DESCRIPTION OF LAND

Exhibit VIII. C.1.e

The existing soil conditions are consistent with the geological conditions of the area and the region. Some areas of the site have been overly compacted or structurally modified due to the nature of the existing development on site, such as the existing Ski Resort, the New York Renaissance Faire located on the south western portion of the site, and the airplane landing strip located on the northern portion of the tract. Preliminary geotechnical investigations show the existing air plane landing strip underlain by sediment greater than 65 feet below surface in the valley center to approximately 27.5 feet towards the valley's sides, gradually decreasing to about 2 feet at the west flank of the valley. (A Preliminary Investigation and Engineering Report may be found in Appendix VIII. C.1.e-1.) The sediments consist of glacial till and outwash, and fine-grained lake deposits, overlain by a thin (~5 foot) layer of man-made fill. The bedrock underlying the sediments consists of very hard, sound and of generally "good to excellent" rock quality metamorphic rock (granite gneiss). The man-made fill and lake deposits are deemed unsuitable for support of the proposed structure foundations.

In locations in which excavation for proposed structures will result in foundation elevations below layers of unsuitable material, shallow foundations may be used. In locations in which excavation for proposed structures will result in foundation elevations above or within layers of unsuitable material, deep foundation alternatives will be used. In locations in which roadway or other surface improvements are required, remediation efforts such as undercutting, or dynamic compaction will be used to improve unsuitable soils.

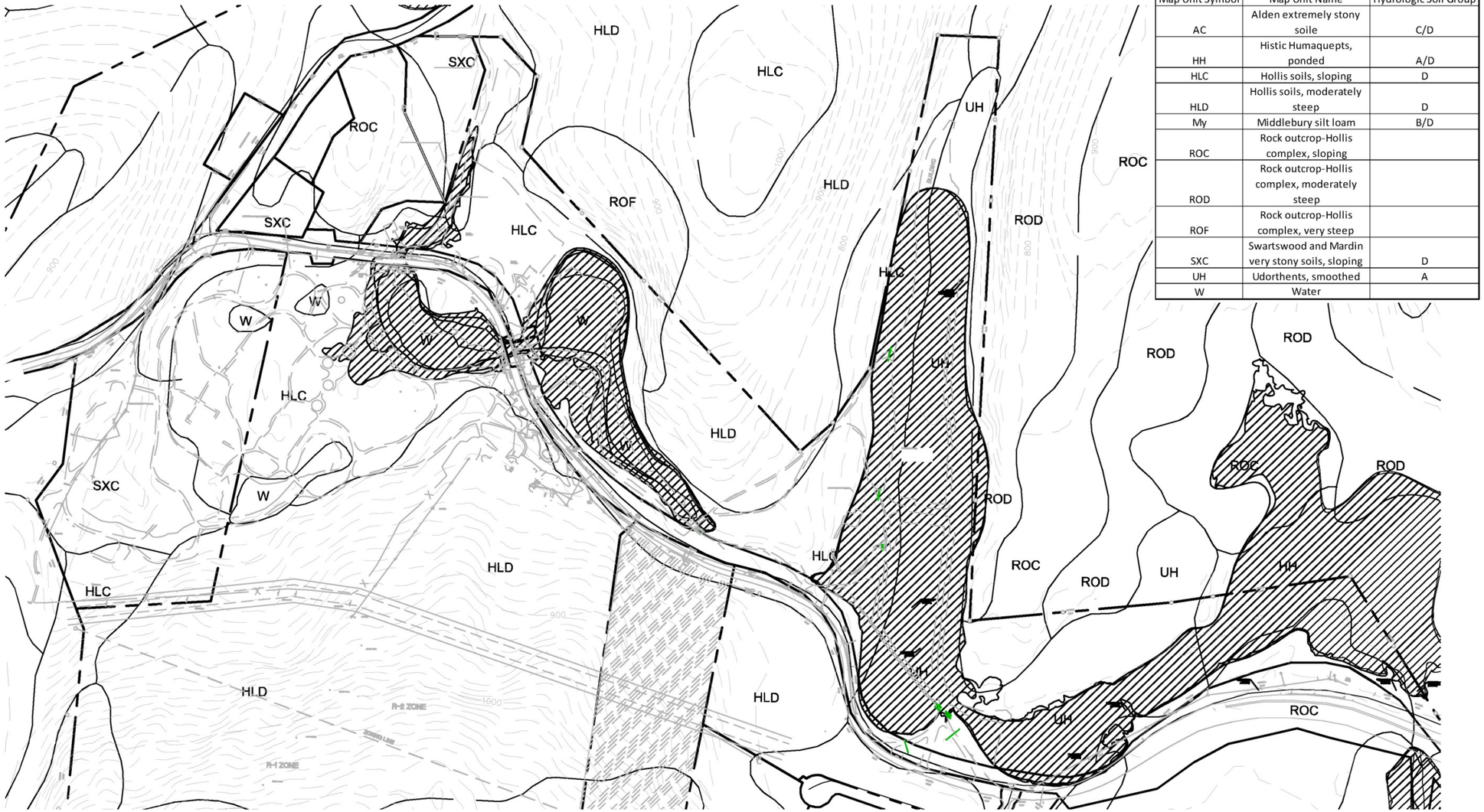
The Sterling Forest Resort project will excavate some areas of the poor soils identified in the geotechnical report likely lowering the groundwater elevation. (See Appendix VIII. C.1.e-2.) Proper remediation efforts to improve poor soils will be evaluated based on the needs of the development occurring in the area. The geotechnical report identifies groundwater elevations at or just below the existing surface grades of the site. Figure X contains the "Preliminary Geotechnical Investigation and Engineering Report for the Proposed Sterling Forest Resort," prepared by The Louis Berger Group Inc., dated May 2014.

The Sterling Forest Resort project site is primarily contained within a section of the existing floodplain that is mapped as zone AE and the mapped elevations are a result of backwater from a downstream bridge crossing on Indian Kill Creek. Because the existing floodplain is mapped as a result of backwater from this bridge, the proposed casino and garage footprint should not adversely affect the Federal Emergency Management Agency (FEMA) model. This associated reach of channel was modeled using a steady state HEC-2 model; therefore, flood storage within the valley was not used in the model and proposed grading that adjusts overbank storage volume should not adversely affect the proposed conditions flood elevations.

In addition to Sterling Forest Resort being developed within the existing floodplain, the proposed project also will modify the downstream bridge to address flood conditions and will adjust the available hydraulic conveyance of the proposed stream crossing to comply with local floodplain ordinance requirements and the National Floodplain Insurance Program (NFIP). These proposed improvements will be coordinated with the local floodplain administrator and FEMA.

Based on research, the last notable flooding in the area of the project occurred in August 2011. Flooding was the result of Hurricane Irene dropping approximately 12 inches of rain on the area. No specific information related to flooding within the limits of the project could be found.

Figure VIII. C.1.e-1. Existing Soil Map



Map Unit Symbol	Map Unit Name	Hydrologic Soil Group
AC	Alden extremely stony soile	C/D
HH	Histic Humaquepts, ponded	A/D
HLC	Hollis soils, sloping	D
HLD	Hollis soils, moderately steep	D
My	Middlebury silt loam	B/D
ROC	Rock outcrop-Hollis complex, sloping	
ROD	Rock outcrop-Hollis complex, moderately steep	
ROF	Rock outcrop-Hollis complex, very steep	
SXC	Swartswood and Mardin very stony soils, sloping	D
UH	Udorthents, smoothed	A
W	Water	

STERLING FOREST RESORTS
Tuxedo, NY

0 200' 400' 800' 1600'

EXISTING SOIL MAP
05.28.2014 Scale: 1"=400'
Kimley»Horn of New York, P.C.

Figure VIII. C.1.e-2a. FEMA Flood Insurance Rate Maps

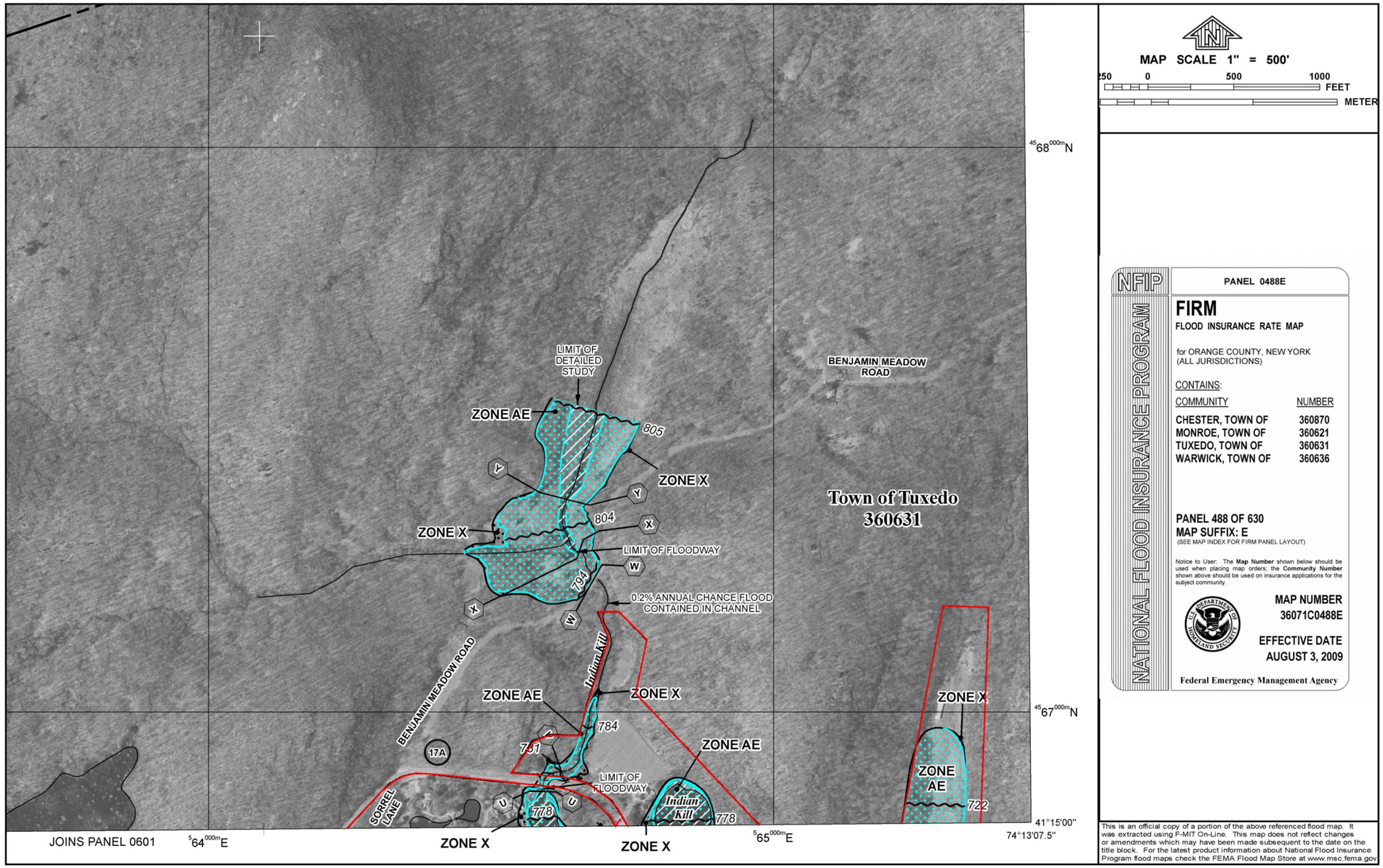
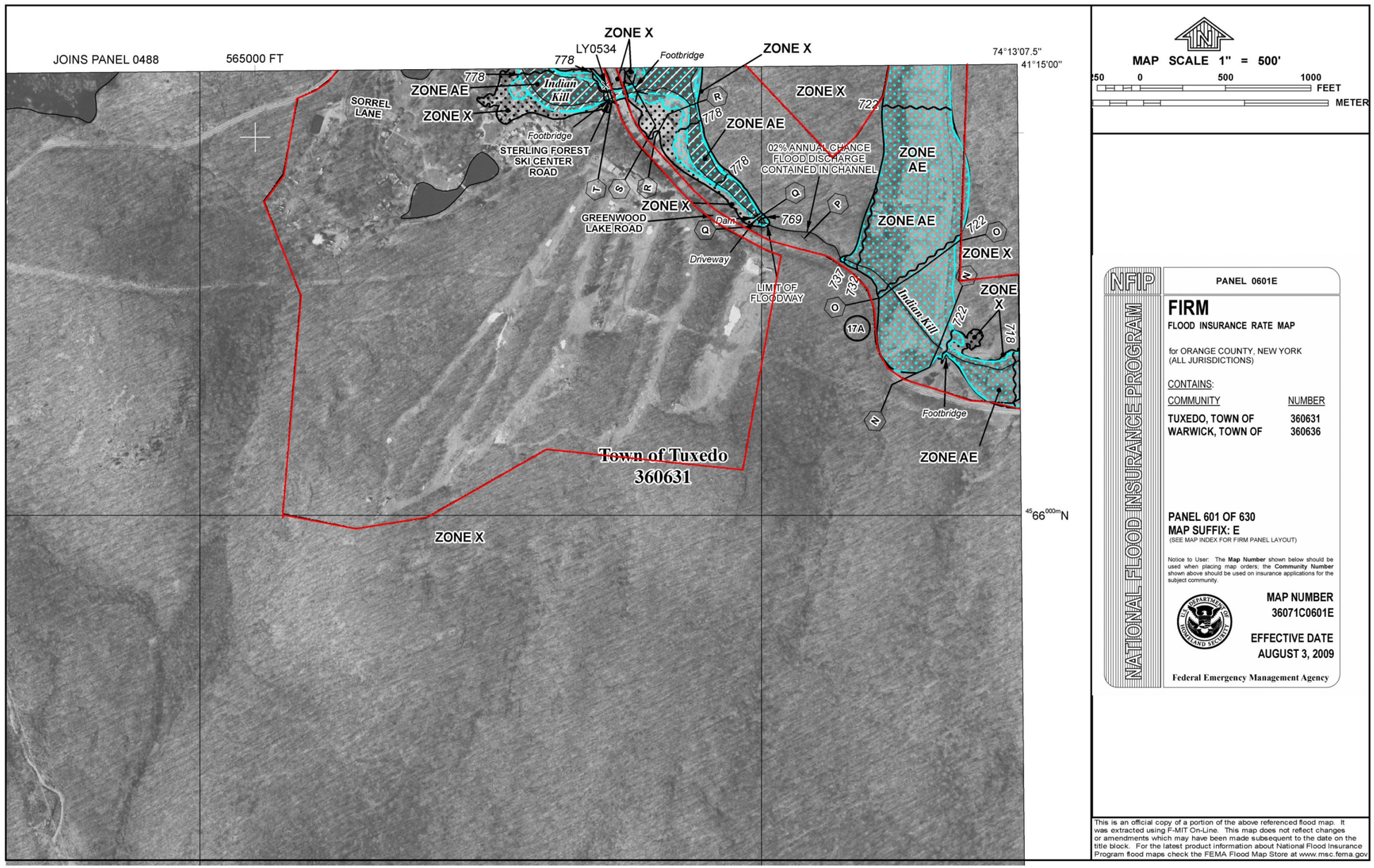


Figure VIII. C.1.e-2b. FEMA Flood Insurance Rate Maps



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0601E

FIRM

FLOOD INSURANCE RATE MAP

for ORANGE COUNTY, NEW YORK
(ALL JURISDICTIONS)

CONTAINS:

COMMUNITY	NUMBER
TUXEDO, TOWN OF	360631
WARWICK, TOWN OF	360636

PANEL 601 OF 630
MAP SUFFIX: E
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

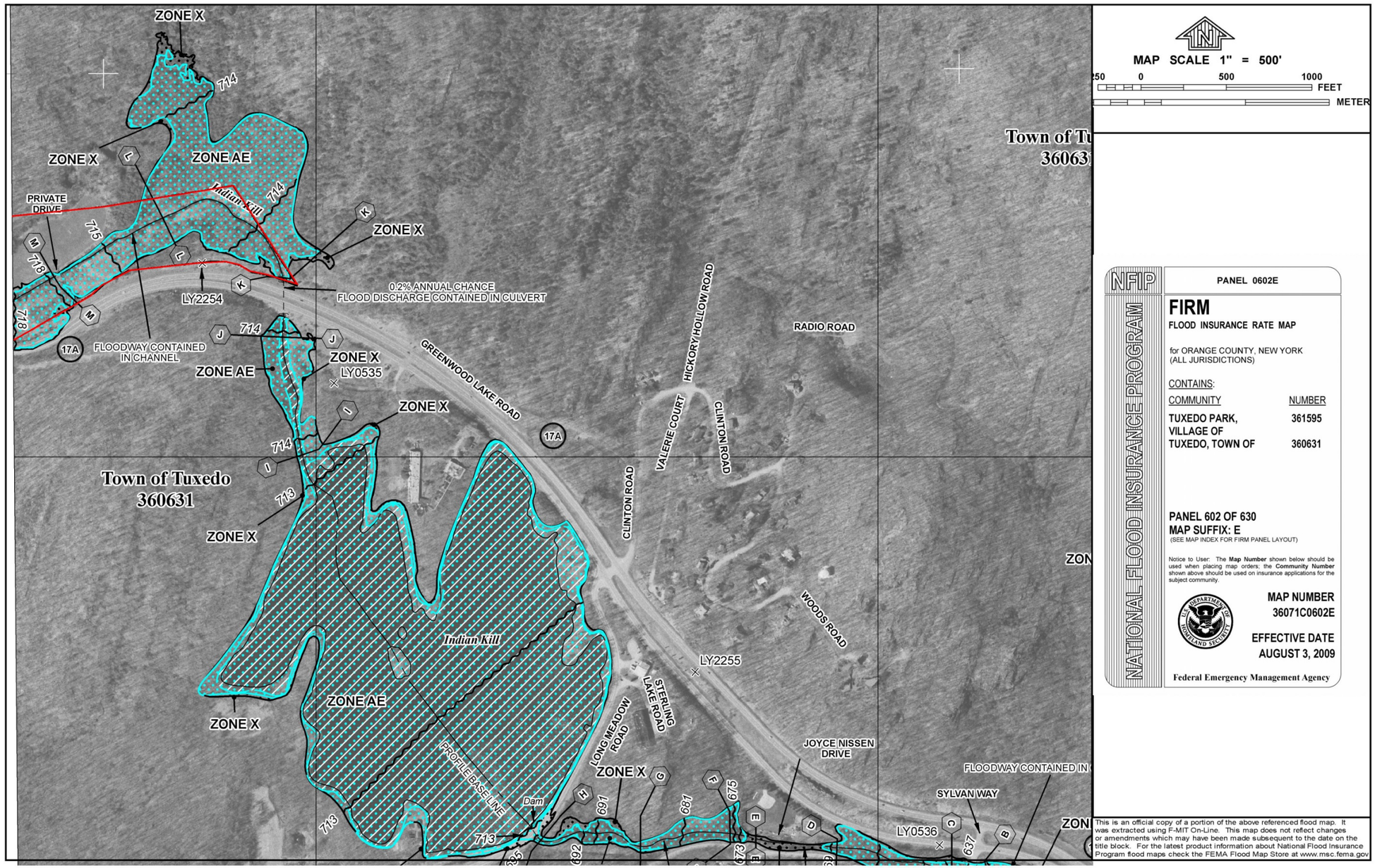
MAP NUMBER
36071C0601E

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Figure VIII. C.1.e-2c. FEMA Flood Insurance Rate Maps



DESCRIPTION OF LAND

APPENDIX VIII. C.1.e-1. PRELIMINARY GEOTECHNICAL REPORT

Prepared for

Alesund I LLC
and
Cleary Gottlieb Steen & Hamilton LLP

PRELIMINARY GEOTECHNICAL INVESTIGATION AND ENGINEERING REPORT FOR THE PROPOSED STERLING FOREST RESORT TUXEDO, ORANGE COUNTY, NEW YORK

Prepared by:

THE Louis Berger Group, INC.

412 Mt. Kemble Avenue
PO Box 1946
Morristown, New Jersey 07962-1946

May, 2014

SEALS PAGE

Name:	Preliminary Geotechnical Investigation and Engineering Report for the proposed Sterling Forest Resort.
Location:	Tuxedo, Orange County, New York
Dated:	May 13, 2014
Prepared for:	Alesund I LLC and Cleary Gottlieb Steen & Hamilton, LLP, New York
Prepared by:	The Louis Berger Group, Inc.

GEOTECHNICAL ENGINEER

Dincer Egin, PhD, PE
The Louis Berger Group, Inc.

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EXECUTIVE SUMMARY

Alesund I LLC & Cleary Gottlieb Steen & Hamilton, LLP has retained the Louis Berger Group, Inc. (Louis Berger) to conduct a preliminary geotechnical investigation and prepare a preliminary geotechnical investigation report to assess the development potential at the Sterling Forest Resort located in the Town of Tuxedo, Orange County, New York. This report presents the results of the preliminary geotechnical investigation and engineering study, evaluations of the site and foundation systems, and geotechnical related recommendations for the proposed development.

The proposed site is located about 4 miles northwest of Tuxedo Village in Orange Country, New York. The general development area is about 50 acres and will likely consist of the construction of a 5-story Resort World Grand Hotel structure, a 7-story parking garage, several surface parking structures and ponds, the renovations, functional improvements/changes of the existing buildings, site access roads, and the installation of utilities.

The project site is located within a north-south trending narrow glacial valley; approximately 2,500 feet in length and 300 feet wide. The valley is at approximately 720 foot above sea level elevation and is situated between two steep ridges that are at approximately 900 foot elevation. To assess the development potential of the site, a preliminary subsurface exploration program was conducted between April 15 and May 7, 2014. The program consisted of four (4) exploration borings (drilled between 8 and 65 feet below the existing ground surface), temporary monitoring well installation, and collection of engineering geologic data within the proposed development area, Dynamic Cone Penetration Testing within the surface parking areas, and laboratory testing on collected samples. To monitor groundwater, five temporary monitoring wells were installed throughout the site area.

The thickness of the valley sediments varies between greater than 65 feet below surface in the valley center to approximately 27.5 feet towards the valley's sides, gradually decreasing to about 2 feet at the west flank of the valley. The sediments consist of glacial till and outwash, and fine-grained lake deposits, overlain by a thin, (~5 ft.) layer of man-made fill. The bedrock underlying the sediments consists of very hard, sound and of generally "good to excellent" rock quality metamorphic rock (granite gneiss). No visual signs of contamination were observed during drilling. The valley sides have slopes between 10 and 20 degrees and contain gravelly silt and sandy soils beneath an approximate 6-inch layer of highly decomposed plant material with abundant boulders with diameters between 3 and 30 feet below the existing grade. At the southern end of the valley, groundwater in overburden was encountered at 0.10 feet below existing grade.

Based on the findings from this investigation, the general foundation conditions for the proposed development (in terms of soil/structure interaction) were reviewed and the alternate methods for foundations for the proposed structures were evaluated. It was determined that the upper fill (Stratum 1) and the underlying soft to medium silt (Stratum 2) are not considered to be suitable bearing strata in accordance with the New York State Building Code, and therefore cannot be relied upon to support the anticipated foundations because of excessive total and differential settlements. For the preparation of development plans, feasibility, and conceptual design studies both shallow foundation system after ground improvement, and deep foundation systems were evaluated and both found to be feasible depending on the final development plans. As discussed in detail in Section 4.2, because of shallow groundwater and likely required rock excavations, construction of below grade structures (i.e. basement) is not recommended due to high initial and life cycle costs. If no basement structures are sought, this study recommends the structures to be supported on timber piled foundation systems (discussed in Section 4.2.3).

For at grade parking and access road, dynamic cone penetration testing (DCPT) showed highly variable surface compactness. Therefore, to provide a uniform subgrade for the satisfactory performance a site specific subgrade preparation was recommended in Section 4.3 of this report. For the site access road and pavement, a CBR value of 10 for a flexible pavement design can be assigned following the preparation of the subgrade as described above. Based on the assumed traffic data, the following pavement structure is recommended:

- 1½-inch Asphalt Concrete Surface Course
- Six (6) inch crushed stone drainage layer
- Four (4)-inch Aggregate Base Course, over compacted subgrade as suggested above.

A limited number of chemical analyses suggested that the potential for sulfate and chloride attack on concrete and steel elements is negligible. Therefore, Type IM (MS), I (MS) P, (MS) or Type II Portland cement can be used in all foundation concrete and concrete in contact with soil and water. To mitigate against long-term corrosion of uncoated ferrous metals (such as reinforcing bars, steel pipes, or other steel members of the structure in contact with the soil), a minimal cover for reinforcement steel in accordance with ACI requirements should be observed. Steel and other metallic pipes in contact with soil should also be protected in accordance with the manufacturer's recommendations.

Seismic parameters used in the design should be based on the Building Code of New York State, according to which Site Class D parameters can be used in the preliminary design. Unless improved by DDC, or excavated and removed, the site has a potential for liquefaction in a seismic event.

Borehole data and the engineering geological map of studies indicate the site does not have a potential for a major geological hazard, like landslides and or slope failures. In a major storm event, however, the site may have a flash flood potential event due to relatively shallow bedrock with relatively poor infiltration characteristics of the soils and the bedrock. A drainage design, including stream training must be prepared by a licensed hydrologist/drainage engineer during preparation of the site development plans.

1.0 INTRODUCTION

Alesund I LLC & Cleary Gottlieb Steen & Hamilton, LLP, has retained the Louis Berger Group, Inc. (Louis Berger) to conduct a preliminary geotechnical investigation and prepare a preliminary geotechnical investigation report for the development potential at the Sterling Forest Resort located in the Town of Tuxedo, Orange County, New York.

The project site is located along the (NY) State Road 17A, about 4 miles northwest of the village of Tuxedo, about 2 miles west of the Interstate 87 (New York Thruway), and about 2,500 feet northeast of the skiing resort, Tuxedo Ridge (Figure 1). The general development area is about 50 acres. The conceptual development plans indicate the site development will consist of the construction of a 5-story Resort World Grand Hotel structure, a 7-story parking garage, and several surface parking structures, and ponds, the renovations, functional improvements/changes of the existing buildings, site access roads, and the installation of utilities.

Louis Berger performed a preliminary geotechnical investigation that consisted of the following:

- Geotechnical borings, in-situ tests, and rock coring,
- Soil and bedrock sampling,
- Installation of groundwater temporary monitoring wells,
- Assessment of the infiltration potential of the soils (i.e. field permeability testing)
- Engineering geological mapping of the development area,
- Dynamic Cone Penetration Testing (DCPT), and
- Geotechnical laboratory testing.

These data were obtained to characterize subsurface conditions and for providing data for possible foundation systems for the proposed buildings, and geotechnical related construction recommendations.

2.0 SUBSURFACE EXPLORATION PROGRAM

A subsurface exploration program consisting of four (4) exploration borings were drilled between 8 and 65 feet below the existing ground surface. Borings were drilled on April 19, April 27, and April 28, 2014, and DCPT were conducted between April 15 and 18, 2014. Boring and DCPT locations were selected by Louis Berger and were within the landing strip area adjacent to the wetlands, where the proposed development is located (Figure 2). The investigation was conducted by a drilling contractor retained by Louis Berger (Allied Drilling).

2.1 Field Exploration Program

The field exploration program consisted of four (4), 4-inch diameter borings drilled to depths between 8 and 65 feet bgs. Drilling was conducted using CME-55 and B-61 Mobile Drill rigs using mud rotary methods with a 4" diameter drill bit. To minimize caving within the borehole during drilling, a mud circulation mixture composed of bentonite and drilling fluid was used and temporary casing was installed to depths between 5 and 40 feet bgs (depending on water level and stratigraphy). Of the four boreholes, two were drilled into rock, one was terminated at the top of bedrock, and one was terminated in very dense glacial till above bedrock. Borehole locations and total depths are displayed in Table 1. After drilling, deep or shallow piezometers were installed in open boreholes or the borehole was backfilled using boring cuttings and clean sand (if a well was not installed). Soil samples were obtained using techniques and equipment in general accordance with the American Society for Testing and Materials (ASTM) Standard Specifications. Representative soil samples

from the borings were collected using a 1.4-inch inner diameter (I.D.) split-spoon Standard Penetration Test (SPT) sampler driven with a 140-pound hammer via a rope and cathead (i.e. donut) from a 30-inch drop. Blow counts were recorded in accordance with ASTM D1586 to determine the SPT resistance "N" values. Representative soil samples (SPT) were collected continuously from ground surface to 12 feet below ground surface, and at five foot intervals thereafter (or at 5 foot intervals for the entire length of boring, as in the case of boring B-3). The recovered split-spoon soil samples were visually classified and placed in glass jars, which were labeled with the project name, boring number, sample number, depth, and SPT blow counts. Samples were visually inspected for signs of contamination and any possible contaminate were noted in boring logs.

