N/A			A	01/07/20	JMP

Client Sample No: **TB-8**
Sample Matrix: Soil
Sample Description: 0-5 ft

Lab Sample No.: 196379-08
Collection Date/Time: 12/12/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**15000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **29**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**7.0**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**12**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**48**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**27**	%	N/A			A	01/07/20	JMP

Client Sample No: **TP-1**
Sample Matrix: Soil
Sample Description: 0-5 ft

Lab Sample No.: 196379-09
Collection Date/Time: 12/12/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**54000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **33**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**7.2**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**11**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**30**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**9.4**	%	N/A			A	01/07/20	JMP

Certificate of Laboratory Analysis

GeoConcepts Engineering, Inc.
Rachel Soper
19955 Highland Vista Dr., Suite 170
Ashburn, VA 20147

Report Number: **196379**
Date Received: 12/30/19 17:08
Date Reported: 01/08/20 14:00
Project Location: Revitalization of Camp Buckner

Client Sample No: **TP-5**
Sample Matrix: Soil
Sample Description: 0-5 ft

Lab Sample No.: 196379-10
Collection Date/Time: 12/12/19 00:00

Soil Corrosion Potential Tests

Parameter	Method	Result	Units	Limit	Dilution	Qualifier	Cont.	Analysis Date	Analyst
Resistivity	ASTM G187	**82000**	ohm-cm	N/A	1		A	01/07/20	JMP
Redox Potential	Electrode	+ **115**	mV	N/A	1		A	01/07/20	JMP
pH	CA-643	**5.5**	pH	N/A			A	01/07/20	JMP
Chloride (Water Soluble)	CA-422	**12**	mg/Kg	2.5	1		A	01/08/20	JMP
Sulfate (Water Soluble)	EPA 375.4	**36**	mg/Kg	5.0	1		A	01/08/20	JMP
Sulfide (Water Soluble)	EPA 376.2	< 1.2	mg/Kg	1.2	1	U	A	01/08/20	JMP
Moisture (Percent)	EPA	**28**	%	N/A			A	01/07/20	JMP

Certificate of Laboratory Analysis

GeoConcepts Engineering, Inc.
Rachel Soper
19955 Highland Vista Dr., Suite 170
Ashburn, VA 20147

Report Number: **196379**
Date Received: 12/30/19 17:08
Date Reported: 01/08/20 14:00
Project Location: Revitalization of Camp Buckner

Qualifier Codes:

U = Analyte was not detected at or above reporting limit
D = Analyte reported from a sample dilution

Sample Container Codes:

Plastic Bag	A	Soil

Notes:

Soil Results are reported on a wet weight basis (as received) unless stated as "dry".
The lab results reflect the measurement of the sample received only and may not be completely representative of the sampled site.
The Client has the responsibility for assessing risk and appropriate data interpretation of the results contained herein.
Laboratory reports issued are intended for the exclusive use by the Client and shall not be reproduced except in its entirety.
The chain-of-custody is a part of the entire analytical report.
Residual sample(s) will be disposed of in three months unless otherwise notified.

Laboratory Report Approved by:

J Pfaff 01/08/20

Laboratory Director, Chemistry Date

HP ENVIRONMENTAL, INC.
104 Elden St, Herndon, VA 20170 (703) 471-4200 Fax (703) 471-0020

Environmental Sample Chain-of-Custody Record

COC Reference Number:

Client: GeoConcepts Engineering, Inc.	TURN-AROUND TIME: *Routine* X
Address: 19955 Highland Vista Dr., Suite 170 Ashburn, VA 20147	Emergency Rush (24-48hr)
Contact: Rachel Soper Rachel.Soper@terracon.com	P.O./Job Number: JD195203
Phone: (571) 510-7860	SITE: Revitalization of Camp Buckner
Fax: (703) 726-8032	Sampled by: Jen Von Erden

Sample ID	Sample Depth (ft.)	Sample Date	Comp/ Grab	Matrix	Preserv. pH	# Bags	Tests Requested: pH	Chloride	Sulfides	Resistivity	Redox Potential	Sulfates	Moisture Content	Description/Comments
TB-1	0-5	12/13/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TB-11	0-5	12/12/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TB-13	0-5	12/12/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TB-2	0-5	12/11/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TB-4	0-5	12/12/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TB-5	0-5	12/12/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TB-7	0-5	12/11/2019	Grab	Soil		1	X	X	X	X	X	X	X	Corrosion series testing
TB-8	0-5	12/12/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TP-1	0-5	12/12/2019	Grab	Soil		1	X	X	X	X	X	X	X	
TP-5	0-5	12/12/2019	Grab	Soil		1	X	X	X	X	X	X	X	

Received Condition: 24°C	Relinquished By: Matthew Johnson	Date/Time: 12-30-19 1708	Received By:	Date/Time
Mode of Shipment: hand delivered	Relinquished By:	Date/Time	Received By Laboratory: Jme	Date/Time: 12/30/19 17:08
HPE Report Number: 196379				