The below table shows the boring location coordinates, elevation, and total drilling depth.

Table 1: Borehole information

Boring	Date Completed	X Coordinate	Y Coordinate	Approximate Elevation (ft. MSL)	Total Drilling Depth (feet)
B1	4/19/2014	530795.546656	455183.175180	723	41.5
B2	4/28/2014	530860.262828	454400.760430	717	65.0
B3	4/27.2014	530751.854932	454887.770489	720	31.0
B4	4/28/2013	530629.597265	545650.078098	725	8.0

Dynamic cone penetration tests (DCPT) were conducted to assess the compactness/consistency of the near surface soils in the seven proposed surface parking and access road areas (Figure 2). Tests were conducted using a 17.6 lb. hammer dropped from 22.6 inches to drive 0.63 in diameter rods connected to a replaceable 60 degrees pointed tip (cone). Tests were conducted to an average depth of four feet (48 inches). The amount of penetration was measured after each blow and recorded as the Dynamic Cone Penetration Index (PI). Stiffer or stronger soils require a higher number of blows or drop the hammer to achieve a given penetration. Based on the review of PI values, soil strength estimate vs. depth, pavement design parameters and a typical pavement section were developed.

To observe groundwater levels in the overburden deposits and bedrock, temporary standpipe piezometers were installed at selected boreholes throughout the proposed development site (i.e., the narrow valley). Depth to groundwater was measured upon completion of the borings and periodically throughout the investigation. The table 2 in Appendix C displays locations temporary well construction information, including the depth and soil/rock composition of the screened interval.

2.2 Laboratory Testing

Soil samples collected from test borings were sent to a geotechnical laboratory to determine their index classification, and corrosivity related preliminary chemical characteristics. The following laboratory tests were conducted:

- Grain size distribution (sieve analysis) in accordance with ASTM D421, D422;
- Soluble sulfate determination in accordance with EPA 375.2;
- Chloride determination in accordance with EPA 325
- pH determinations in soil in accordance with ASTM D 2976

The geotechnical laboratory test results are presented in Appendix B.

3.0 EXISTING SITE CONDITIONS

The project site is located within a narrow north-south trending glacial valley in Southeast New York, along the NY State Road 17A, about 4 miles northwest of the village of Tuxedo, and about 2 miles west of the Interstate 87 (New York Thruway). The valley is approximately 2,500 feet in length and 300 feet wide. The valley floor elevation is approximately 724 feet above mean sea-level (alms) and is situated between ridges of approximately 900 foot elevation on either side. The valley is of glacial origin. The sediments that occupy the valley above bedrock consist of glacial till and outwash and fine-grained lake deposits (overlain by man-made fill). The depth to bedrock beneath the valley sediment varies between greater than 65 feet below surface (in the valley center) to approximately 27.5 feet towards the valley's side, and eventually less than two feet at the valley flanks. The bedrock is granitic in composition (i.e. gneiss), hard, sound and of generally "good to excellent" rock quality. Bedrock exposures can be found on steep slopes on the eastern valley side and in fresh road cuts on Route 17A, west and east of the site. Historic aerial photographs and USGS topographic maps of the area indicate that this narrow valley was once occupied by wetlands and was filled for the creation of a small aircraft landing strip (runway).

The valley slopes are heavily vegetated with abundant glacial erratic boulders that range in size between 3 and 30 feet in diameter. The valley walls are strongly sloping, approximately 20 degrees on the east side and approximately 10 degrees on the west side. Here the sloping soils that underlay an approximately 6-inch layer of decomposed vegetation consist of yellowish brown gravelly silt and sand (locally known as Hollis Group Soils).

3.1 Subsurface Conditions

The following section describes the geologic units encountered during this investigation, based on literature and geotechnical boring data.

3.1.1 General Geologic Setting

The project area is located within the Hudson Highlands region of Southern New York State. The province is part of a large expanse of ridge and valley system that is characterized by north-northeast trending ridges and lowlands. Bedrock in the area consists of igneous and metamorphic basement rocks of the Grenville Orogeny. The Grenville Orogen was a major mountain building event involving most of the Earth's landmasses, between ~900 and 1,300 Ma (Li et al 2008). Greenville rocks still present today are basement complexes that occupied the core of the mountain range, crystallized at great depths, and experienced high-grade metamorphism during mountain building. The bedrock within the area is mapped as Quartzofeldspathic gneiss (Gates, 2004). Original crystallization ages of these rocks range from 1,160 to 1,220 Ma and experienced peak granulite facies metamorphism at approximately 1,150 – 1,050 Ma (Gates et al 2001). The rocks have a strong metamorphic fabric defined by alignment of platy elongated minerals (micas and amphiboles) that are embedded in a strongly foliated quartz-feldspar matrix.

The Ridge and Valley province and Orange County in general, was greatly affected by the Wisconsinian Glaciation (approximately 22,000 years ago). Glacial events left a sequence of unconsolidated till, outwash and lacustrine deposits over much of the region's bedrock. The depth of these deposits range from a few feet to over 300 feet. The thickness of the glacial deposits within the development area is between 27 to greater than 65 feet. Glacial sediments include unconsolidated well-sorted till, coarse granular outwash from glacial streams, and fine-grained sediment likely deposited from temporary shallow lakes or kettles. The likely sequence of events resulting in this stratigraphy involve: 1) the glacial till was deposited from the receding ice sheet. The till is seen at depths between 42 and 65 feet bgs in the center of the valley and is not present in borings near the valley sides. 2) Stratified sand and gravel were deposited by meltwater streams (glacial outwash). 3) Temporary shallow lakes deposit glacial-lake sediment. Glacial-lake sediment is seen between 5 and 10 feet in the center of the valley and between 6 to 20 feet towards the valley walls, where is it is more

sandy.

3.1.2 Subsurface Conditions Based on Borehole Data

Based on the information collected during this investigation, there are generally four (4) strata with different geotechnical characteristics underlying an approximate two (2) to five (5) foot layer of pavement and crushed stone aggregate. No visual signs of contamination were observed during drilling. From top to bottom, these strata are as follows:

1. Fill
2. Glacial-lake Sediment
3. Glacial outwash and till
4. Bedrock Granite Gneiss

Stratum 1 **Fill and Probable Fill.** A layer of fill probable fill was found on the surface to depths between 4 and 5.5 feet below ground surface. The fill consists of asphalt, pieces of asphalt, gravel aggregate and gravelly sand. Average SPT N-resistance values range between 23 and 47; suggesting some degree of compaction during its placement.

Stratum 2 **Glacial lake sediment.** A layer of fine-grained gray to grayish black soil is present under the fill stratum. The stratum generally displays a coarsening upwards sequences of Silt that transitions into a sandy silt, or silty sand in boring near the valley wall (possible kame deposit). The thickness of this stratum ranges between 10 and 14 feet. SPT N-resistance values were between 11 and 19 blows/foot, suggesting the soil is medium stiff. The top of this Stratum was identified at the following depths/elevations:

Boring	Top of Stratum 2 (ft. below surface, elevation)
B-1	4.0’ (+719)
B-2	5.0’ (+712)
B-3	5.5’ (+714)
B-4	1.0’ (+724)

Stratum 3 **Glacial Outwash and Till.** Underlying the glacial lake sediment is a layer of glacial outwash and till. The stratum consists of stratified layers of gravel, sandy gravel, and sand. The sediment is gray to grayish brown in color. The thickness of this stratum ranges between 11 and 27 feet. SPT N-values are between 27 and 60 blows/foot and generally increase with depth; suggesting this sediment is dense to very dense. The stratum is very dense with large boulders at depths greater than 40 feet below ground surface in the center of the valley. The top of this Stratum was identified at the following depths/elevations:

Boring	Top of Stratum 3 (ft. below surface, elevation)
B-1	15’ (+708)
B-2	15’ (+702)
B-3	20’ (+700)
B-4	not present

Stratum 4 **Bedrock Granite Gneiss.** Underlying the glacial outwash and till is bedrock gneiss. The rock is very hard, sound and fresh. The depth to bedrock increases from north to south and is greatest in the center portions of the valley. Depth to

bedrock ranges from two (2) feet at the valley flanks to greater than 65 feet in the valley center and between 27 and 32 feet toward the side of the valley. One boring was drilled on the valley's western side and showed bedrock to be 4 feet below surface. All rock core samples recovered display the same similar characteristics. The rock is gray in color with a strong gneissocity defined by alignment of mafic minerals in a quartz-feldspar matrix. When present, joints are moderately to widely spaced and are tight, with less than 1/10" openings with no filling or mineral alteration. Rock Quality Designation (RQD) values ranged from 80% to 100% and total core recovery values were between 90 to 100%. The top of the bedrock was identified at the following depths/elevations:

Boring	Top of Stratum 4 (ft. below surface, elevation)
B-1	27.5' (+695)
B-2	>65' (<+652)
B-3	31.0' (+689)
B-4	3.0' (+722)

3.2 Groundwater

Regional groundwater is expected to flow towards the Ramapo River, located approximately 2 miles east of the Site. Locally, groundwater at the site, as indicated from the groundwater head measurements in the well couplets (May 1 and May 6, 2014), exhibits an upward groundwater flow gradient suggesting groundwater discharge into the narrow valley fill deposits. The horizontal groundwater gradient or groundwater flow direction in the overburden deposits within the valley is north to south. Shallow and deep groundwater discharges to the streams and wetlands that bound the proposed development site.

Groundwater levels were determined during drilling as the first occurrence of saturated soils seen in the center of the split spoon sampler. These elevations were between 12 and 15 feet below ground surface in granular soils below fined grained glacial lake stratum. Groundwater encountered during drilling can be found in the boring logs in Appendix A. Post drilling groundwater elevations were seen to recover to depths near or at ground surface to approximately 3 feet below surface. Groundwater elevations were monitored in five (5) installed temporary piezometers (installed at boring locations B-1, B-2, and B-3), including deep and shallow well couplets (MW-1 and MW-2; MW-4 and MW-5) installed at boring locations B-1 and B-2 to obtain groundwater vertical head gradients.

Temporary well design consisted of 5 to 14 feet of slotted PVC installed in the overburden wells or in bedrock. Clean sands were used as filter pack around the PVC to depths ~ 2 feet above the top of screen. A 2-5 foot thick bentonite seal was inserted above the sand and soil cutting/bentonite slurry was placed on top of the seal. A protective steel cover covered and protected the PVC pipe exposed at the surface and was cemented in place. Well construction information is presented in Table 2, and in Appendix C. (Appendix C).

Groundwater observed during drilling and post-drilling is presented in the table 3, below. Groundwater Potentiometric Surface Map of the Overburden is presented in Figure 3.

Table 3: Groundwater Measurements

Groundwater Measurements				Remarks
Date	**Temporary**	**Hydraulic Head**	**Hydraulic Head**	

	Monitoring Well	(feet below existing grade)	(feet above mean sea-level)	
4/28/2014	MW-1	3.34	719.29	
4/28/2014	MW-2	3.08	719.57	
4/28/2014	MW-3	2.28	717.43	
4/28/2014	MW-4	1.62	715.54	
4/28/2014	MW-5	0.88	715.96	
*5/1/2014	MW-1	2.20	720.43	
*5/1/2014	MW-2	2.97	719.68	
*5/1/2014	MW-3	0.23	719.48	
*5/1/2014	MW-4	-1.28	718.44	At/ above surface
*5/1/2014	MW-5	-1.37	718.21	At/ above surface
5/6/2014	MW-1	2.94	719.69	
5/6/2014	MW-2	2.97	719.68	
5/6/2014	MW-3	1.18	718.53	
5/6/2014	MW-4	-0.1	717.26	At/ above surface
5/6/2014	MW-5	-0.12	716.96	At/ above surface

3.3 Dynamic Cone Penetration Testing

Dynamic cone penetration testing (DCPT) was conducted in proposed surface parking areas of the development. The data was used to estimate the stiffness of the soils, and also the California Bearing Ratio (CBR). The DCPT test locations are shown in Figure 2. Where possible, samples were also collected at the DCPT locations, and identified using the Burmister Soil Classification System. Based on the Dynamic Cone Penetration Index (PI), and soil descriptions, DCPT logs from each field test were prepared and are presented in Appendix A. Soil descriptions and estimated CBR values are provided in Table 4

Table 4: Summary Data for DCPT, and the description of the soils encountered during testing

DCPT Test	Test Depth (feet)	Description of the Soils	Estimated CBR
T-A1	0.5 to 1.5	coarse to fine GRAVEL, some coarse to fine Sand, Cobbles, brownish gray, moist	46
T-A2	0.5 to 1.0	coarse to fine GRAVEL, some coarse to fine Sand, Cobbles, brownish gray, moist	46
T-A3	0.5 to 1.0	coarse to fine GRAVEL, some coarse to fine Sand, Cobbles, brown, moist	56
T-A4	0.5 to 1.0	coarse to fine GRAVEL, and coarse to fine Sand, trace Silt, Cobbles, brown, moist	29
T-A5	0.5 to 1.0	coarse to fine GRAVEL, and coarse to fine Sand, trace Silt, cobbles, brown, wet	47
T-A6	0.5 to 1.0	coarse to fine GRAVEL, some coarse to fine Sand, cobbles, brownish gray, moist	48
T-B1	1.0 to 1.5	coarse to fine SAND, some silt, little coarse to fine Gravel, grayish brown, moist	30
T-B2	1.0 to 2.0	coarse to fine SAND, some silt, little coarse to fine Gravel, grayish brown, moist	19
T-B3	0.5 to 1.0	coarse to fine SAND, some(+) coarse to fine Gravel, trace	11

		Silt, light brown, moist	
T-B4	0.5 to 1.0	coarse to fine SAND, some coarse to fine Gravel, trace Silt, light brown to gray, moist	30
T-B5	0.5 to 1.0	coarse to fine SAND, some Silt, little coarse to fine Gravel, light brown to gray, moist	10
T-C1	1.0 to 1.5	coarse to fine SAND, little Silt, little coarse to fine Gravel, light brown, moist	42
T-C2	2.5 to 2.5	SILT, and medium to fine Sand, trace fine Gravel, brown, moist	1
T-C3	3.0 to 3.0	SILT, and medium to fine Sand, dark brown, wet	1
T-D1	3.0 to 3.0	SILT, little coarse to fine Gravel, trace medium to fine Sand, yellowish brown, moist	7
T-D2	3.0 to 3.0	SILT, little coarse to fine Gravel, trace medium to fine Sand, yellowish brown, moist	10
T-D3		Could not collect sample due to roots and cobbles.	12
T-E1	3.5 to 3.5	SILT, some medium to fine Sand, yellowish brown, moist	9
T-E2	3.0 to 3.0	SILT, and medium to fine Sand, trace coarse to fine Gravel, brown	5
T-E3	2.5 to 2.5	medium to fine SAND, some Silt, trace coarse to fine Gravel, brown, moist	6
T-E4		Could not collect sample due to roots and cobbles.	35
T-F1	2.0 to 2.0	medium to fine SAND, little Silt, little coarse to fine Gravel, cobbles, brown, moist	31
T-F2	2.0 to 2.0	medium to fine SAND, little Silt, little coarse to fine Gravel, cobbles, brown, moist	15
T-F3		Could not collect sample due to roots and cobbles.	5
T-F4		Could not collect sample due to roots and cobbles.	51
T-G1	2.5 to 3.5	coarse to fine GRAVEL, some silt/clay, little coarse to fine Sand, brown, moist	8
T-G2	1.5 to 2.5	coarse to fine SAND, some Silt, little coarse to fine Gravel, brown, moist	10
T-G3	2.0 to 3.0	coarse to fine SAND, trace Silt, trace fine Gravel, yellow brown, moist	30
T-G4	2.5 to 3.5	coarse to fine SAND, little Silt, some coarse to fine Gravel, brown, moist	13
T-G5	0.5 to 1.5	coarse to fine SAND, little(+) Silt, little coarse to fine Gravel, brown, moist	37

4.0 PRELIMINARY GEOTECHNICAL ANALYSIS AND EVALUATIONS

This section evaluates the general foundation conditions for the proposed development in terms of soil/structure interaction, as the proposed development will result in added loads, thus significant stress changes. As discussed in Section 3.3 above, the subsurface below the proposed development area consists of

Stratum 1: Fill
Stratum 2: Fine grained (possible glacial lake) deposits
Stratum 3: Glacial outwash and till
Stratum 4: Bedrock Gneiss

Groundwater is estimated to be on average about 1-2 feet below the existing grade.

4.1. Foundation Support

We reviewed the alternate methods for foundations for the proposed structures and concluded that the upper fill (Stratum 1) and the underlying soft to medium silt (Stratum 2) are not considered to be suitable bearing strata in accordance with the New York State Building Code, and therefore cannot be relied upon to support the anticipated foundations because of excessive total and differential settlements.

For the preparation of development plans, feasibility, and conceptual design studies (not for final design and construction) both shallow foundation system after ground improvement and deep foundation systems were evaluated and found to be feasible depending on the final development plans.

Both foundation alternatives are evaluated in the following sections:

4.1.1 A shallow foundation system with a basement

Because the (static) groundwater level is near the surface and both the Stratum 1 and Stratum 2 do not have bearing characteristics, this option may be feasible if the development plans agree with the following conditions:

1. Because the rock is shallow at the side of the valley, the footprint of the basement would need to be away from the sides of the valley (at least 50 feet) to avoid hard rock excavation which will require blasting to make it feasible. Rock excavation by other means (rock breakers, expansion agents, etc.) would be cost and time prohibitive.
2. The depth of basement excavation (which will determine the foundation bottom depth) should be not less than 15 feet to reach a bearing stratum for the structures foundations'. About 70 percent of the excavated materials will either need to be disposed of, or can only be used for landscaping and re-use. The remaining 30 percent can be used as subbase of the at grade parking, and access road.
3. High groundwater at the development site necessitates the construction of a "bath tub to minimize/eliminate water infiltration, and resist soil and earth pressures. For the basement construction structural diaphragm wall with slurry techniques, or permanent sheet-piled wall, or jet grouted wall, or secant piled wall can be used effectively to retain soil and water pressures, and provide water-tightness. Because there is no impervious layer at the bottom, also water tightness of the bottom will be required which can be achieved by jet grouting methods. Generally, retaining/sheeting systems for excavations below groundwater table are very expensive. Depending on the final geometry of the basement, such below grade construction would take at least 9 months by using multi-set equipment for a basement below either the hotel and/or the parking garage.
4. The basement will require lifetime maintenance with relatively high life cycle costs.

5. Significant volumes of dewatering will be required during construction,
6. If the basement does not cover the entire footprint of the development area, deep foundation system will be required for the foundations outside the basement area.

For the preliminary design of foundations resting at minimum 15 feet below the existing grade (i.e. below a one level basement), an allowable bearing capacity of 6.0 ksf (kips square foot) can be assigned. Settlements under this magnitude of stress would be about one (1) inch. In the design of the slab-on-grade, or a mat foundation, a subgrade modulus of 200 pci (pounds per cubic inch) using a 12 inches by 12 inches plate can be assigned.

4.1.2 A shallow foundation System after a ground improvement program (no basement)

Because the (static) groundwater level is near the surface, this option may be feasible if the development plans agree with the following conditions:

1. Existing site grade is to be elevated (raised) with additional 8 feet of common fill, or RCA (recycled concrete aggregate) to provide a relatively dry platform for the proposed ground improvement program,
2. Factored column loads would be on the order of 60-80 kips, and about 250 psf (pounds per square foot) floor load would adequately address the requirements of the development plans
3. Basement (below grade structures) should not be considered due to construction difficulties and costs after ground improvement and lifetime maintenance with high life cycle costs.
4. Localized dewatering during foundation construction may be required,
5. Localized rock excavation on an average of 2 feet of the foundation footprint areas on the west side tower of the hotel may be required,
6. A structural joint and separation will be required between the west side (West Tower), and the rest of the hotel (East Tower) unless the hotel footprint is shifted about 50 feet towards eastward.

In order to improve the bearing characteristics of the fill, improve/increase the soils shear resistance of the underlying soft to medium silt, and provide a relatively uniform and homogeneous subgrade, ground improvement by "*Deep Dynamic Compaction (DDC)*" is evaluated and recommended to support the proposed hotel structure, the parking garage and other similar structures within the limits of the development area. DDC consists essentially of repeatedly dropping a large weight (a tamper) from a large crane to the ground to be compacted, in a controlled, overlapping pattern. For this application, a 20 ton tamper would need to be dropped from about 60 feet. to generate an energy on the order of 80-100 ton-ft./ft^2, applied in several tamping passes across the area to be improved. The final pass (the ironing pass) includes carefully controlled, overlapping drops from a relatively low height to re-compact and level out the soil at shallow depths that has been sheared and loosened during the initial DDC passes.

For effective compaction efforts, the entire footprint area of the structures are to be filled with about 8 foot of common granular fill (fines content less than 30 percent) before the start of DDC application. Based on the site conditions, we anticipate that DDC would result in a land surface drop (i.e. compaction/subsidence) of about two (2) feet as a result of granular fill and the imported fill being pushed into the relatively loose Stratum 1, and the underlying Stratum 2, Silt. Therefore, if this option is elected, the site development plans should assume to raise the existing grade by about 6 feet, resulting in the finished grades of El.+722 at the hotel area, and El.+725 at the Parking Garage. The imported granular fill will need to be spread in two lifts: the first lift of the fill would be about four foot thick and would be spread evenly before the start of the DDC operations, which will be buried under the first pass of the DDC; the second lift, and additional 4 foot of fill, will be placed into the craters, before the second pass of the DDC, and will be buried during the second pass, resulting in improved shear resistance due to the mixing of granular fill with loose soils and silt. After completion of the DDC, the subgrade for the foundations, floor slab should be prepared as follows:

- Under the building foundations and the floor slab, over excavate by a minimum of 12 inches below

the foundation bottom elevations for the building foundations, and slab-on-grade areas, and compact the exposed surface until obtaining a modified proctor density of 98 percent as observed in ASTM D1557.

- Add a 12 inches thick densely grade aggregate (DGA), or RCA in two lifts and compact each lift to 98 percent of the Maximum Dry Density of the fill, as determined in ASTM D1557. The DGA or RCA should consist of gravelly, silty sand with fines content (passing the #200 sieve) less than 8 percent, passing no more than 20 percent through the #4 sieve, and with a maximum grain size of four (4) inches.

After preparing the subgrade in this manner, for the preliminary design of foundations resting on the improved ground, an allowable bearing capacity of 4.0 ksf (kips square foot) can be assigned. Settlements under this magnitude of stress would be about one (1) inch. In the design of the slab-on-grade, a subgrade modulus of 150 pci (pounds per cubic inch) using a 12 inches by 12 inches plate can be assigned.

4.1.3. Deep Foundation System for the building structures (no basement)

Because the (static) groundwater level is near the surface, this option may be feasible if the development plans agree with the following conditions:

1. No basement or below grade structure is considered,
2. Localized dewatering during foundation construction may be required,
3. Localized rock excavation on an average of 2 feet of the foundation footprint areas on the west side tower of the hotel may be required,
4. If rock is encountered, a minimum 12 inches over excavation will be required,
5. A structural joint and separation will be required between the west side (West Tower), and the rest of the hotel (East Tower) unless the hotel footprint is shifted about 50 feet towards eastward.

An alternative foundation support of a deep foundation system has been evaluated. Possible deep foundation alternatives were considered and evaluated for the project based on economic design, site conditions, the magnitude of loads, and our experience with foundation construction in similar ground conditions. Pile types considered include: timber piles, H-piles, pipe piles, continuous flight auger piles and mono-tube piles. Analysis related to the structural capacity, geotechnical capacity, driving force and anticipated vibration velocities, estimated pile lengths, skin and end bearing capacities and pile capacities under lateral loads (both dynamic and static) for each type of pile, was performed.

For foundation support of the proposed development, 25-ton installed service capacity (allowable) tapered timber piles with minimum eight (8) inch tip and 12 inch butt diameters, made of Southern Pine or Douglas Fir, or other approved equivalent conforming to ASTM D 25 is selected and recommended. The timber piles should be unused, clean peeled, and preferably one piece from butt to tip. The piles must be pressure-treat round timber piles according to AWPA C3 and AWPA C18 for the service conditions of "land and brackish water", and the pile treatment should be by waterborne preservatives. To achieve the pile design capacity of 25 tons, the piles would need to have a minimum pile length of 30 feet to develop a working capacity of 20 tons after allowing a negative skin friction (i.e. pile drag-down) due to Stratum 2, Silt. The estimated pile capacity in tension is about ten (10) tons with a lateral load capacity of one (1) kip per pile. Under these conditions post-construction pile settlement is estimated to be less than one (1) inch. Piles should be driven to 30 blows per foot for the last two consecutive one-foot penetrations. In order to confirm the capacity, pile dynamic tests may be required: a minimum of three (3) Pile Dynamic Tests using a Pile Driving Analyzer, (PDA) should be conducted to observe the actual hammer energy, to verify the pile capacity and to ensure that efforts to minimize vibrations do not in turn result in failure to achieve the necessary pile capacity. The piles should not be driven beyond the point at which there is no measurable net penetration under the hammer blow (i.e., refusal). The pile driving criterion is based on the use of a 12,000 lb-ft pile-hammer with a minimum efficiency of 80 percent. Should the PDA tests demonstrate a lower efficiency, or lower hammer

energy is required to reduce the effects of vibrations, the pile-driving criteria must be revised to achieve the allowable pile capacity. The pile dynamic tests should be accompanied by vibration monitoring. The pile specification should also provide that the contractor must use a suitable cushion or cap block of solid block hardwood which should be replaced if burned, crushed or otherwise damaged, or after driving 50 piles, whichever comes first.

The review of the boring logs indicates generally high SPT blow counts in the upper fill (Stratum 1), as well the presence of asphalt/concrete pieces in fill stratum. Therefore, it is important to include in the pile specification that the project site may contain over size materials which may result in false refusal before a pile is driven to meet the minimum pile length criterion, in addition to potentially overstressing and even damaging the pile material, and possible amplification of the vibration velocities. The pile contractor must be prepared to pre-auger to avoid early refusals at these and other locations where very dense sand, gravel and boulders may be present.

4.2. Access Road and at-grade parking subgrade preparation

DCPT testing showed highly variable surface compactness (Appendix A). Therefore, for a uniform subgrade for the satisfactory performance of the at grade parking and access road, the following subgrade preparation is recommended:

- Excavate the top 12 inches and stockpile excavated materials,
- Compact the exposed surface using vibratory rollers with a minimum static weight of 10 tons in overlapping passes until obtaining a modified proctor density of 95 percent as observed in ASTM D1557.
- Replace the excavated soils in two lifts and compact each lift until obtaining a modified proctor density of 95 percent as observed in ASTM D1557.
- Place a minimum 6 inches thick single size (for example ¾ inches size) crushed stone drainage layer.

For the site access road and pavement, a CBR value of 10 for a flexible pavement design can be assigned following the preparation of the subgrade as described above.

The pavement structure for the access roads and the at grade parking can be based on the AASHTO *Pavement Design Manual*. As a guideline, assuming traffic of less than 50,000 ESALs (Equivalent Single Axle Load) during a design period of 20 years, the pavement section would consist of:

- 1½-inch Asphalt Concrete Surface Course
- Six (6) inch crushed stone drainage layer
- Four (4)-inch Aggregate Base Course, over compacted subgrade as suggested above.

4.3 Corrosion and Sulfate Attack Potential

A limited number of chemical analyses were performed samples collected from soils. Sulfate (as SO_4) concentrations were between below the detection limit 180 ppm, Chloride (Cl) concentrations range from below the detection limit to 110 ppm, and pH values were between 5.8 and 8.0 ppm. All of these values suggest the potential for sulfate and chloride attack on concrete and steel elements is negligible (AASHTO 2012).

Accordingly, Type IM(MS), I(MS)P,(MS) or Type II Portland cement can be used in all foundation concrete and concrete in contact with soil and water (see ASTM C 595). Buried concrete should be dense and fully compacted, and the minimum cement content requirements of ACI should be observed. To mitigate against long-term corrosion of uncoated ferrous metals (such as reinforcing bars, steel pipes, or other steel members

of the structure in contact with the soil), a minimal cover for reinforcement steel in accordance with ACI requirements should be observed. Steel and other metallic pipes in contact with soil should also be protected in accordance with the manufacturer's recommendations.

4.4 Excavation and earthwork related evaluations

For the site development, depending on the elected foundation system (Section 4.1), and the final locations of the structures, excavation of silt, gravel, sand and boulders will be required for site grading, foundations, and the basement (if required). Excavated materials are expected to be composed of mostly sand in the upper five (5) feet and silt to about 20 feet, and some gneissic bedrock, depending on the planned excavation depths. Silt material is moisture sensitive and not suitable for re-use as structural fill or backfill except for landscaping areas. Sand can be used as a common fill and subbase for the road and at-grade parking structures in its present state. If the upper five (5) feet of soils are to be used as structural fill, it will need to be screened to eliminate coarse fractions and the fine fractions (passing the #200 sieve) to eight (8) percent.

Limited volumes of rock excavations for the foundations (about 2 feet thick), or substantial volumes of rock excavations (in excess of 10 feet in thickness) for basement if the basement footprint is close to the flanks of the valley will be required. Rock excavations will mainly include the removal hard, sound and strong bedrock, which is characterized by the borings B1 and B4. For excavations not deeper than 2 feet, hydraulic heavy duty rock hammer attached to a heavy excavator can excavate and remove shallow rock materials during the foundation excavations for this development. For deeper and voluminous rock excavations, rock blasting would be required for time and cost efficiency. If rock blasting is planned, the development of significant and harmful vibrations will need to be mitigated by selecting 'Cautious Blasting Techniques'. The bedrock, if excavated has excellent characteristics that can be used as fine and coarse aggregate after crushing, or masonry material.
It is important to note that any excavation approximately 2 feet depth below the existing grade will require dewatering. Unless below ground water mitigation structures are planned (see Section 4.1.1), dewatering should be limited to construction period. The order of magnitude coefficient of permeability values are given the following table that can be used in preliminary dewatering planning.

Except for the rock, excavations would be done by the use of conventional excavation equipment. Because the development area is generally open with no nearby structures, temporary excavations can be done sloped using a gradient of 1.0H: 1.0V. In areas where sloped excavation is unsafe or not possible sheeting and shoring will be required, a plan of which must be prepared by a New York State Registered Professional Engineer, and be approved by the owner. In the design of the temporary excavation systems, dewatering and below grade structures, the following preliminary design parameters can be used:

Parameters/ Material type	Stratum 1 Fill	Stratum 2 Silt	Stratum 3, Glacial Till	Stratum 4 Gneiss
Angle of Internal Friction (ϕ^0)	32	0	36	70
Cohesion (psf)	-	500	-	-
Unit Weight (pcf)	130	120	130	160
Coefficient of Passive Resistance, Kp	3.22	1.50	3.84	20.0
Coefficient of Active Pressure, Ka	0.31	0.50	0.26	0.05
Coefficient of interface friction-ultimate	0.35	0.35	0.45	0.65
Approximate Coefficient of Permeability (cm/s)	1E10-3	1E10-5	1E10-4	1E10-10

Table 5: Geotechnical Preliminary Design Parameters.

4.5 Seismic Considerations

Seismic parameters used in the design should be based on the Building Code of New York State, according to which Site Class D parameters can be used in the preliminary design. Unless improved by DDC, or excavated and removed, the site has a potential for liquefaction in a seismic event.

4.6 Geologic Hazards

Borehole data and the engineering geological map of studies indicate the site does not have a potential for a major geological hazard, like landslides and or slope failures. In a major storm event, however, the site may have a flash flood potential event due to relatively shallow bedrock with relatively poor infiltration characteristics of the soils and the bedrock. A drainage design, including a stream training study must be prepared by a licensed hydrologist/drainage engineer during preparation of the site development plans.

5.0 CONCLUSIONS AND RECOMMENDATIONS

1. This report presents the results of a preliminary geotechnical investigation and engineering study for the development potential at the Sterling Forest Resort located in the Town of Tuxedo, Orange County, New York.

2. The general development area is about 50 acres, and located about 4 miles northwest of the village of Tuxedo, Orange Country, New York. The conceptual development plans indicate the site development would consists of the construction of a 5-story Resort World Grand Hotel structure, a 7-story parking garage, several surface parking structures, and ponds, the renovations, functional improvements/changes of the existing buildings, site access roads, and the installation of utilities.

3. Subsurface exploration program consisted of four (4) exploration borings that were drilled between 8 and 65 feet below the existing ground surface, Dynamic Cone Penetration Testing, field and laboratory tests that were conducted between April 15 and May 7, 2014.

4. The project site is located within a narrow glacial valley which is approximately 2,500 feet in length and 300 feet wide. The valley floor elevation is approximately 724 feet above mean sea-level (alms). The valley is trending north to south with ridges of approximately 800 foot elevation on either side. The sediments that occupy the valley above bedrock consist of glacial till and outwash, and fine-grained lake deposits overlain by man-made fill. The depth to bedrock beneath the valley sediments varies between greater than 65 feet below surface in the valley center to approximately the 27.5 feet towards the valley's side, and eventually less than two (2) feet at the valley flanks. The bedrock is granitic in composition (i.e. gneiss), hard, sound and of generally "good to excellent" rock quality. Based on the information collected during this investigation, there are generally four (4) strata with different geotechnical characteristics underlying an approximate two (2) to five (5) foot layer of pavement and crushed stone aggregate. No visual signs of contamination were observed during drilling. From top to bottom, these strata are as follows: 1. Fill; 2. Glacial-lake Sediment; 3. Glacial outwash and till, 4. Bedrock Granite Gneiss.

5. Groundwater is estimated to be on average about 1-2 feet below the existing grade but at or near grade in the southern part of the valley.

6. Based on the findings from this investigation, the general foundation conditions for the proposed development in terms of soil/structure interaction was reviewed, the alternate methods for foundations for the proposed structures were evaluated. It was determined that the upper fill (Stratum 1) and the underlying soft to medium silt (Stratum 2) are not considered to be suitable bearing strata in accordance with the New York State Building Code, and therefore cannot be relied upon to support the anticipated foundations because of excessive total and differential settlements.

7. For the preparation of development plans, feasibility, and conceptual design studies both shallow foundation system after ground improvement, and deep foundation systems were evaluated and both found to be feasible depending on the final development plans. As discussed in detail in Section 4.2, because of shallow groundwater and likely required rock excavations, construction of below grade structures (i.e. basement) is not recommended due to high initial and life cycle costs.

8. If no basement structure is sought, this study recommends the structures to be supported on timber piled foundation systems discussed in Section 4.2.3.

9. For at grade parking and access road, DCPT testing showed highly variable surface compactness. Therefore, to provide a uniform subgrade for the satisfactory performance a site specific subgrade

preparation was recommended in Section 4.3 of this report. For the site access road and pavement, a CBR value of 10 for a flexible pavement design can be assigned following the preparation of the subgrade as described above. Based on the assumed traffic data, the following pavement structure is recommended:

- 1½-inch Asphalt Concrete Surface Course
- Six (6) inch crushed stone drainage layer
- Four (4)-inch Aggregate Base Course, over compacted subgrade as suggested above.

10. A limited number of chemical analyses suggested the potential for sulfate and chloride attack on concrete and steel elements is negligible. Therefore, Type IM (MS), I (MS) P, (MS) or Type II Portland cement can be used in all foundation concrete and concrete in contact with soil and water To mitigate against long-term corrosion of uncoated ferrous metals (such as reinforcing bars, steel pipes, or other steel members of the structure in contact with the soil), a minimal cover for reinforcement steel in accordance with ACI requirements should be observed. Steel and other metallic pipes in contact with soil should also be protected in accordance with the manufacturer's recommendations.

11. Seismic parameters used in the design should be based on the Building Code of New York State, according to which Site Class D parameters can be used in the preliminary design. Unless improved by DDC, or excavated and removed, the site has a potential for liquefaction in a seismic event.

12. Borehole data and the engineering geological map of studies indicate the site does not have a potential for a major geological hazard, like landslides and or slope failures. In a major storm event, however, the site may have a flash flood potential event due to relatively shallow bedrock with relatively poor infiltration characteristics of the soils and the bedrock. A drainage design, including a stream training study must be prepared by a licensed hydrologist/drainage engineer during preparation of the site development plans.

6.0 STATEMENT OF LIMITATIONS

The data presented and the opinions expressed in this report are qualified as follows:

1. This report has been prepared by The Louis Berger Group, Inc. for Alesund I LLC, to be used solely by Alesund I LLC in the evaluation and performance of the proposed work related to the proposed development Sterling Forest Resort, located in Tuxedo, Orange County, New York. The report has not been prepared for use by other parties, and may not necessarily contain sufficient information for the purposes of other parties or other uses. Any undisclosed and/or unpermitted alternate use shall be at that party's own risk and without liability to Louis Berger.

2. The evaluations and recommendations provided in this report are based upon our understanding of the described project information and on our interpretation of the information, the visible conditions for accessible properties and the data that were available and/or collected during the performance of this study. Unless otherwise stated, the work performed by Louis Berger should be understood to be preliminary, exploratory and interpretational in character. Any results, findings, or recommendations contained in this report may be the result, at least in part, of professional Judgment and not necessarily based solely on pure science and engineering.

3. Our professional geotechnical engineering services for this project have been performed using a degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice in this report.

4. In preparing this report, Louis Berger has relied upon and presumed accurate certain information (or the absence thereof) about the Site and adjacent properties provided by governmental officials and agencies, the Client, other consultants, and others identified herein. Except as otherwise stated, Louis Berger has not attempted to verify the accuracy or completeness of any such information. Louis Berger derived the data in this report primarily from visual inspections, examination of records in the public domain, and a limited number of boreholes and tests where we were granted access. The passage of time, manifestation of latent conditions or occurrence of future events may require further exploration at the Site, analysis of the data, and reevaluation of the findings, observations, and conclusions expressed in the report.

5. No warranty or guarantee, whether express or implied, is made with respect to the data reported or findings, observations, and conclusions expressed in this report. Further, such data, findings, observations, and conclusions are based solely upon Site conditions in existence at the time of investigation.

6. The data reported and the findings, observations, and conclusions expressed in the report are limited by the scope of services, including the extent of subsurface exploration and other tests. The scope of services was defined by the requests of the Client, the time and budgetary constraints imposed by the Client, and the availability of access to the Site. This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the Agreement and the provisions thereof.

7.0 REFERENCES

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3. ASTM D 422 (2007) Standard Test Method for Particle-Size Analysis of Soils
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7. Gates, A.E., Valentino, D.W., Chiarenzelli, J.R., Solar, G.S., and Hamilton, M.A., 2004, Exhumed Himalayan-Type Syntaxis in the Grenville Orogen, Northeastern Laurentia, Journal of Geodynamics, vol. 37, p. 337-359.
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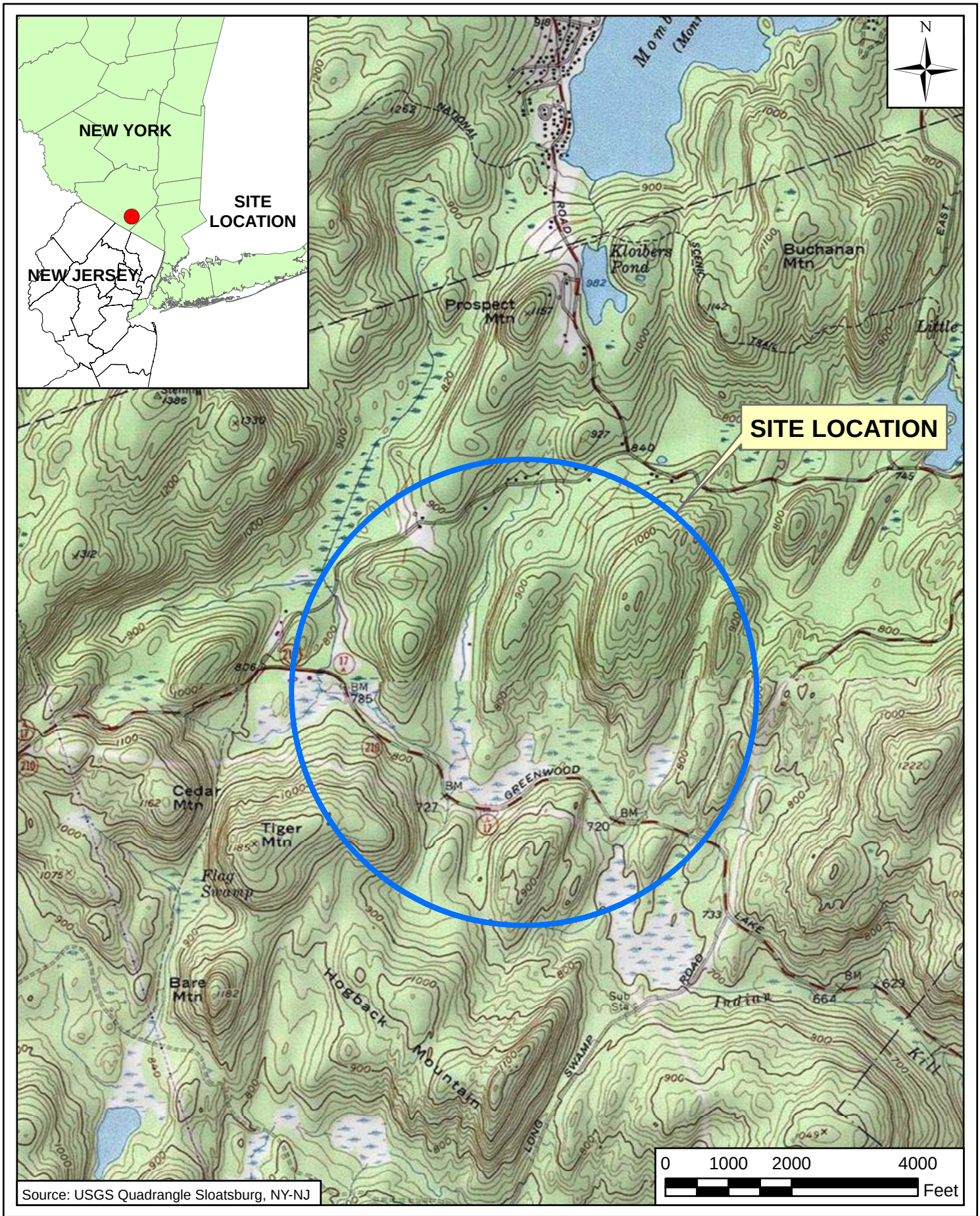
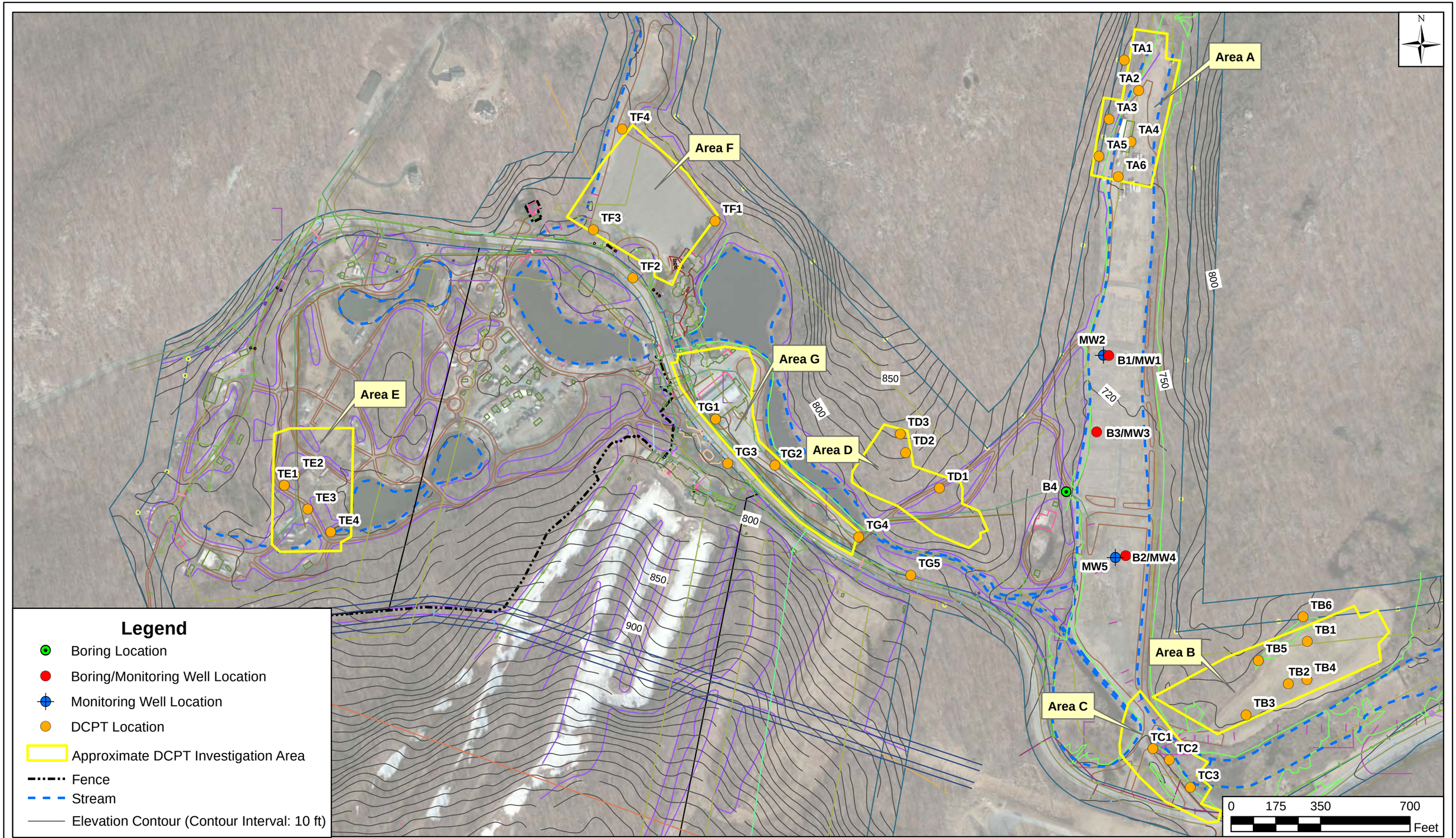
9. ASTM D 25-12 Standard Specification for Round Timber Piles
10. AWPA C3 Piles – Preservative Treatment by Pressure Processes
11. AWPA C18 Standard for Pressure treated Material in Marine Construction
12. ASTM D 1557 – 12 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
13. ASTM C 595 Standard Specifications for Blended Hydraulic Cements

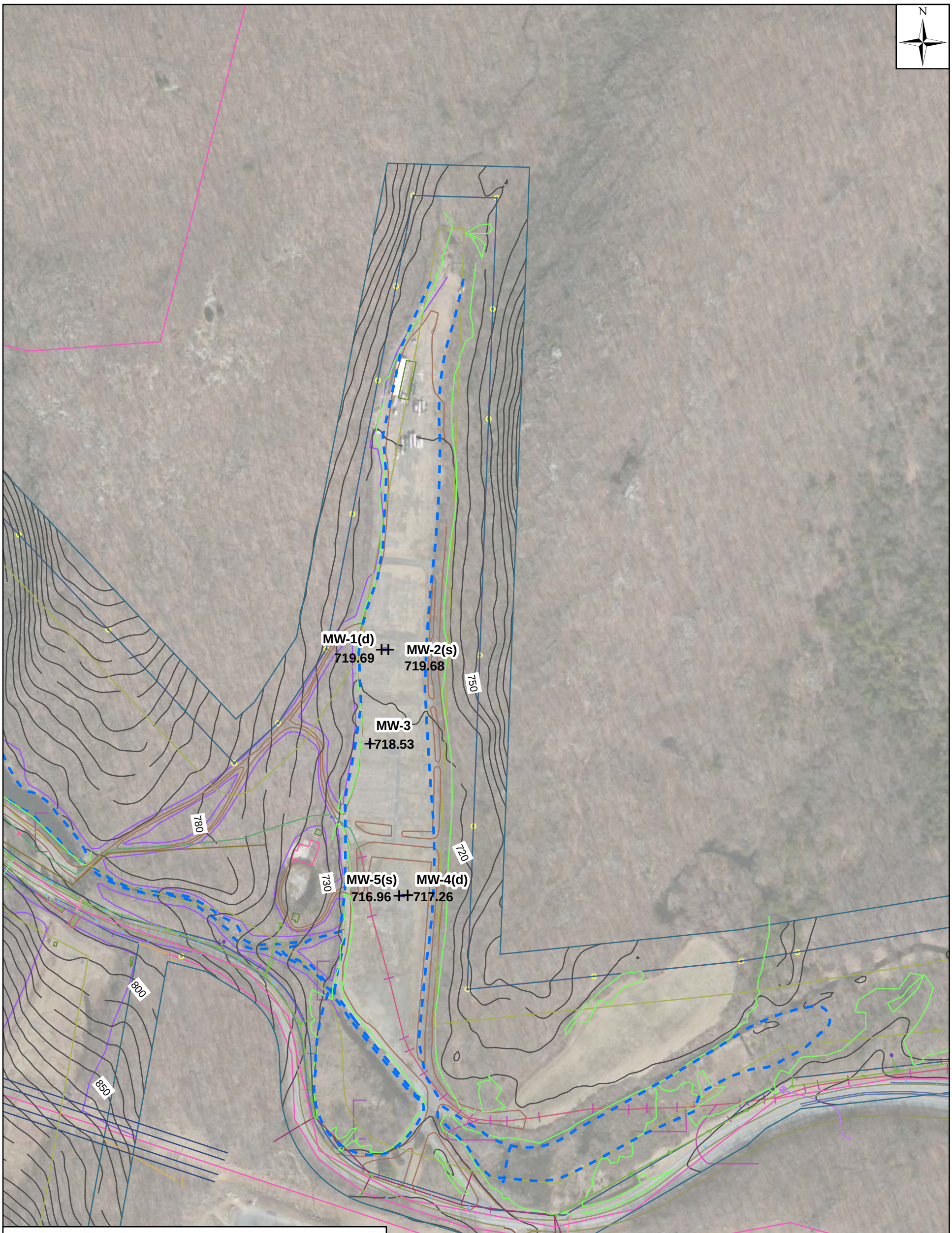
FIGURES



STERLING FOREST RESORT	New York 17A, Tuxedo Park, New York **SITE LOCATION MAP**	THE Louis Berger Group, INC.	**FIGURE 1**



STERLING FOREST RESORT	New York 17A, Tuxedo Park, New York **BORING, PIEZOMETER AND DYNAMIC CONE PENETRATION TEST LOCATION PLAN**	THE Louis Berger Group, INC.	**FIGURE 2**



STERLING FOREST RESORT	New York 17A, Tuxedo Park, New York **GROUNDWATER POTENTIOMETRIC SURFACE MAP**	THE Louis Berger Group, INC.	**FIGURE 3**

N

Legend

- Boring Location
- 5 — Boulder with Approximate Diameter
- Stream with Direction of Flow
- Contour Lines (Contour Inteval: 10 ft)
- PHOTO1 — Photo (Pointing in direction of photo with photo number)
- Geologic Section
- Lake/Pond

DESCRIPTION OF MAPPED UNITS

FILL AND GLACIAL OUTWASH SEDIMENTS
Gray to grayish black to brown, Glacial lake, outwash, and till deposits. Approximate thickness between 30 and 70 feet. (very gentle surface slope, probable air strip)

GRAVELLY SAND AND SILT (GLACIAL TILL)
Yellowish brown. Thickness is approximately 5 feet. Soil is present beneath an approximate 6-inch layer of highly decomposed plant material. Surface slopes are between 15 and 20 degree with abundant boulders between 3 and 30 feet in diameter.

GRANITIC GNEISS
Gray, very hard, strong, widely to moderately spaced joints.

Woodland Area, Ridges and Valleys
Gentle to Strong Slopes

Woodland Area, Ridges and Valleys
Gentle to Strong Slopes

B1
B2
B3
B4
A
A'
PHOTO 1
PHOTO 2
PHOTO 3
PHOTO 4
PHOTO 5
720
730
750
780
800
850
0 150 300 600 Feet

STERLING FOREST RESORT	New York 17A, Tuxedo Park, New York **ENGINEERING GEOLOGY MAP**	THE Louis Berger Group, INC.	**FIGURE 4-1**

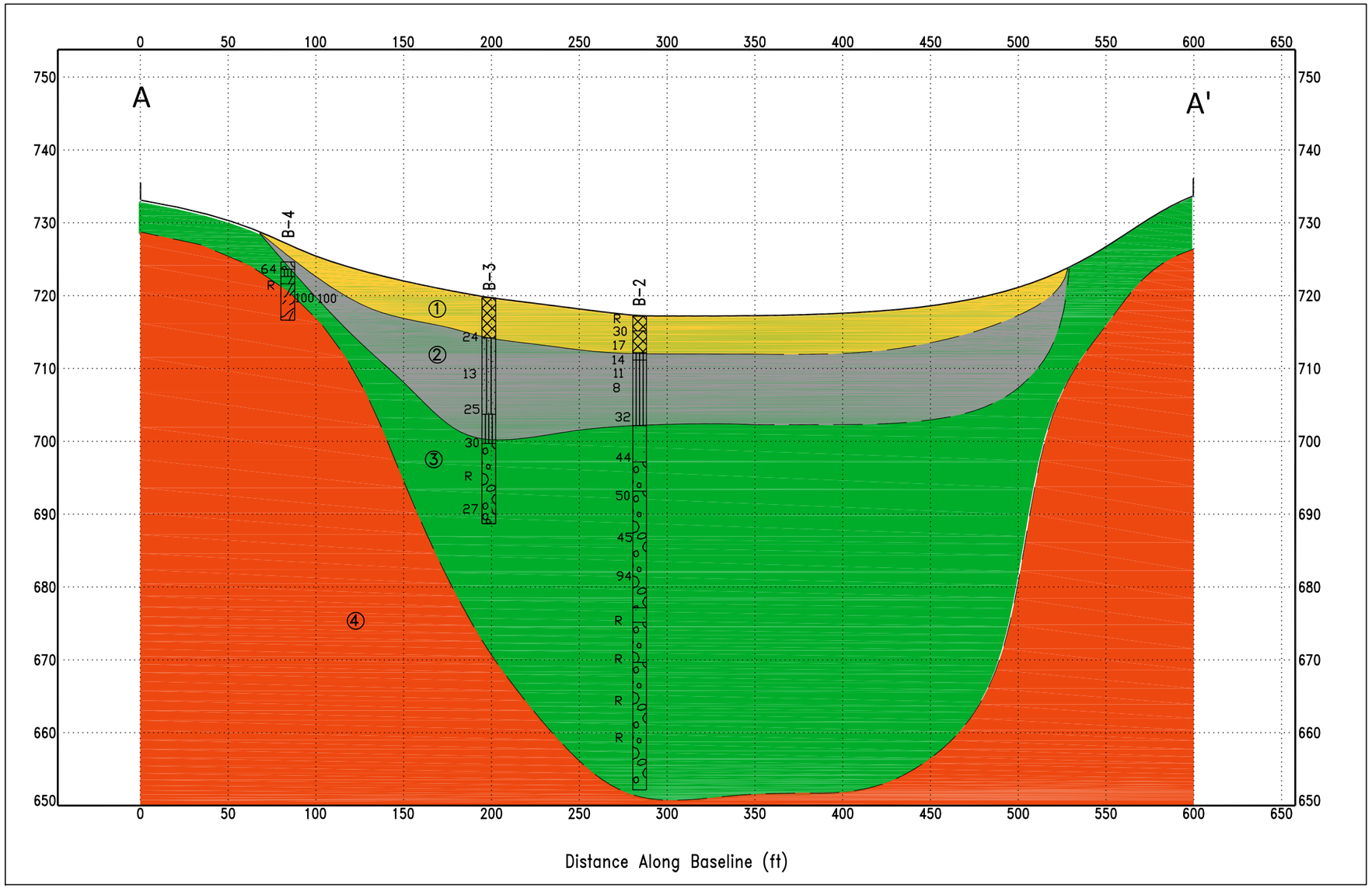
Photo 1 (facing north)

Photo 2 (facing west-northwest)

Photo 3 (facing north-northeast)

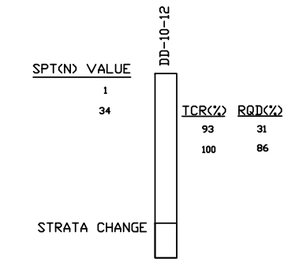
Photo 4 (facing east)

Photo 5 (facing west)



LEGEND

EXPLORATION BORING DESIGNATION

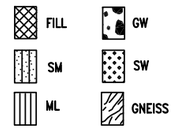


GROUND SURFACE

GEOLOGIC CONTACT

INTERPRETED GEOLOGIC CONTACT

SOIL AND ROCK SYMBOLS



① STRATUM 1: FILL. Gray to bluish gray. Asphalt, pieces of asphalt, gravel aggregate, and gravelly sand. Thickness between 4 and 5.5 feet below ground surface. Average SPT N-resistance values range between 23 and 47.

② STRATUM 2: GLACIAL LAKE SEDIMENT. Gray to Grayish-black. Coarsening upwards sequences of Silt and sandy silt, or silty sand in boring near the valley wall (possible kame deposit). Thickness ranges between 10 and 14 feet. SPT N-resistance values between 11 and 19 blows/foot.

③ STRATUM 3: GLACIAL OUTWASH AND TILL. Gray to grayish brown. Interbedded layers of gravel, sandy gravel, and sand. Thickness ranges between 11 and 27 feet. Large boulders present at depths greater than 40 feet below ground surface in the center of the valley. SPT N-values are between 27 and 60 blows/foot and generally increase with depth.

④ STRATUM 4: BEDROCK GNEISS. Gray. Very hard, sound and fresh. Joints are moderately to widely spaced, are tight with less than 1/10" openings, and have no filling or mineral alteration. Rock Quality Designation (RQD) values ranged from 80% to 100% and total core recovery values were between 90 to 100%.

STERLING FOREST RESORT	SUBSURFACE PROFILES BASED ON BORING LOG NEW YORK 17A, TUXEDO PARK, NEW YORK	THE Louis Berger Group, INC.	FIGURE 4-2

APPENDIX A: BOREHOLE LOGS and DCPT GRAPHS

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 1 of 2	**BORING NO.: B-1**

CLIENT:	Resorts World, New York	**PROJECT NO.:**	2002907.02
PROJECT:	Project Orange	**DATE STARTED:**	4/19/2014
LOCATION:	Tuxedo, NY	**DATE FINISHED:**	4/19/2014
DRILLING CONTRACTOR:	Allied Drilling	**DRILLER:**	V. Gandolfo
DRILLING METHOD:	Mud rotary	**SIZE AND TYPE OF BIT:**	Tricone Roller bit, 4" diameter
DRILLING EQUIPMENT:	Mobile drill rig (B-61)	**INSPECTOR:**	D. Cuomo
SAMPLER TYPE:	Split barrel sampler, NX 3.5 O.D. Core barrel	**HAMMER:** Donut	**WEIGHT:** 140 lbs **DROP:** 30 in

BOREHOLE DATA

Diameter (inches):	4	**Elevation (ft. MSL):**	722.63	**Northing:**	455183.175180
Total Depth (ft.):	41.5	**Groundwater Depth [Elevation] (ft.):**	2.94	**Easting:**	530795.546656

NOTES: Piezometer installed in borehole (MW-1)

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
		6 6 17 19		**23**	14	SS-1	1				**FILL: Grayish black, Asphalt and gravel aggregate, moist.**	
	720.63						2	2				
720		15 22 50	>>	**72**	14	SS-2	3				**PROBABLE FILL: Dark yellowish brown, coarse to fine SAND, some Silt, some Gravel, moist.**	
	718.63	36					4	4				
		20 24 22		**46**	16	SS-3	5			**SM**	**Grayish black, medium to fine SAND, some (+) Silt, little coarse to fine Gravel, moist.**	
	716.63	26					6	6				
		10 11 4		**15**	18	SS-4	7			**SM**	**Grayish black, coarse to fine SAND, some (+) Silt, moist.**	
715												
	714.63	6					8	8				
		1 2 4		**6**	6	SS-5	9			**SM**	**Grayish black, SILT, some coarse to fine Sand, moist.**	
	712.63	4					10	10				
		7 8 11 11		**19**	14	SS-6	11			**ML**	**Light brown, SILT, little medium to fine Sand, moist.**	
710							12					
							13					
							14					
	707.63						15	15				
		8 9 9 10		**18**	12	SS-7	16			**GP**	**Gray, GRAVEL, and coarse to fine Sand, trace Silt, wet.**	
705							17					
							18					
	703.63						19	19		**SW**	**Gray, coarse to fine SAND, wet.**	

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 2 of 2	**BORING NO.: B-1**
CLIENT: Resorts World, New York		**PROJECT NO.:** 2002907.02

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
	702.63	14 27 32 40		**59**	18	SS-8	21 22	20		**SW**	**Gray, coarse to fine SAND, wet.**	
700							23 24					
		23 15 16 24		**31**	18	SS-9	25 26 27					
695	695.13					C-1	28 29 30 31 32	27.5			**Gray, Granite GNEISS, Very Hard, widely spaced joints, tight to less than 1/10" openings, no filling or joint infill, fresh, TCR=100%, RQD=100%.**	
690	690.13					C-2	33 34 35 36 37	32.5			**Gray, Granite GNEISS, Very Hard, moderately spaced joints, tight to less than 1/10" openings, no filling or joint infill, fresh, TCR=90%, RQD=80%.**	
685	685.13					C-3	38 39 40 41	37.5			**Gray, Granite GNEISS, Very Hard, moderately spaced joints, tight to less than 1/10" openings, no filling or joint infill, fresh, TCR=100%, RQD=80%.**	
	681.13						42	41.5			**Total Depth of Boring 41.5 feet.**	
680							43 44 45 46					
675							47					

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 1 of 3	**BORING NO.: B-2**

CLIENT:	Resorts World, New York	**PROJECT NO.:**	2002907.02
PROJECT:	Project Orange	**DATE STARTED:**	4/27/2014
LOCATION:	Tuxedo, NY	**DATE FINISHED:**	4/28/2014
DRILLING CONTRACTOR:	Allied Drilling	**DRILLER:**	V. Gandolfo
DRILLING METHOD:	Mud rotary	**SIZE AND TYPE OF BIT:**	Tricone Roller bit, 4" diameter
DRILLING EQUIPMENT:	Mobile drill rig (B-61)	**INSPECTOR:**	D. Cuomo
SAMPLER TYPE:	Split barrel sampler	**HAMMER:** Donut	**WEIGHT:** 140 lbs **DROP:** 30 in

BOREHOLE DATA

Diameter (inches):	4	**Elevation (ft. MSL):**	717.16	**Northing:**	454400.760430
Total Depth (ft.):	65	**Groundwater Depth [Elevation] (ft.):**	0.0	**Easting:**	530860.262828

NOTES: Piezometer installed in borehole (MW-4)

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
		20	>>	R	4	SS-1	1				**FILL: Grayish brown, coarse to fine GRAVEL, little coarse to fine Sand, moist.**	
		20 Refusal										
715	715.16	11		30	4	SS-2	2	2			**FILL: Grayish brown, coarse to fine GRAVEL, and coarse to fine Sand, moist.**	
		16					3					
		14										
		9					4					
		5		17	16	SS-3						
	712.16	7					5	5		ML	**Gray, SILT, little coarse to fine Sand, moist.**	
		10										
	711.16	10					6	6		ML	**Gray, Clayey SILT, trace coarse to fine Sand, moist.**	
		4		14	24	SS-4						
710		6					7					
		8										
		8					8					
		4		11	14	SS-5						
		5					9					
		6										
		6					10					
		6		8	20	SS-6						
		4					11					
		4										
705		6					12					
							13					
							14					
	702.16						15	15		SM	**Brown, coarse to fine SAND, little Silt, some Gravel, wet.**	
		8		32	14	SS-7	16					
		13										
		19					17					
700		15										
							18					
							19					

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 2 of 3	**BORING NO.: B-2**
CLIENT: Resorts World, New York		**PROJECT NO.:** 2002907.02

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
	697.16	26 28 16 24		**44**	4	SS-8	20 21 22 23	20		GW	**Grayish brown, GRAVEL, some coarse to fine Sand, little Silt, wet.**	
695												
	693.16	17 23 27 29		**50**	3	SS-9	24 25 26 27	24		GW	**Grayish brown, GRAVEL, some coarse to fine Sand, trace Silt, wet.**	
690												
		42 30 15 18		**45**	6	SS-10	28 29 30 31 32					
685												
		44 38 56 94	>>	**94**	12	SS-11	33 34 35 36 37					
680												
	677.16	80 115/6	>>	**R**	10	SS-12	38 39 40 41	40		SM	**Gray, coarse to fine SAND, some Silt, some coarse to fine Gravel, wet.**	
675	675.16						42 43 44	42		GW	**Gray, GLACIAL TILL: GRAVEL, little coarse to fine Sand, wet.**	**Very dense till with abundent boulders (42'-65' bgs)**
		100/2	>>	**R**	1	SS-13	45 46 47					
670	669.66							47.5				

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 3 of 3	**BORING NO.: B-2**
CLIENT: Resorts World, New York		**PROJECT NO.:** 2002907.02

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
							48			GW	**Gray, GLACIAL TILL: GRAVEL, little coarse to fine Sand, wet.**	
		100/4	>>◆	R	0.5	SS-14	49 50					
665							51 52					
		100/2	>>◆	R	0		53 54 55					
660							56 57					
							58 59 60					
655							61 62					
	652.16						63 64 65	65			**Total Depth of Boring 65 feet.**	
650							66 67					
							68 69 70					
645							71 72					
							73 74 75					

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 1 of 2	**BORING NO.: B-3**

CLIENT:	Resorts World, New York	**PROJECT NO.:**	2002907.02
PROJECT:	Project Orange	**DATE STARTED:**	4/27/2014
LOCATION:	Tuxedo, NY	**DATE FINISHED:**	4/27/2014
DRILLING CONTRACTOR:	Allied Drilling	**DRILLER:**	T. Martin
DRILLING METHOD:	Mud rotary	**SIZE AND TYPE OF BIT:**	Tricone Roller bit, 4" diameter
DRILLING EQUIPMENT:	CME-55	**INSPECTOR:**	D. Cuomo
SAMPLER TYPE:	Split barrel sampler	**HAMMER:** Donut	**WEIGHT:** 140 lbs **DROP:** 30 in

BOREHOLE DATA

Diameter (inches):	4	**Elevation (ft. MSL):**	719.71	**Northing:**	454887.770489
Total Depth (ft.):	31	**Groundwater Depth [Elevation] (ft.):**	1.18	**Easting:**	530751.854932

NOTES: Piezometer installed in borehole (MW-3)

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
715	714.21	8 16 8 10		24	10	SS-1	1 2 3 4 5	5.5		ML	**FILL: Grayish blue, coarse to fine SAND, and coarse to fine Gravel, moist.** **Gray, SILT, some medium to fine Sand, moist.**	
710		8 6 7 8		13		SS-2	6 7 8 9 10 11 12 13					
705	703.71	13 13 12 12		25		SS-3	14 15 16	16		ML	**Gray, SILT, trace coarse to fine Sand, moist.**	
700		3 10		30		SS-4	17 18 19					

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 2 of 2	**BORING NO.: B-3**
CLIENT: Resorts World, New York		**PROJECT NO.:** 2002907.02

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
	699.71	20 33					20	20		GW	Brown, GRAVEL, trace coarse to fine Sand, wet.	
695		39 50/4	>>	R	2	SS-5	24					
690		10 11 16		27		SS-6	29			GW	Gray, GRAVEL, some coarse to fine Sand, wet.	Boring terminated at top of bedrock (31 ft bgs)
	688.71	11					31	31			Total Depth of Boring 31 feet.	
685												
680												
675												

The Louis Berger Group, Inc. 412 Mount Kemble Avenue Morristown, NJ 07960	**Boring Log** Page 1 of 1	**BORING NO.: B-4**

CLIENT:	Resorts World, New York	**PROJECT NO.:**	2002907.02
PROJECT:	Project Orange	**DATE STARTED:**	4/28/2014
LOCATION:	Tuxedo, NY	**DATE FINISHED:**	4/28/2014
DRILLING CONTRACTOR:	Allied Drilling	**DRILLER:**	V. Gandolfo
DRILLING METHOD:	Mud rotary	**SIZE AND TYPE OF BIT:**	Tricone Roller bit, 4" diameter
DRILLING EQUIPMENT:	Mobile drill rig (B-61)	**INSPECTOR:**	D. Cuomo
SAMPLER TYPE:	Split barrel sampler, NX 3.5 O.D. Core barrel	**HAMMER:** Donut	**WEIGHT:** 140 lbs **DROP:** 30 in

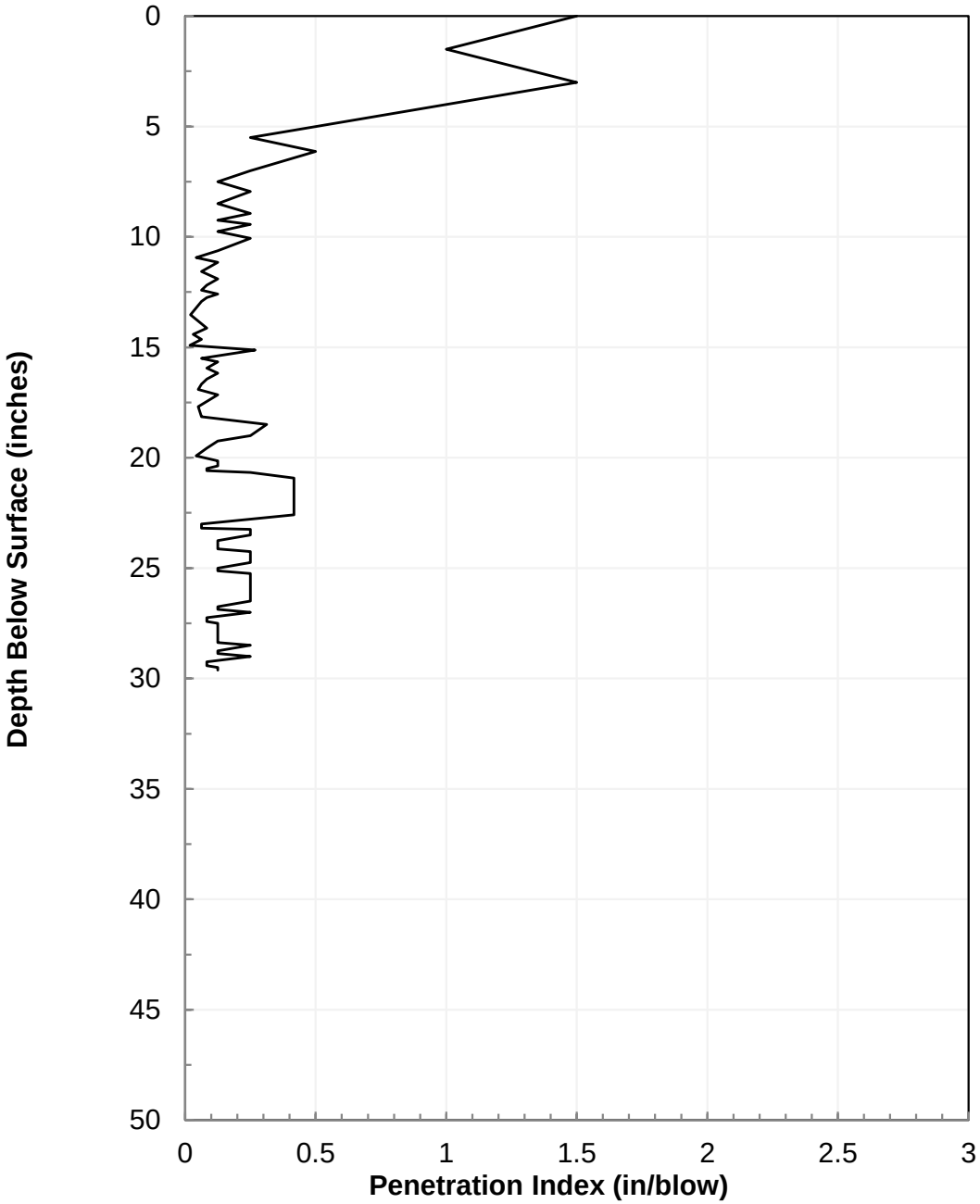
BOREHOLE DATA

Diameter (inches):	4	**Elevation (ft. MSL):**	724.63	**Northing:**	454650.078098
Total Depth (ft.):	8	**Groundwater Depth [Elevation] (ft.):**	not observed	**Easting:**	530629.597265

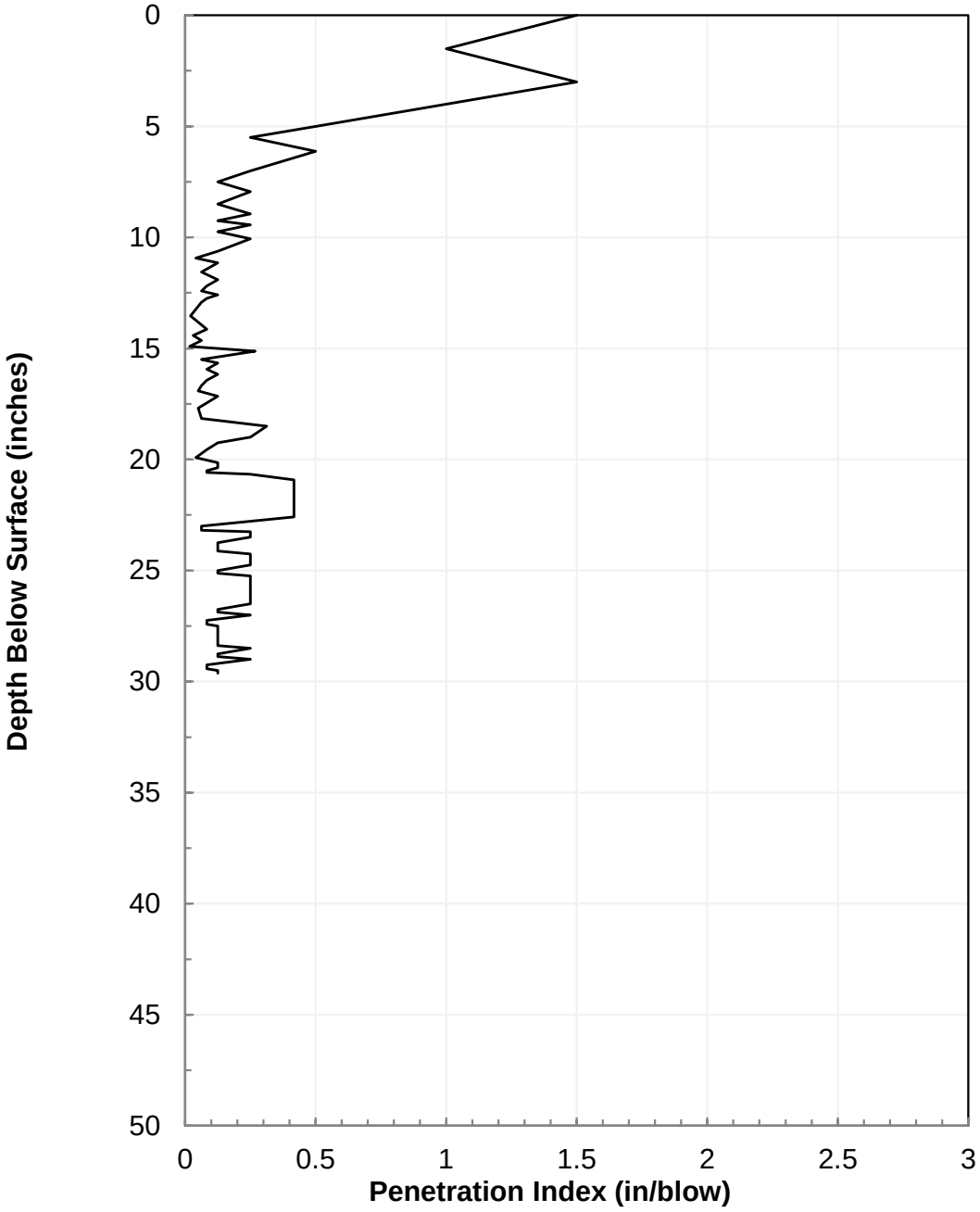
NOTES:

Elevation (ft. MSL)	Bottom Elevation	Blow Counts	Standard Penetration Resistance N-Value (Blows / ft.) 10 20 30 40 50	SPT-N (Blows/ft.)	Recovery (in)	Sample No.	Depth in Feet	Bottom Depth	Lithology	USCS	SOIL DESCRIPTION AND STRATIGRAPHY	NOTES
	723.63	16 46	>>◆	64	18	SS-1/SS-2	1	1			**FILL: Blue Gray, GRAVEL, moist.**	
	722.63	18 17								ML	**Yellow brown, SILT, little fine Gravel, moist.**	
		100/0	>>◆	R	0.25	SS-3	2	2			**Gray, WEATHERED BEDROCK, Granite Gneiss origin, moist.**	
	721.63					C-1	3	3			**Gray, Granite GNEISS, Very Hard, fractured, fresh, rock core sample is not jointed or fractured, TCR=100%, RQD=100%.**	
720							4					
							5					
							6					
							7					
	716.63						8	8			**Total Depth of Boring 8 feet.**	
							9					
715							10					
							11					
							12					
							13					
							14					
710							15					
							16					
							17					
							18					
							19					
705												

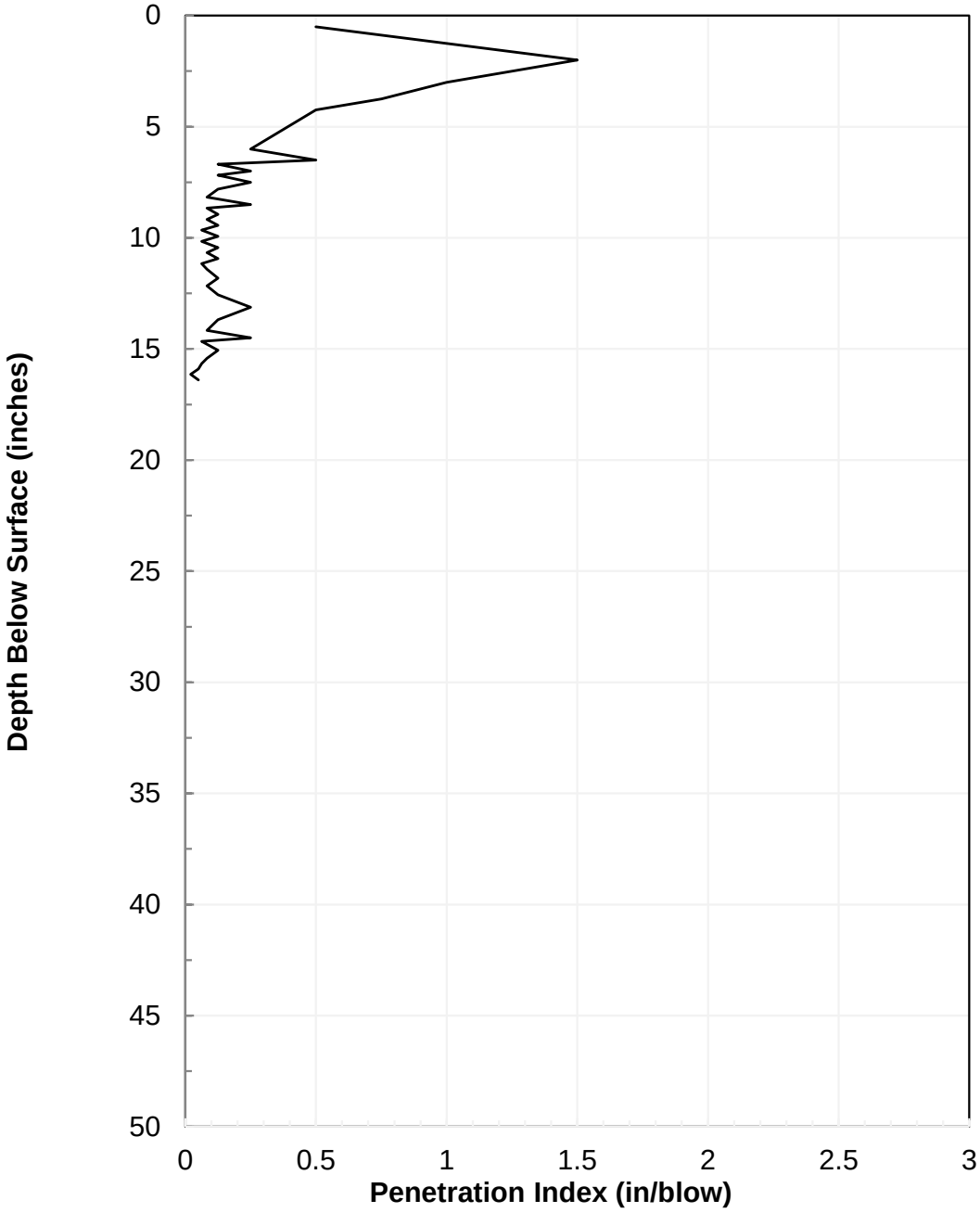
Layer Strength Diagram
DCP Test
Area A
Test T-A1



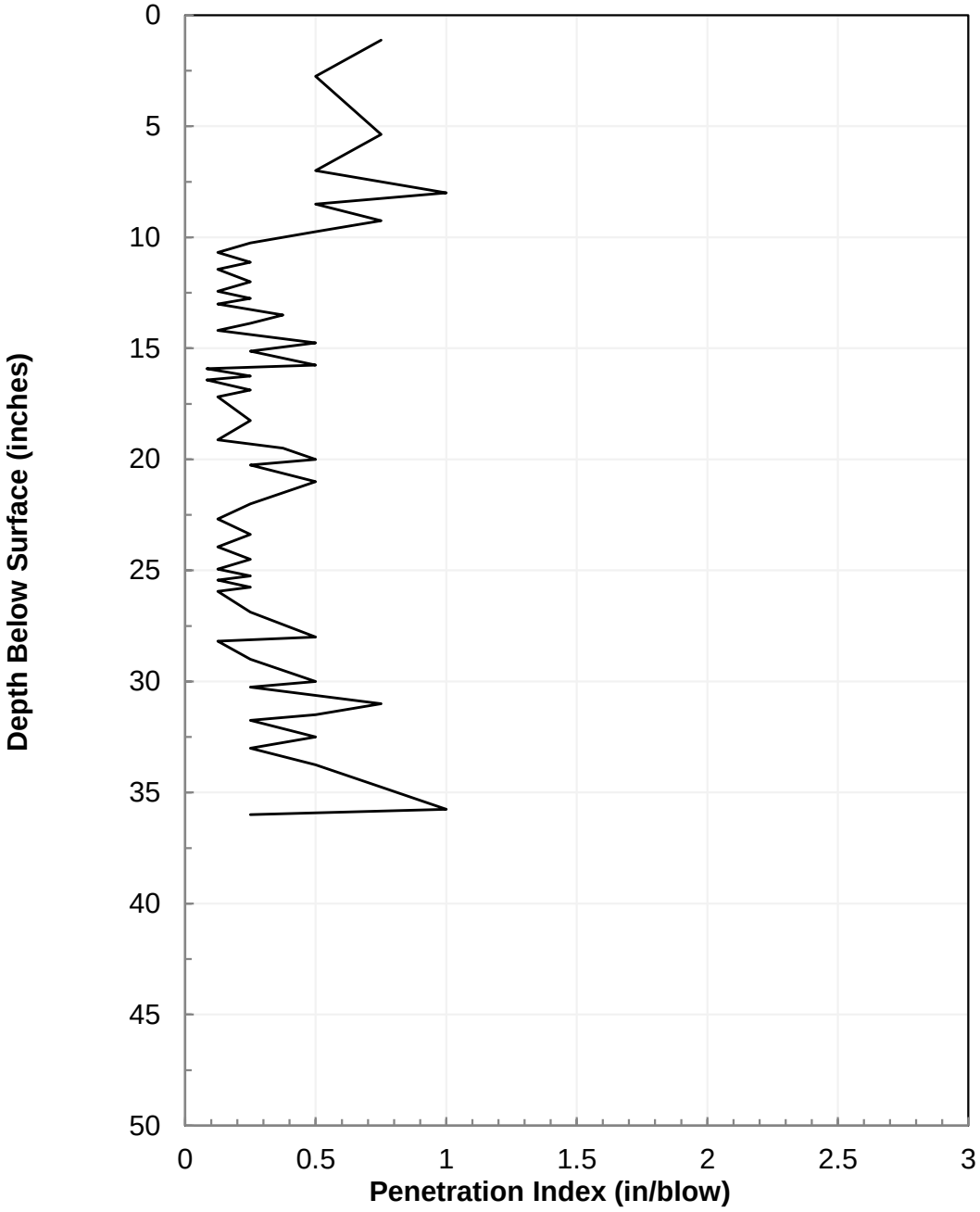
Layer Strength Diagram
DCP Test
Area A
Test T-A2



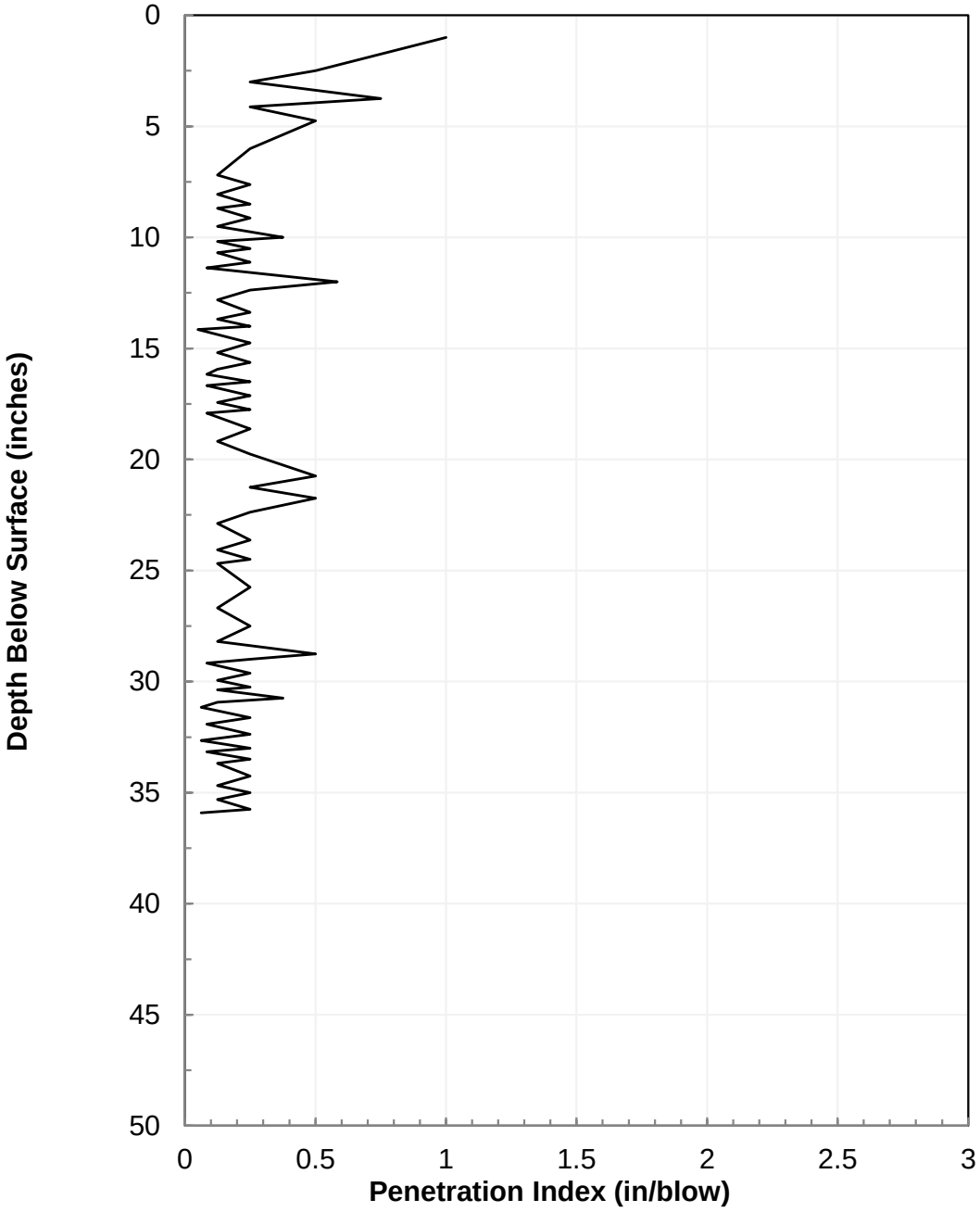
Layer Strength Diagram
DCP Test
Area A
Test T-A3



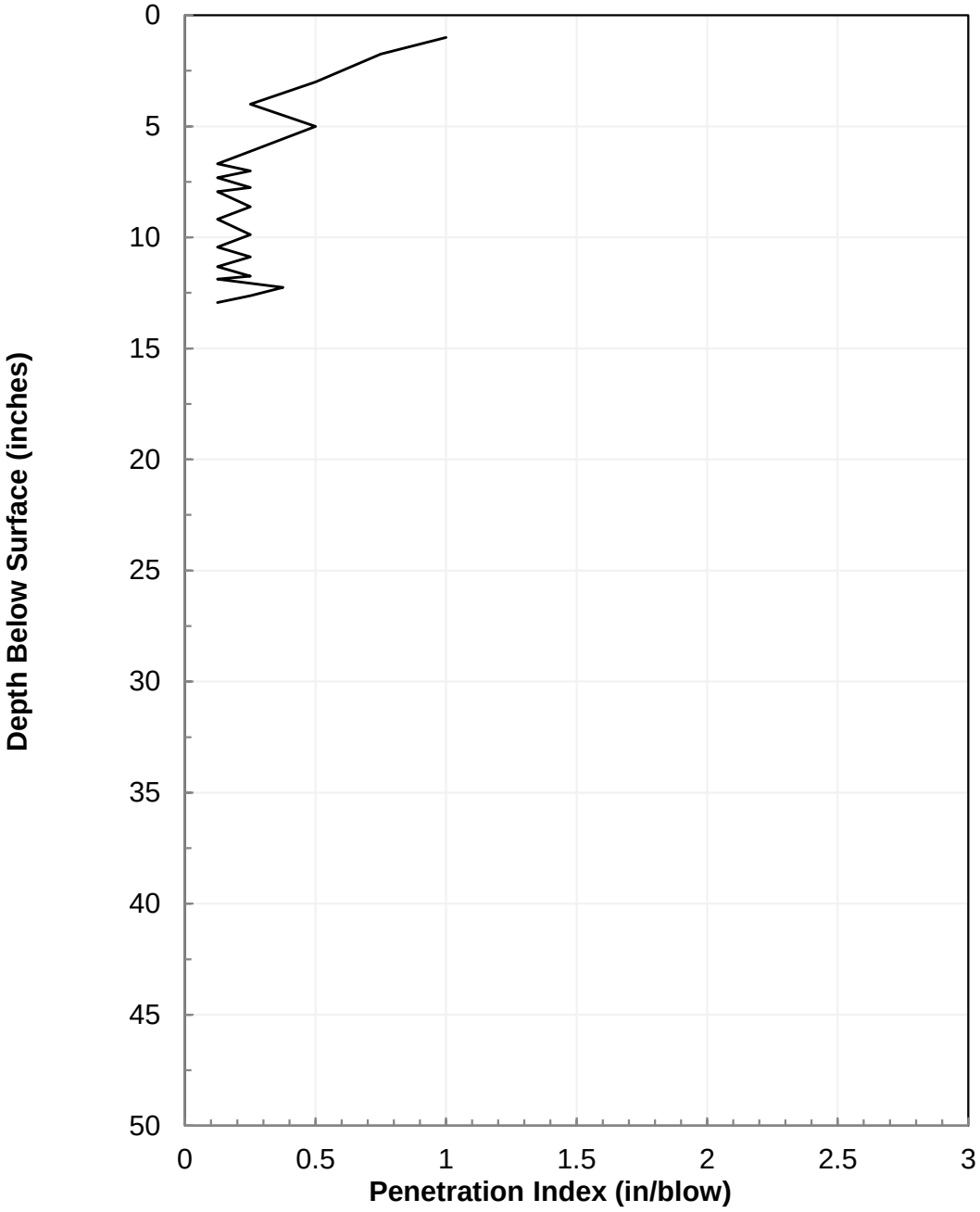
Layer Strength Diagram
DCP Test
Area A
Test T-A4



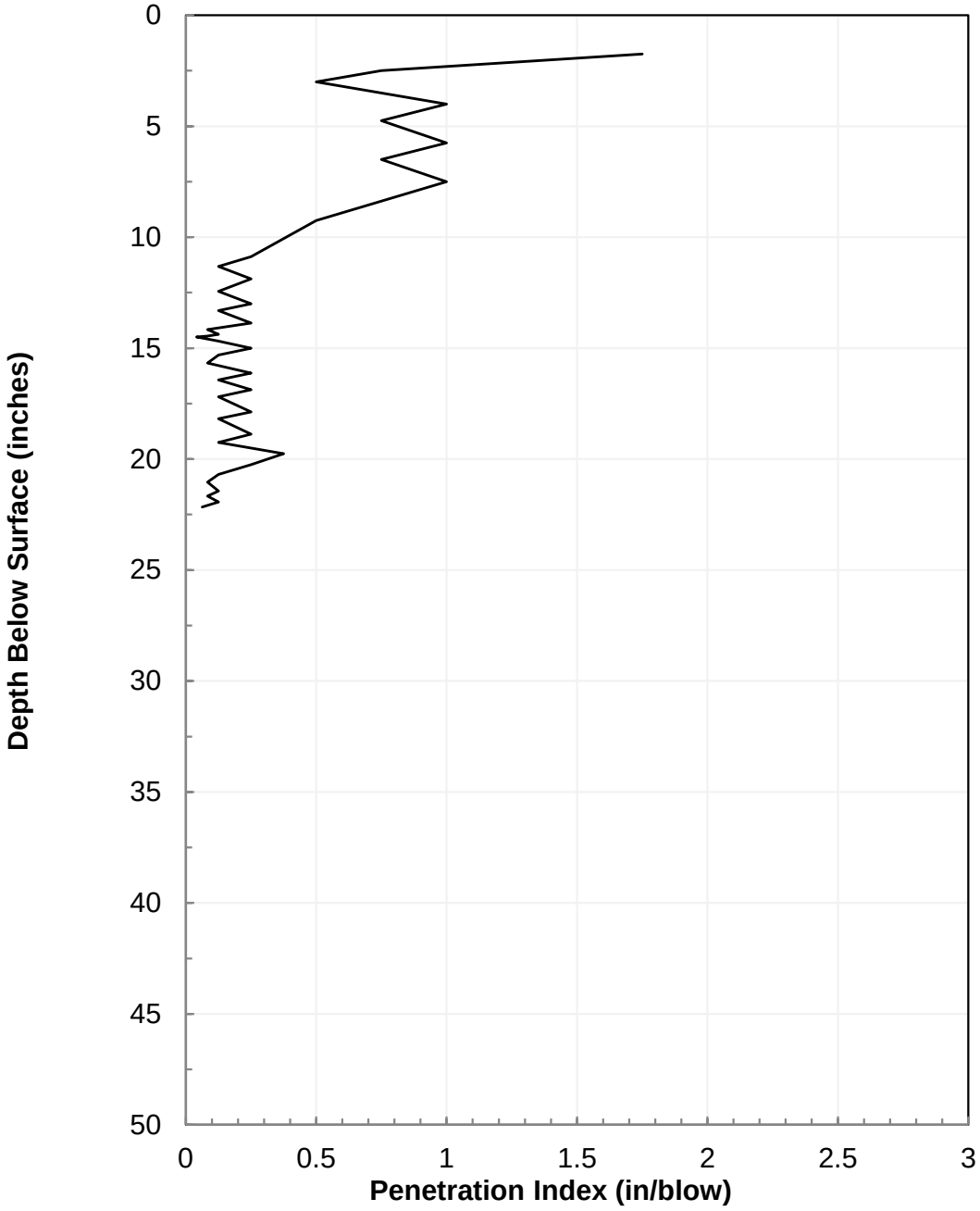
Layer Strength Diagram
DCP Test
Area A
Test T-A5



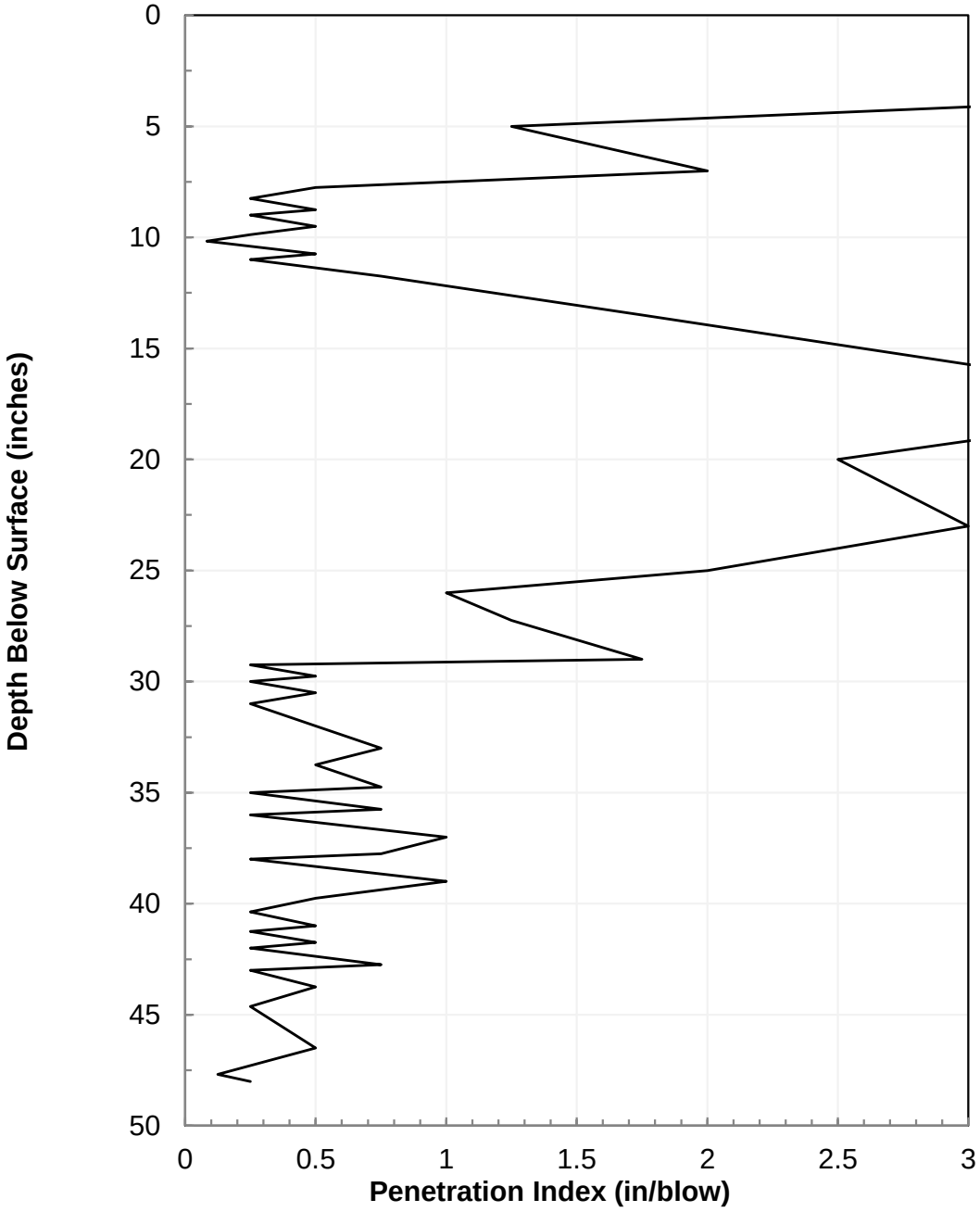
Layer Strength Diagram
DCP Test
Area A
Test T-A6



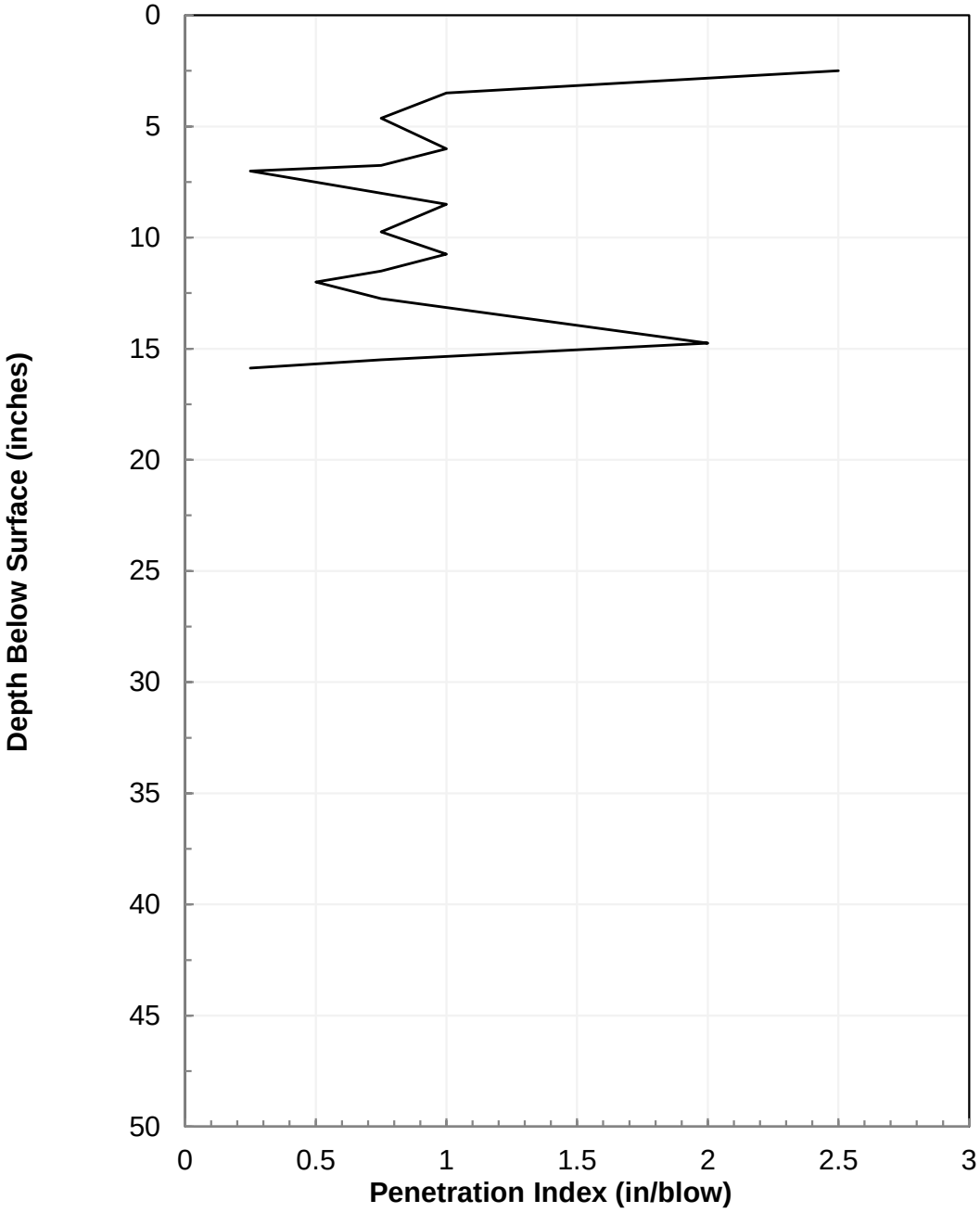
Layer Strength Diagram
DCP Test
Area B
Test T-B1



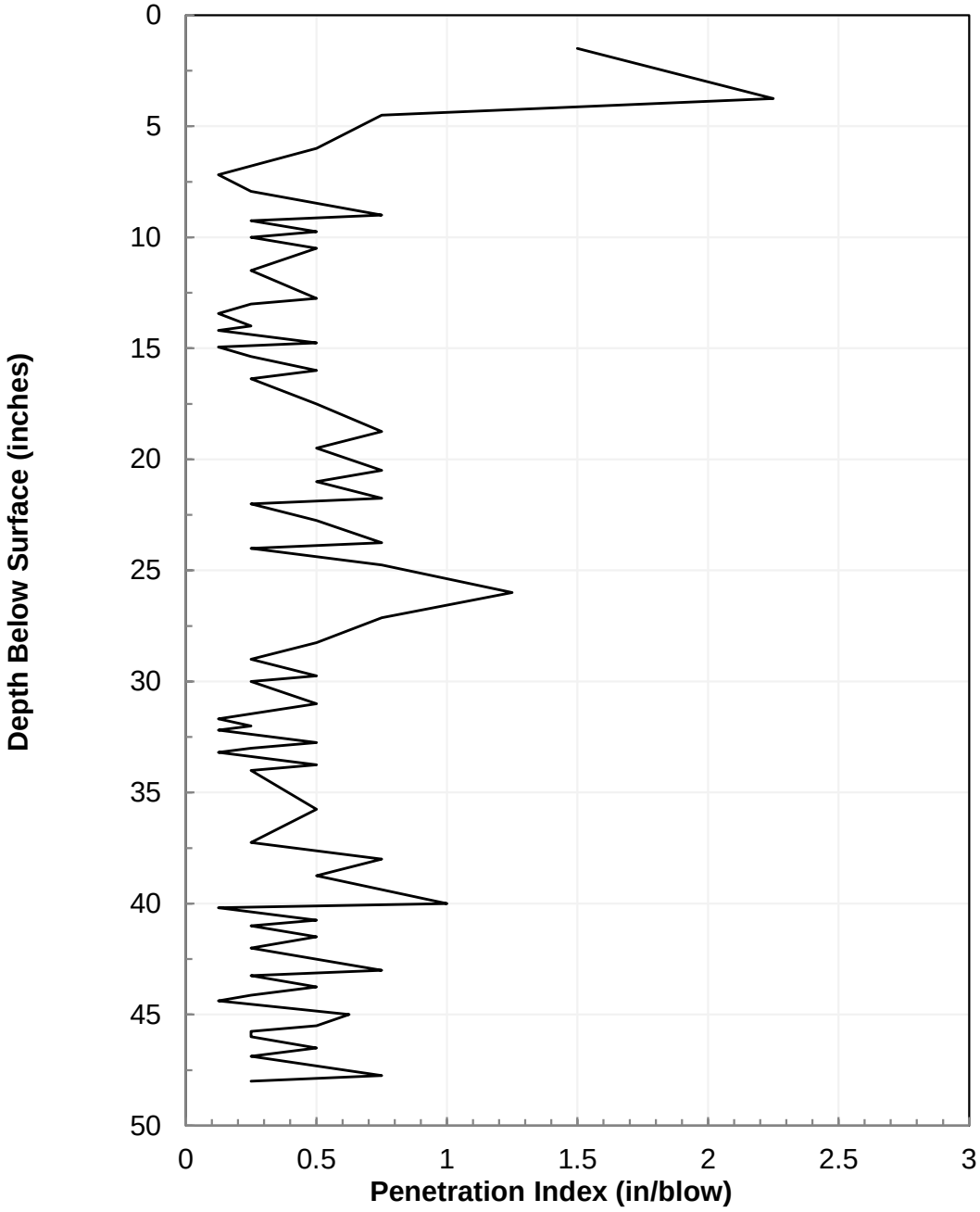
Layer Strength Diagram
DCP Test
Area B
Test T-B2



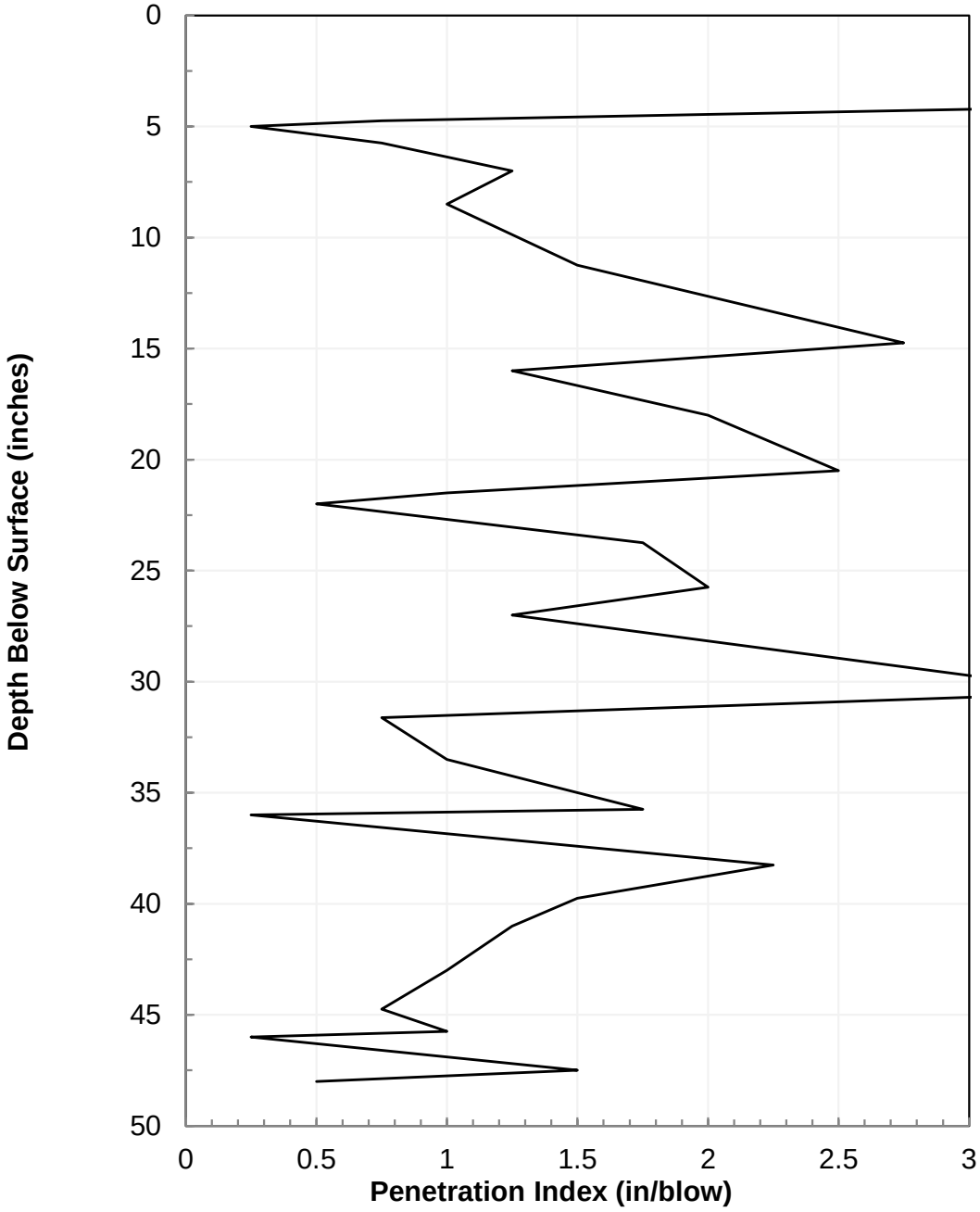
Layer Strength Diagram
DCP Test
Area B
Test T-B3



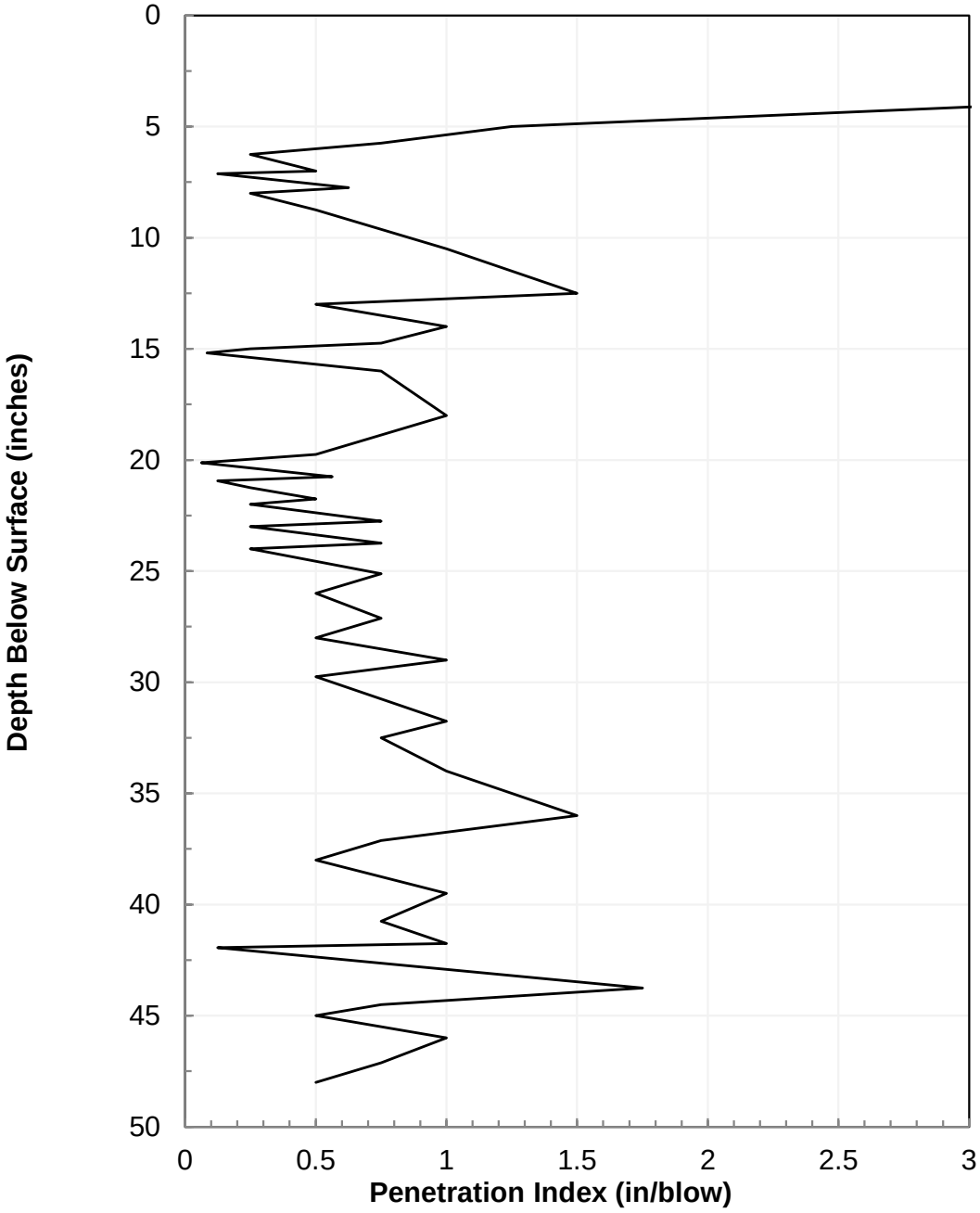
Layer Strength Diagram
DCP Test
Area B
Test T-B4



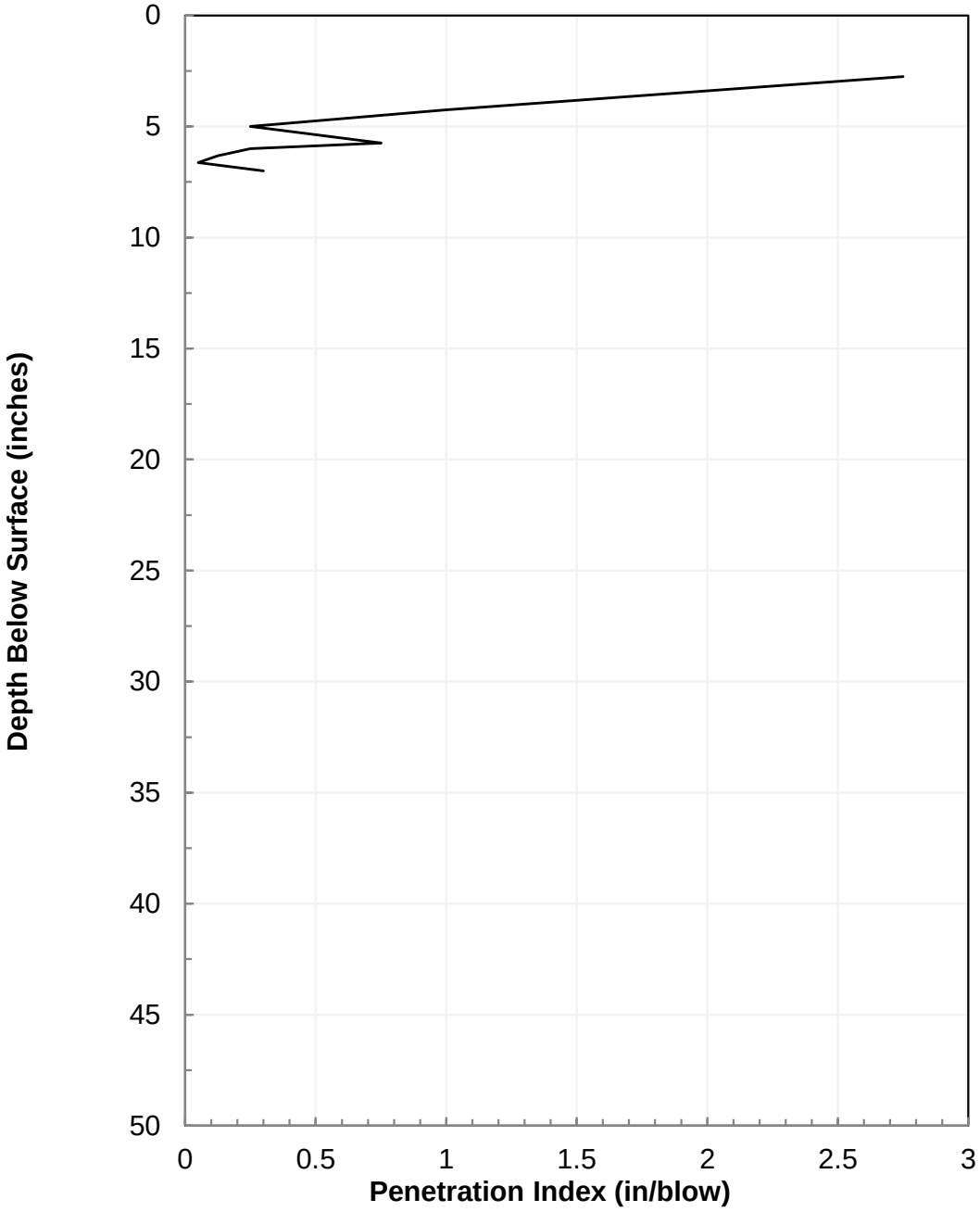
Layer Strength Diagram
DCP Test
Area B
Test T-B5



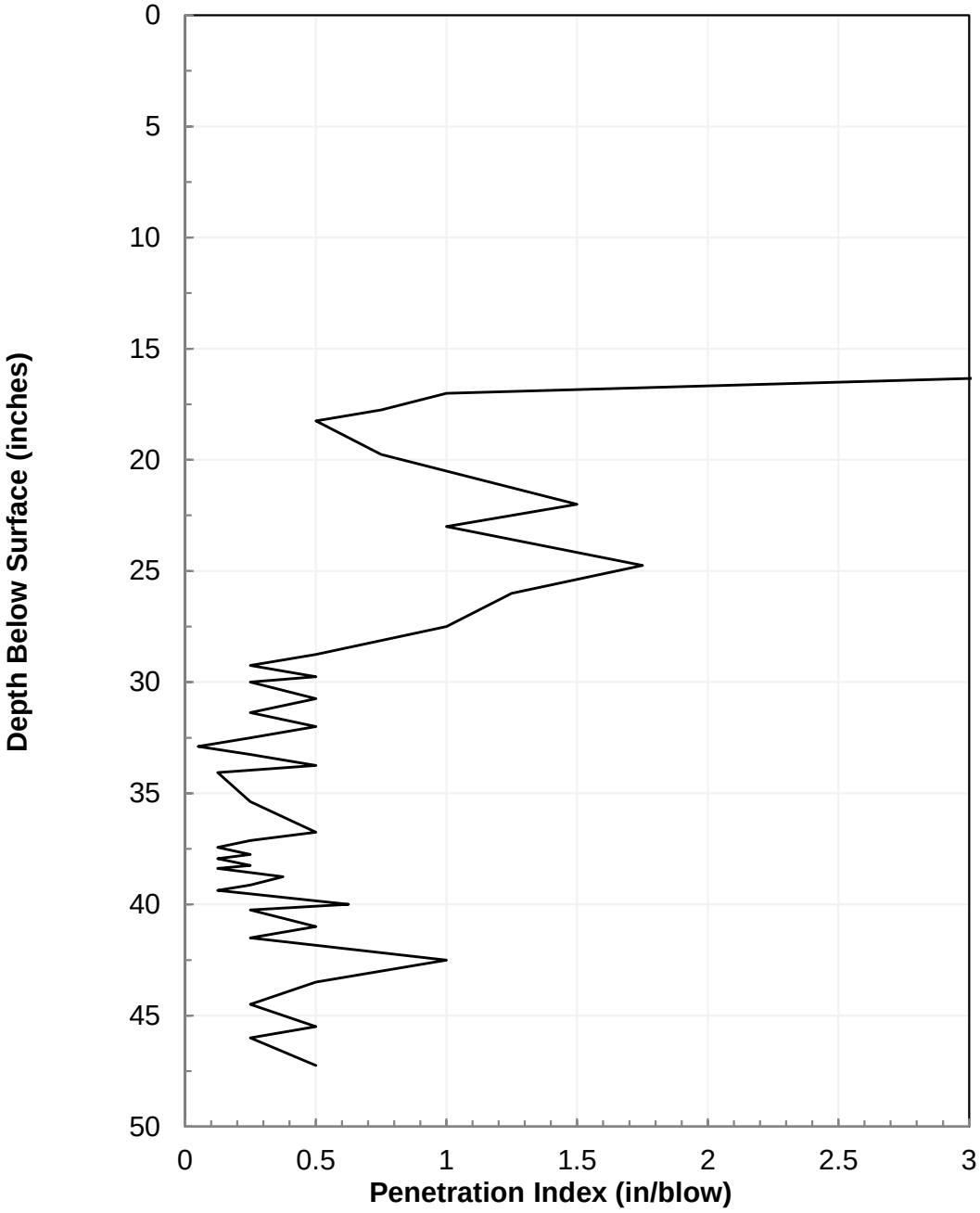
Layer Strength Diagram
DCP Test
Area B
Test T-B6



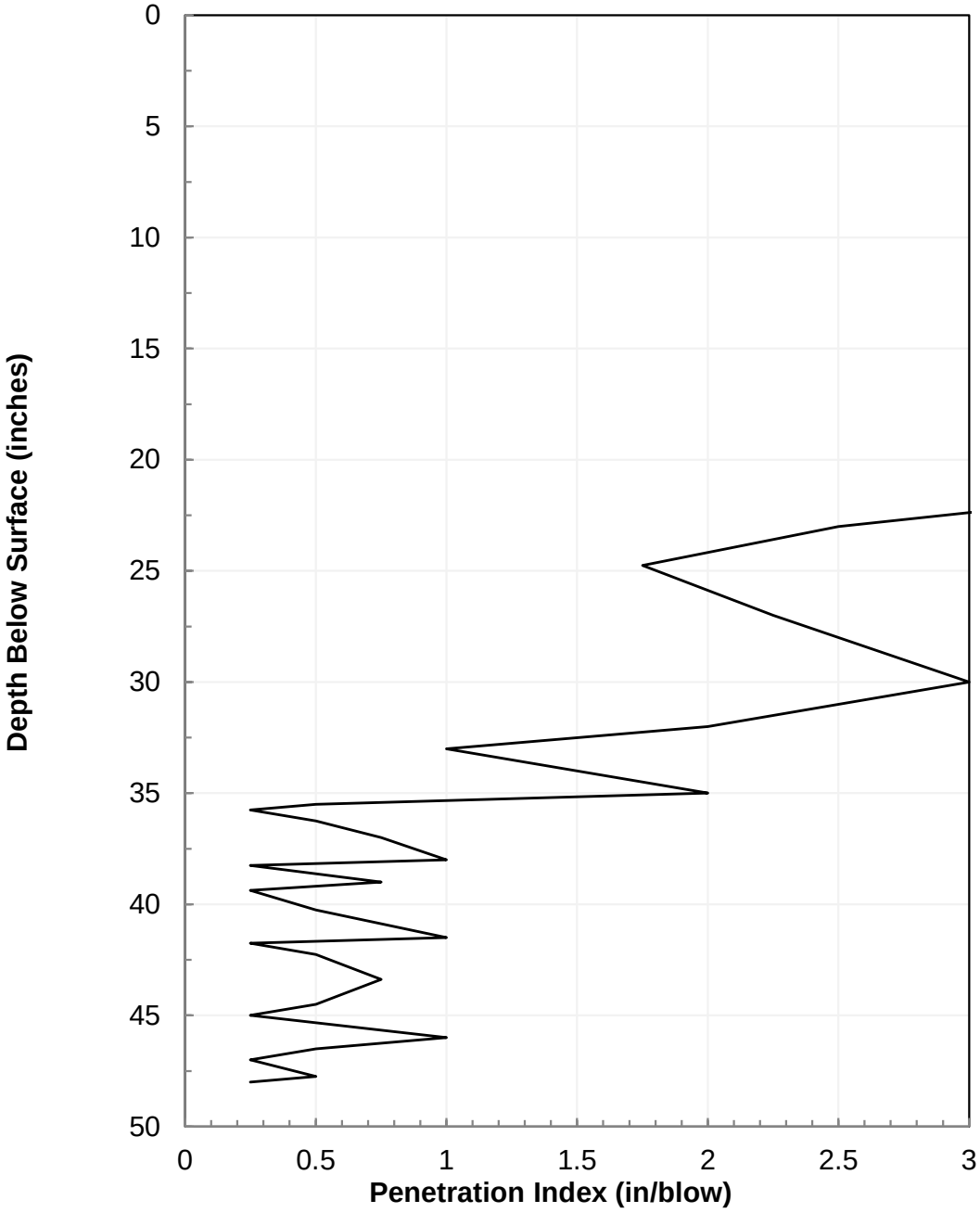
Layer Strength Diagram
DCP Test
Area C
Test T-C1



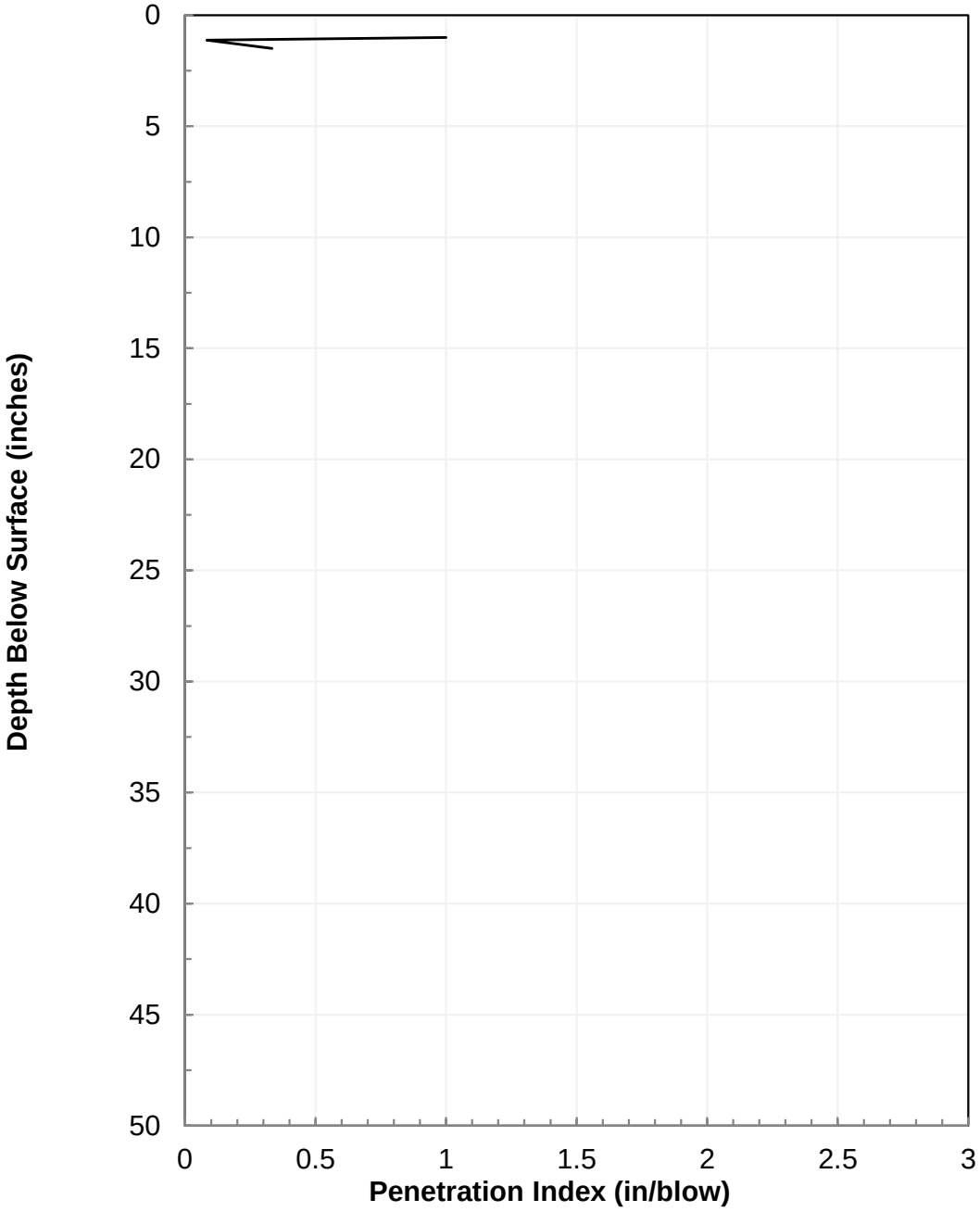
Layer Strength Diagram
DCP Test
Area C
Test T-C2



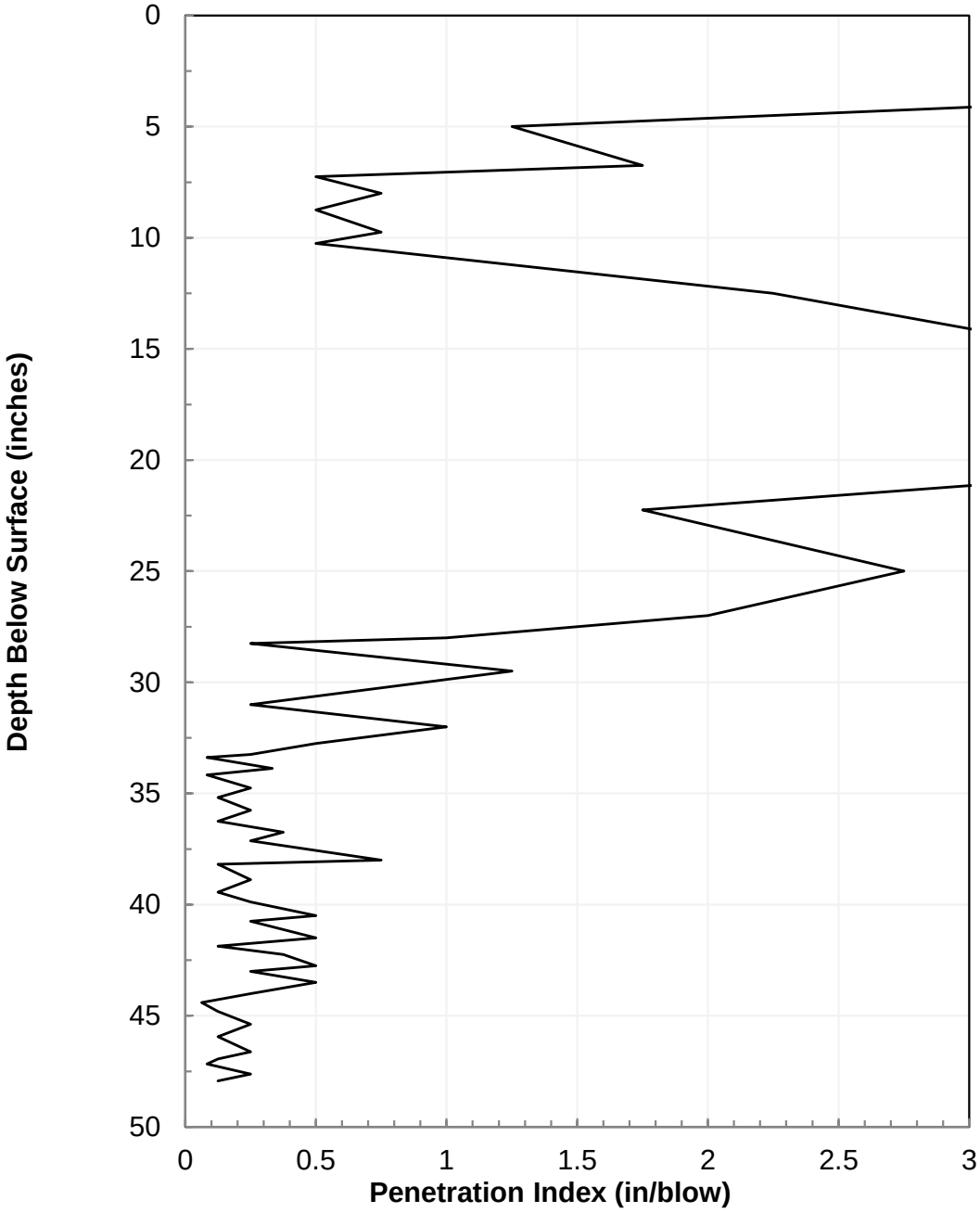
Layer Strength Diagram
DCP Test
Area C
Test T-C3



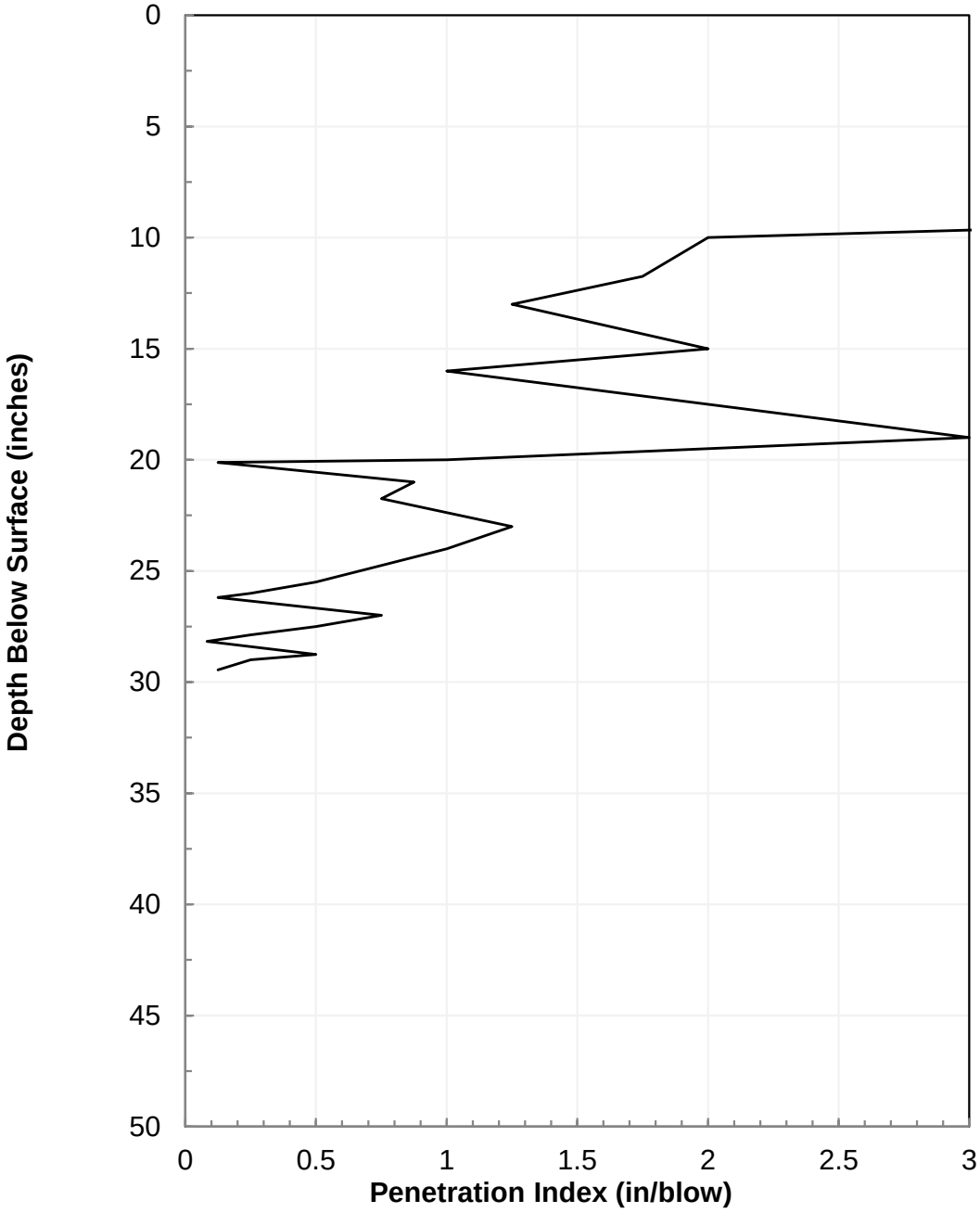
Layer Strength Diagram
DCP Test
Area D
Test T-D2a



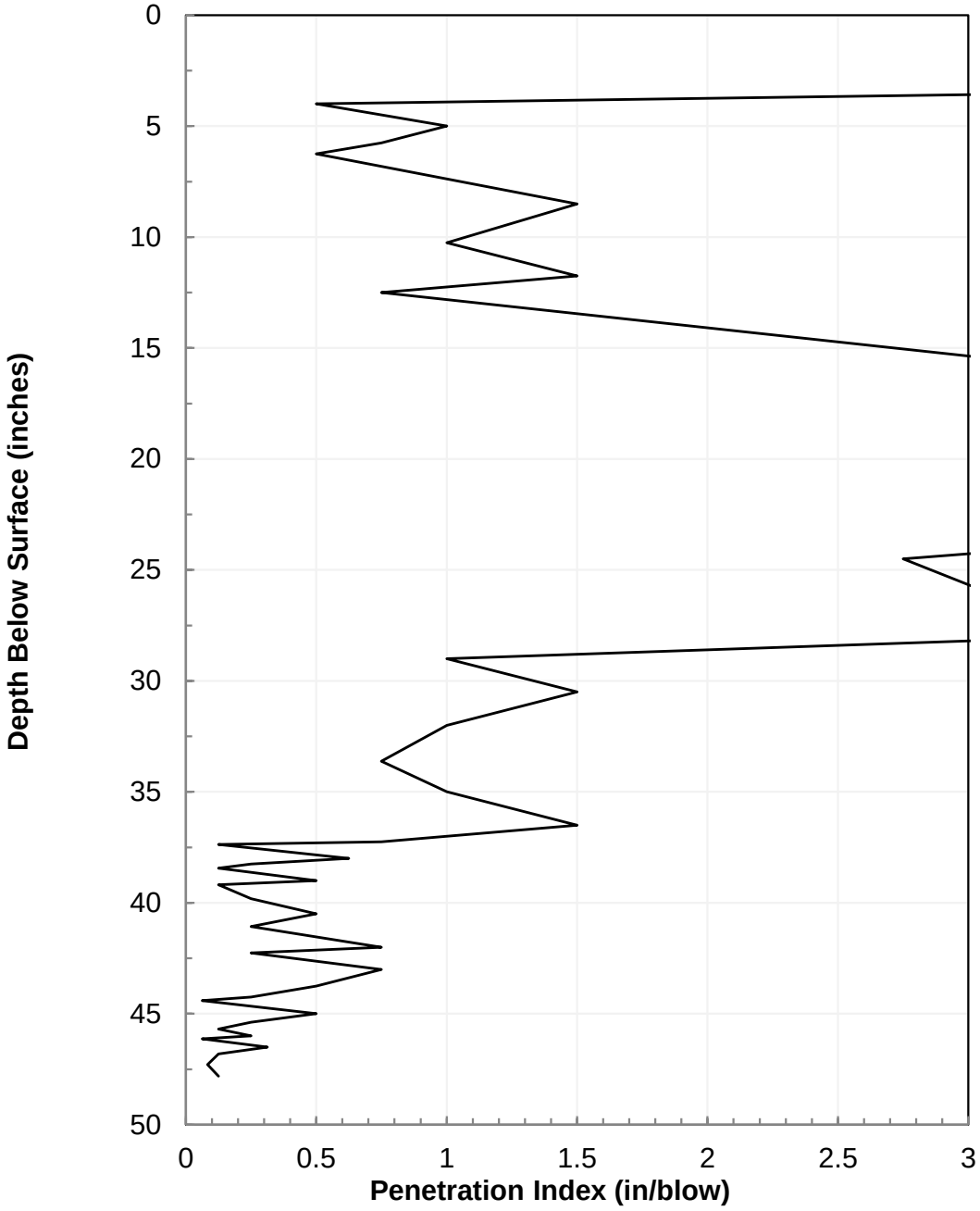
Layer Strength Diagram
DCP Test
Area D
Test T-D2b



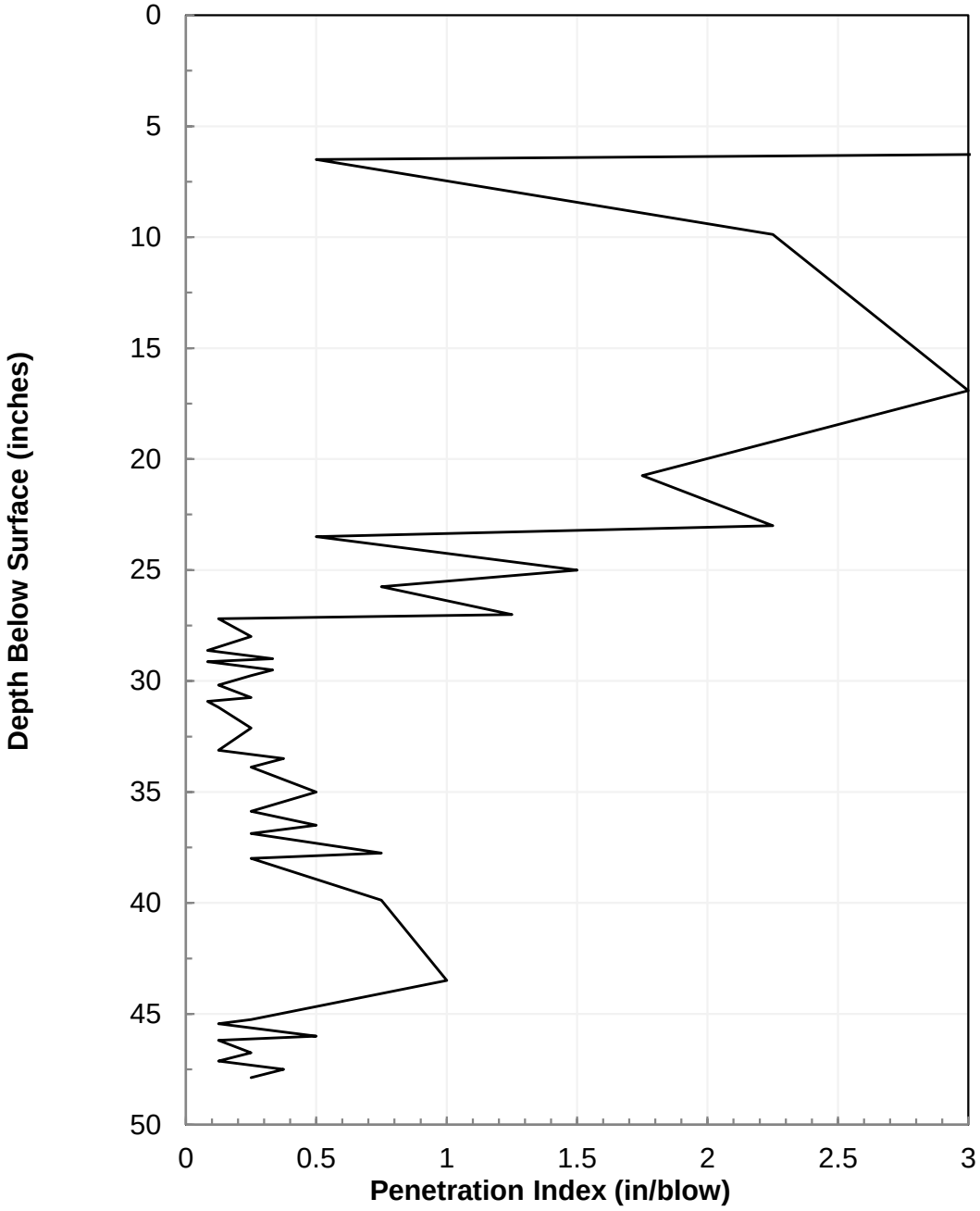
Layer Strength Diagram
DCP Test
Area D
Test T-D3



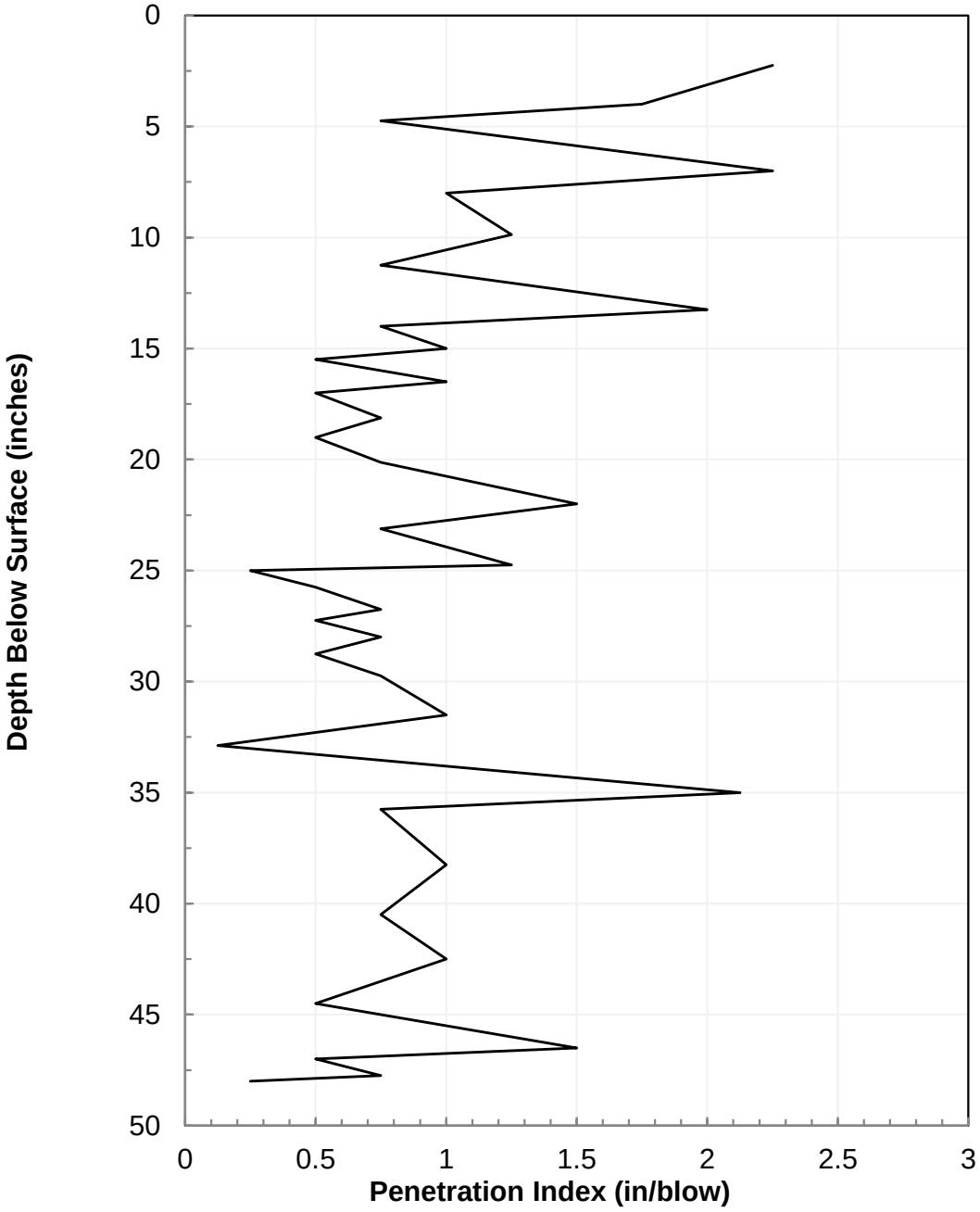
Layer Strength Diagram
DCP Test
Area E
Test T-E1



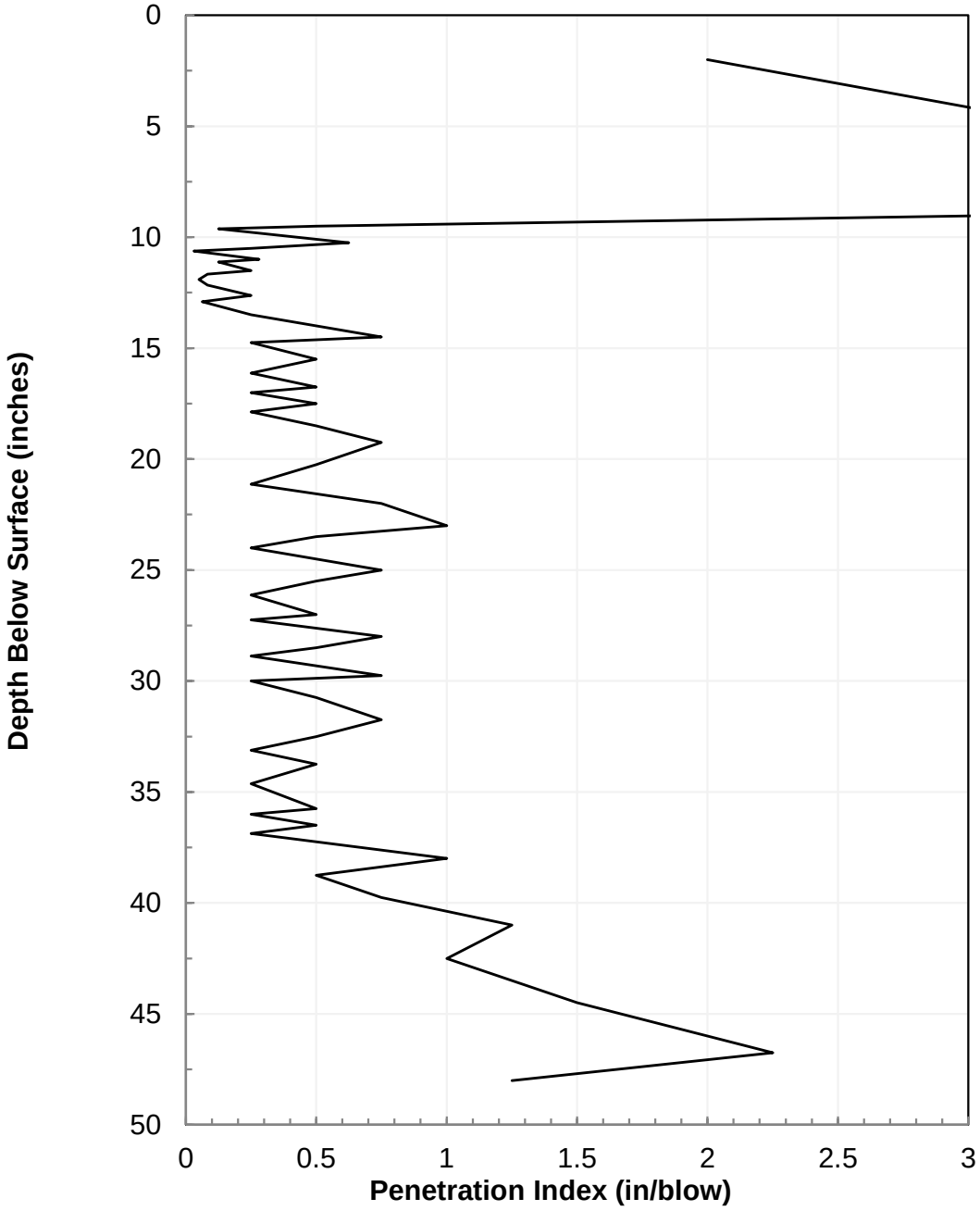
Layer Strength Diagram
DCP Test
Area E
Test T-E2



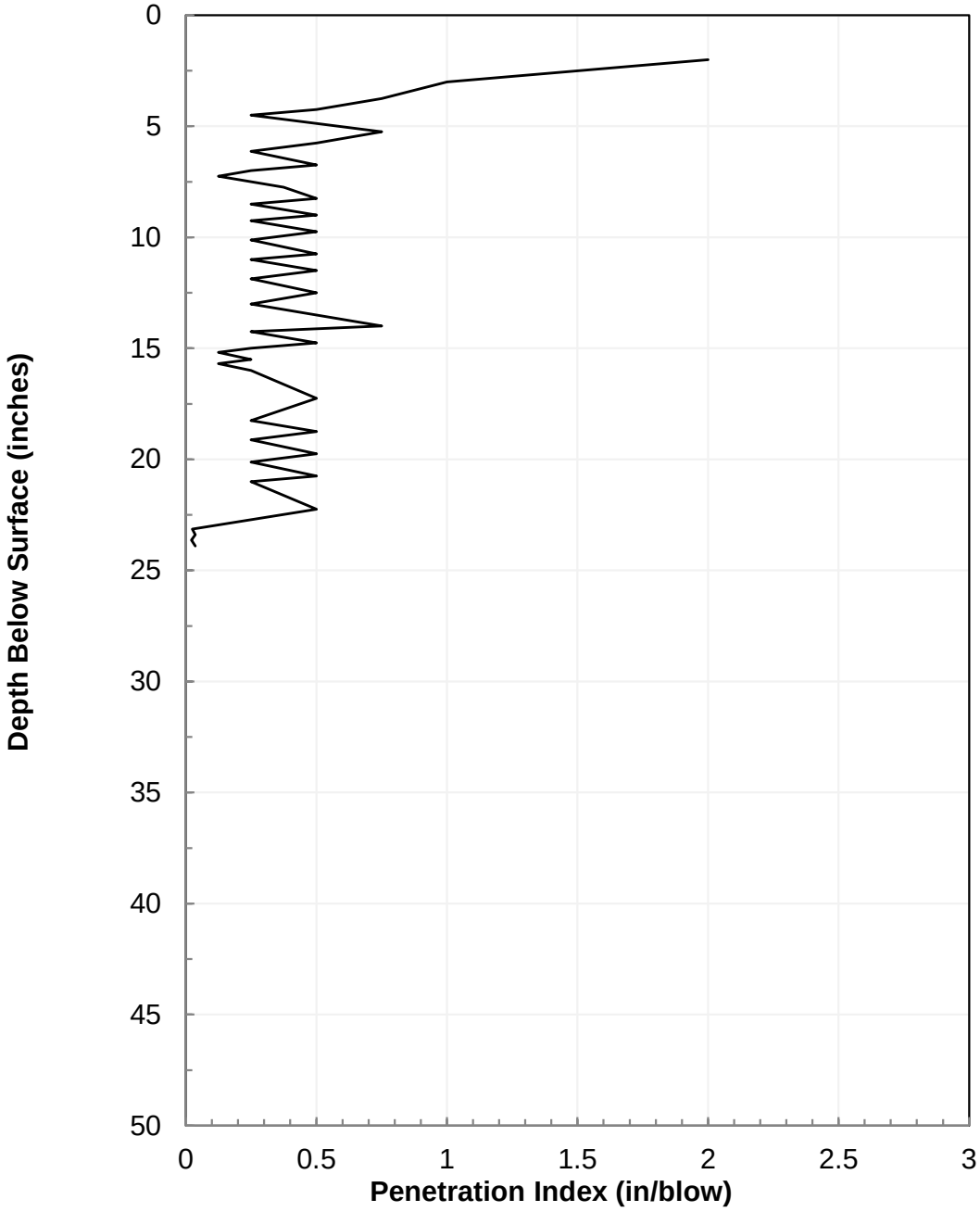
Layer Strength Diagram
DCP Test
Area E
Test T-E3



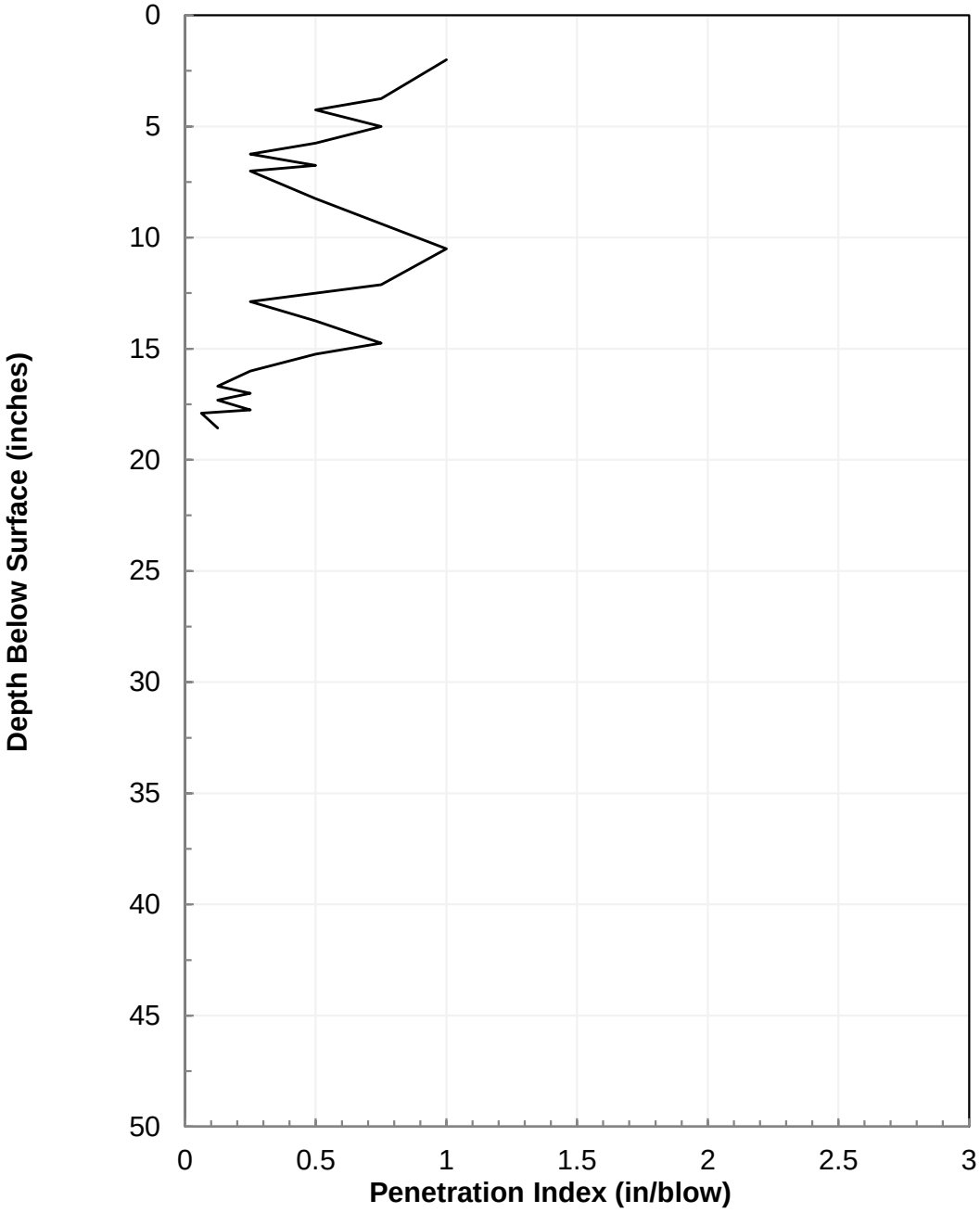
Layer Strength Diagram
DCP Test
Area E
Test T-E4



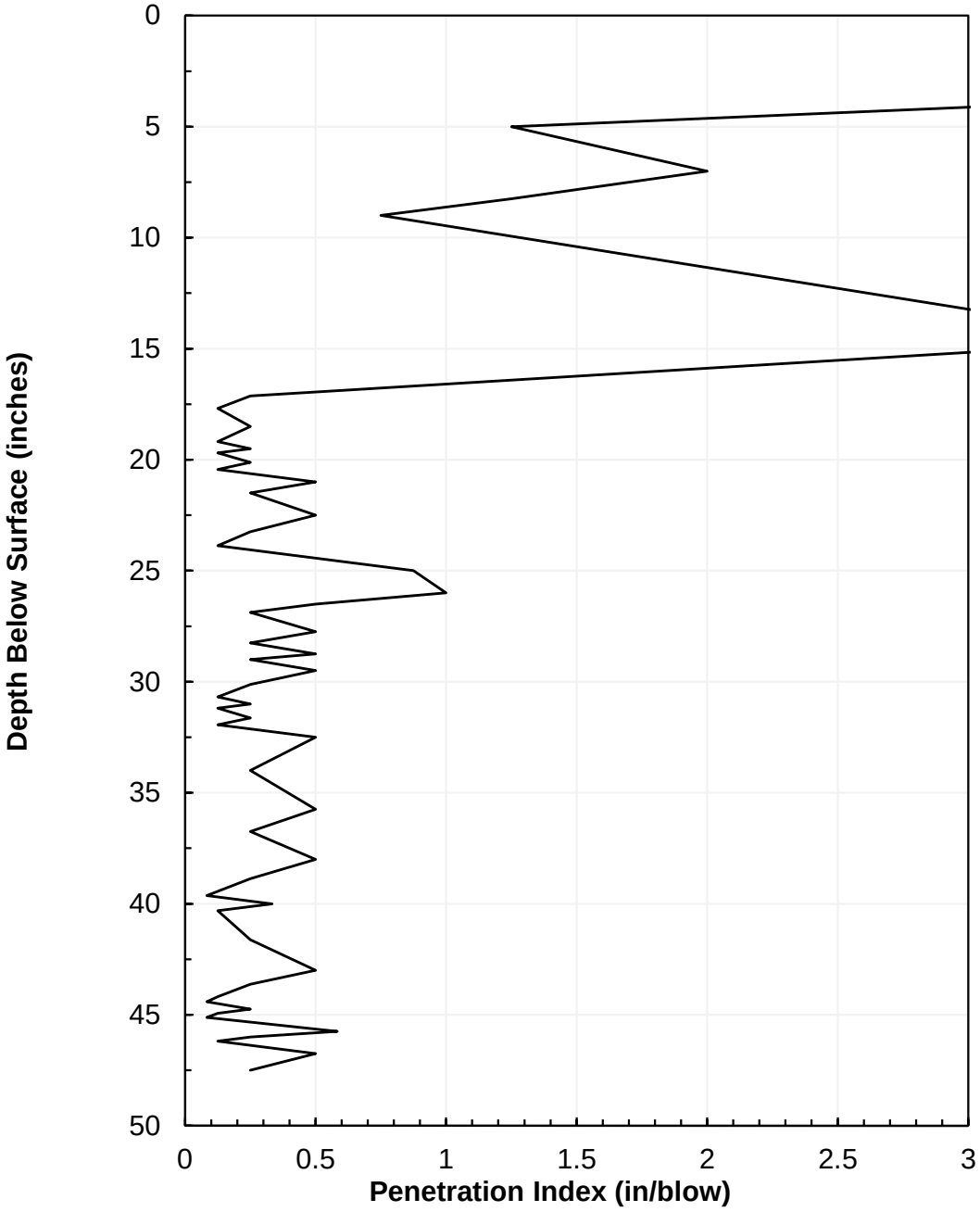
Layer Strength Diagram
DCP Test
Area F
Test T-F1



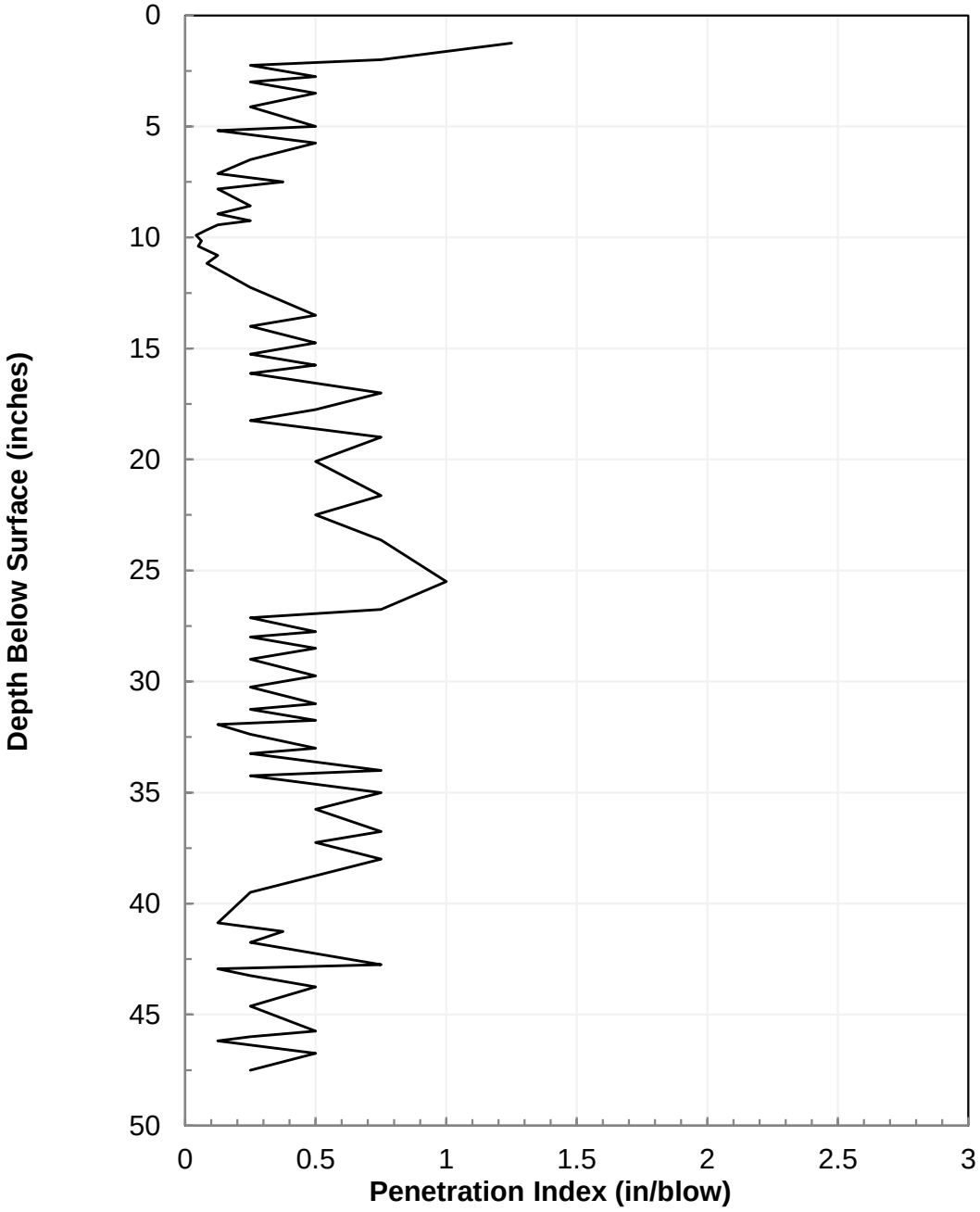
Layer Strength Diagram
DCP Test
Area F
Test T-F2a



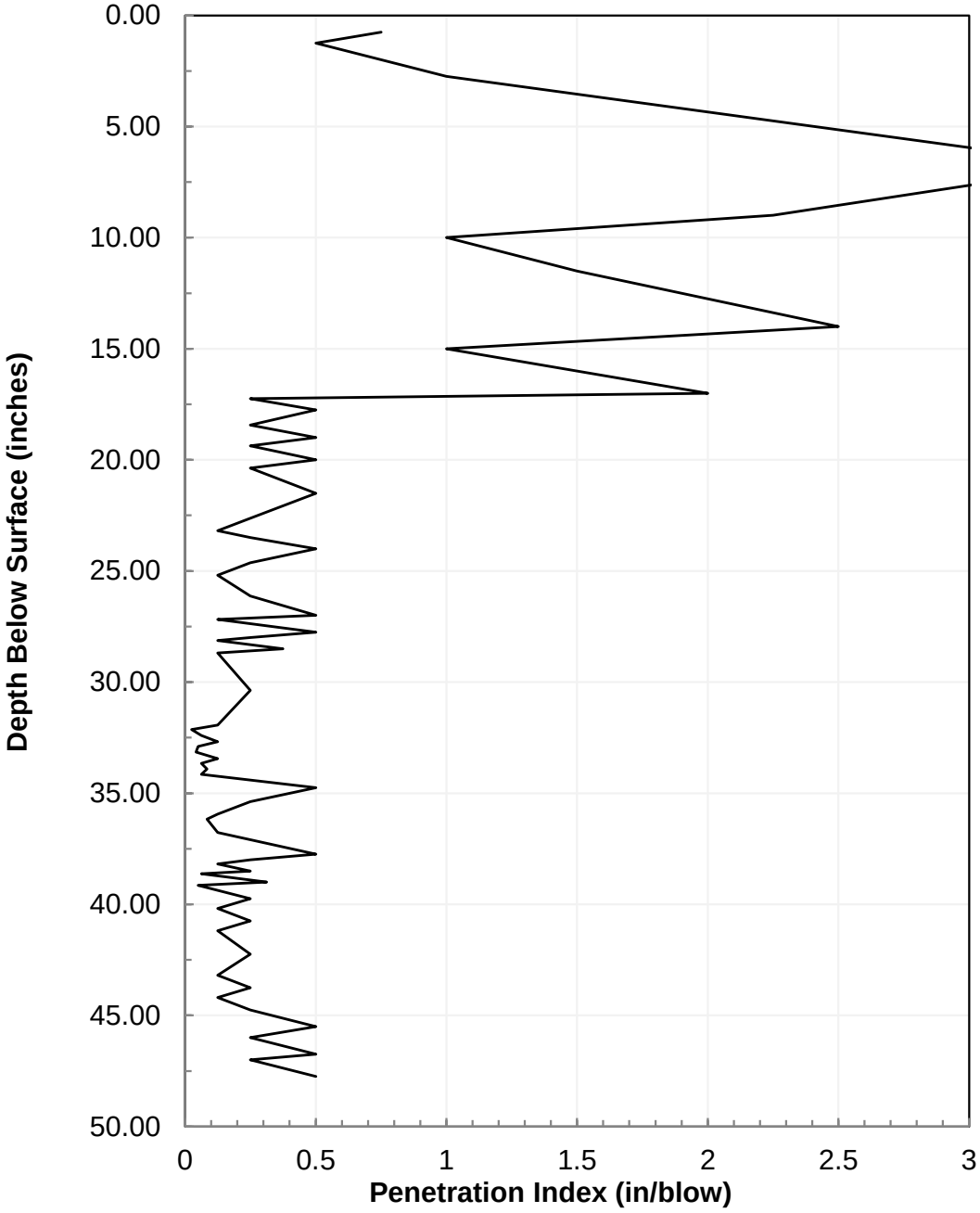
Layer Strength Diagram
DCP Test
Area F
Test T-F3



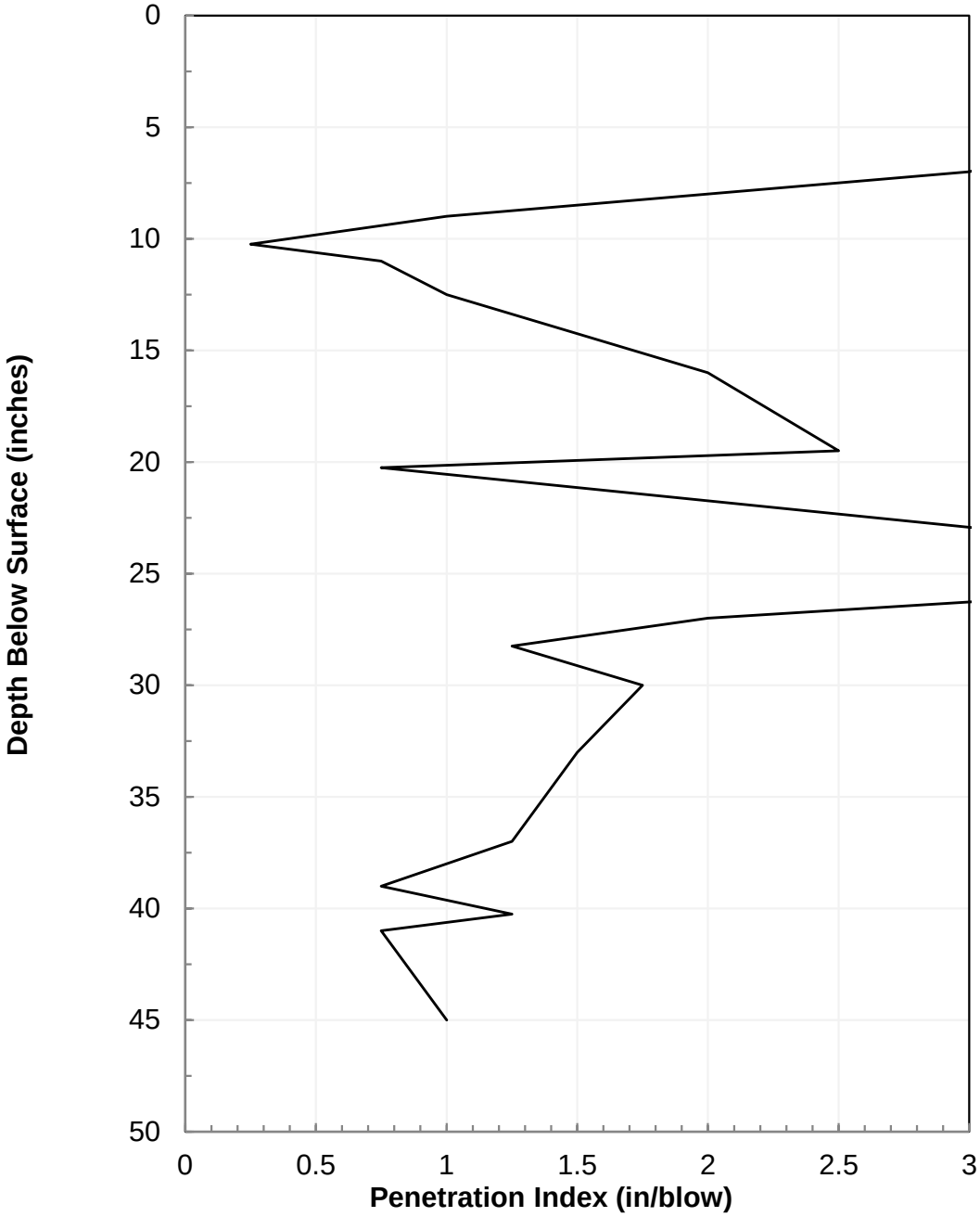
Layer Strength Diagram
DCP Test
Area F
Test T-F4



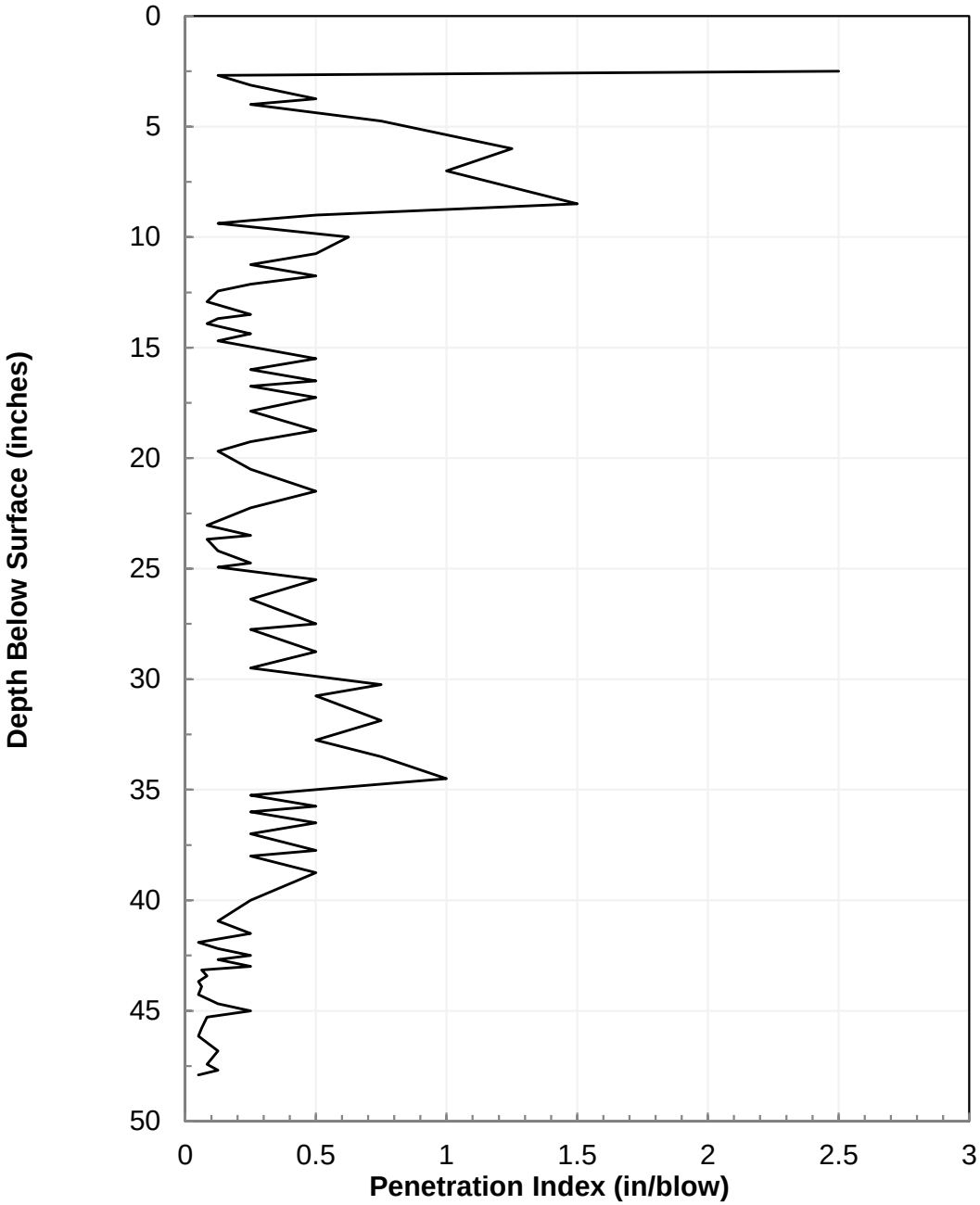
Layer Strength Diagram
DCP Test
Area G
Test T-G1



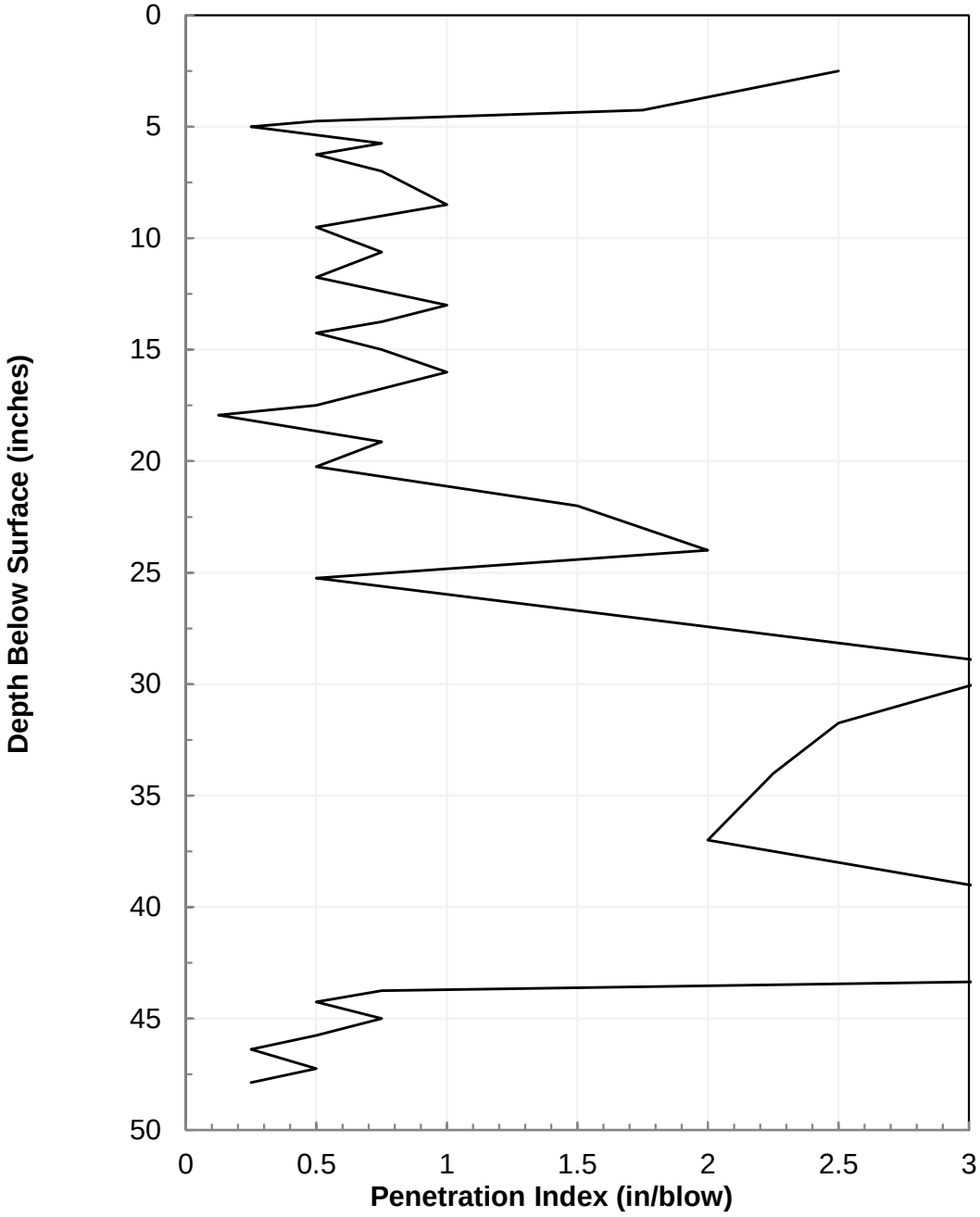
Layer Strength Diagram
DCP Test
Area G
Test T-G2



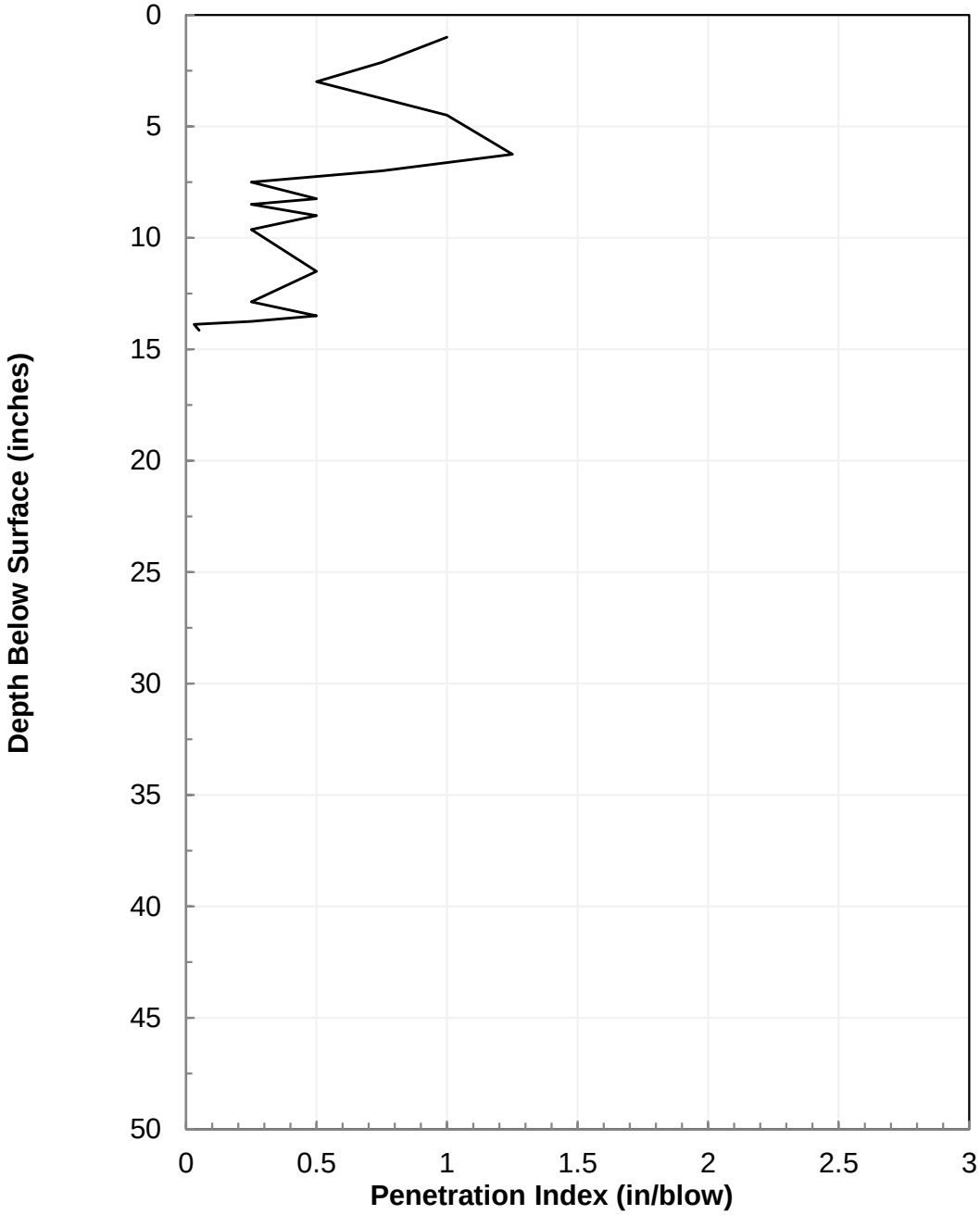
Layer Strength Diagram
DCP Test
Area G
Test T-G3



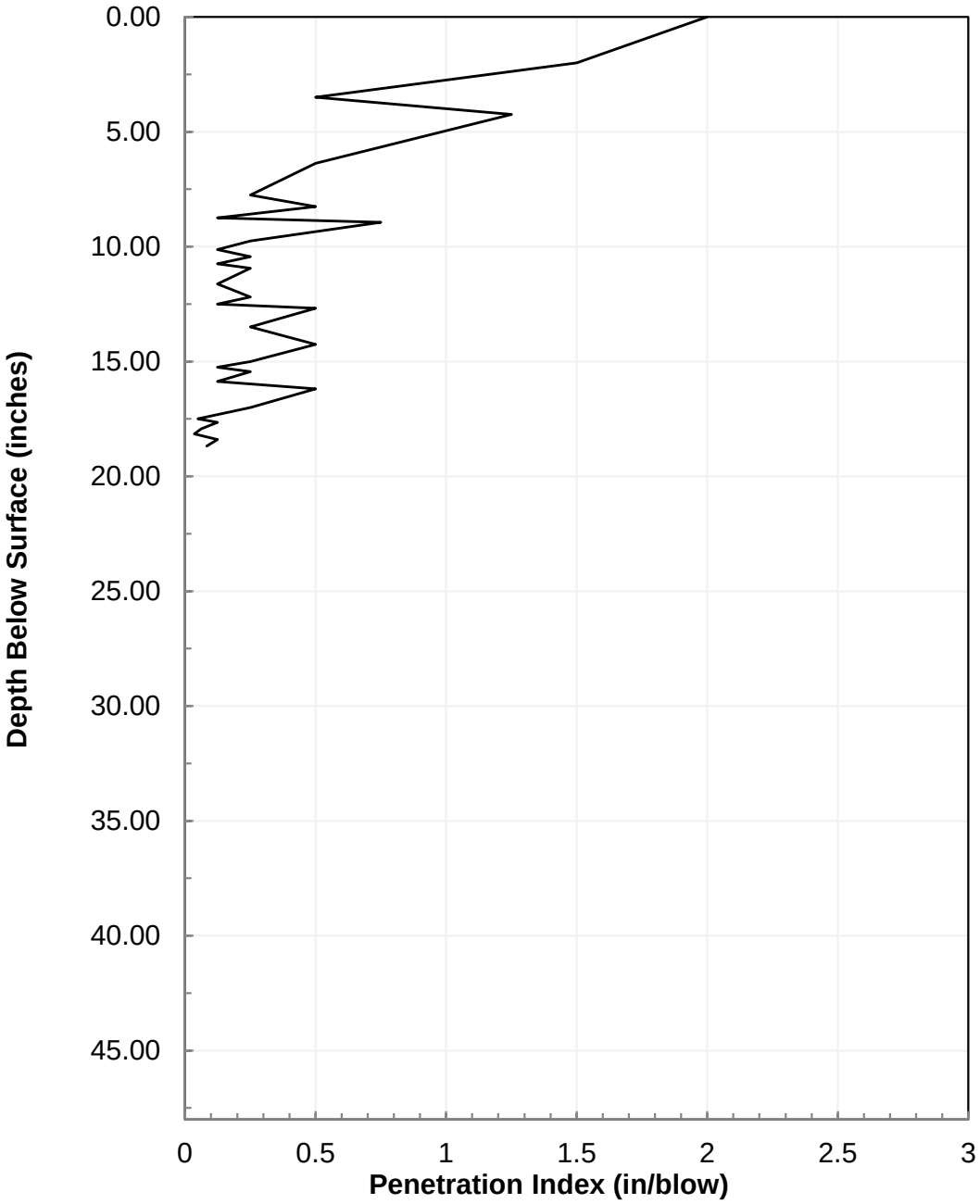
Layer Strength Diagram
DCP Test
Area G
Test T-G4



Layer Strength Diagram
DCP Test
Area G
Test T-G5a



Layer Strength Diagram
DCP Test
Area G
Test T-G5b



APPENDIX B: LABORATORY TEST RESULTS

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	---	Sample Type:	---	Tested By:	jbr
Sample ID:	---	Test Date:	05/05/14	Checked By:	jdt
Depth :	---	Test Id:	293668		

pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
B1	SS-3	4.0-6.0 ft	Moist, gray clay	6.4	6.4
---	T-B2	1.0-2.0 ft	Moist,brown sand with gravel	7.2	6.6
---	T-E1	2.5-3.5 ft	Moist, yellowish brown sandy clay with gravel	6.3	5.8
---	T-F2	1.0-2.0 ft	Moist, brown sand with gravel	5.8	5.3
---	T-G4	1.0-2.0 ft	Moist, dark brown sand with gravel	7.0	6.6

Notes: Sample Preparation: screened through #10 sieve

Method A, pH meter used

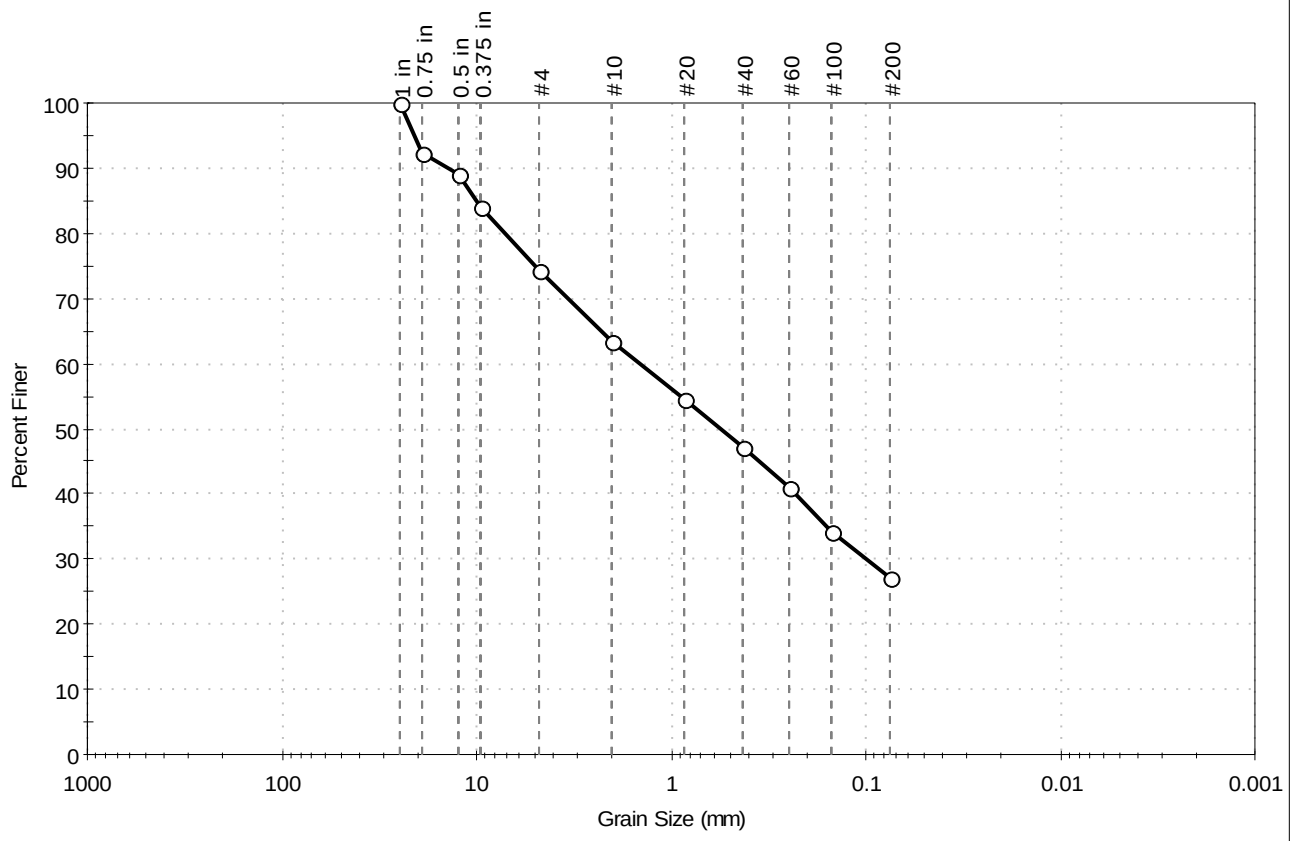
Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	---	Sample Type:	---	Tested By:	jbr
Sample ID:	---	Test Date:	05/05/14	Checked By:	jdt
Depth :	---	Test Id:	293659		

Amount of Material Passing #200 Sieve - ASTM D1140

Boring ID	Sample ID	Depth	Visual Description	Fines, %
B1	SS-6	10.0-12.0 ft	Moist, yellowish brown silt with sand	77.4
---	T-C2	1.5-2.5 ft	Moist, dark brown silty sand with gravel	38.1
---	T-E1	2.5-3.5 ft	Moist, yellowish brown sandy clay with gravel	58.9

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	B1	Sample Type:	jar	Tested By:	jbr
Sample ID:	SS-2	Test Date:	05/02/14	Checked By:	jdt
Depth :	2.0-4.0 ft	Test Id:	293660		
Test Comment:	---				
Sample Description:	Moist, dark yellowish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	25.5	47.2	27.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	92		
0.5 in	12.50	89		
0.375 in	9.50	84		
#4	4.75	74		
#10	2.00	63		
#20	0.85	55		
#40	0.42	47		
#60	0.25	41		
#100	0.15	34		
#200	0.075	27		

Coefficients

D_{85} = 10.0676 mm	D_{30} = 0.0984 mm
D_{60} = 1.4334 mm	D_{15} = N/A
D_{50} = 0.5490 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

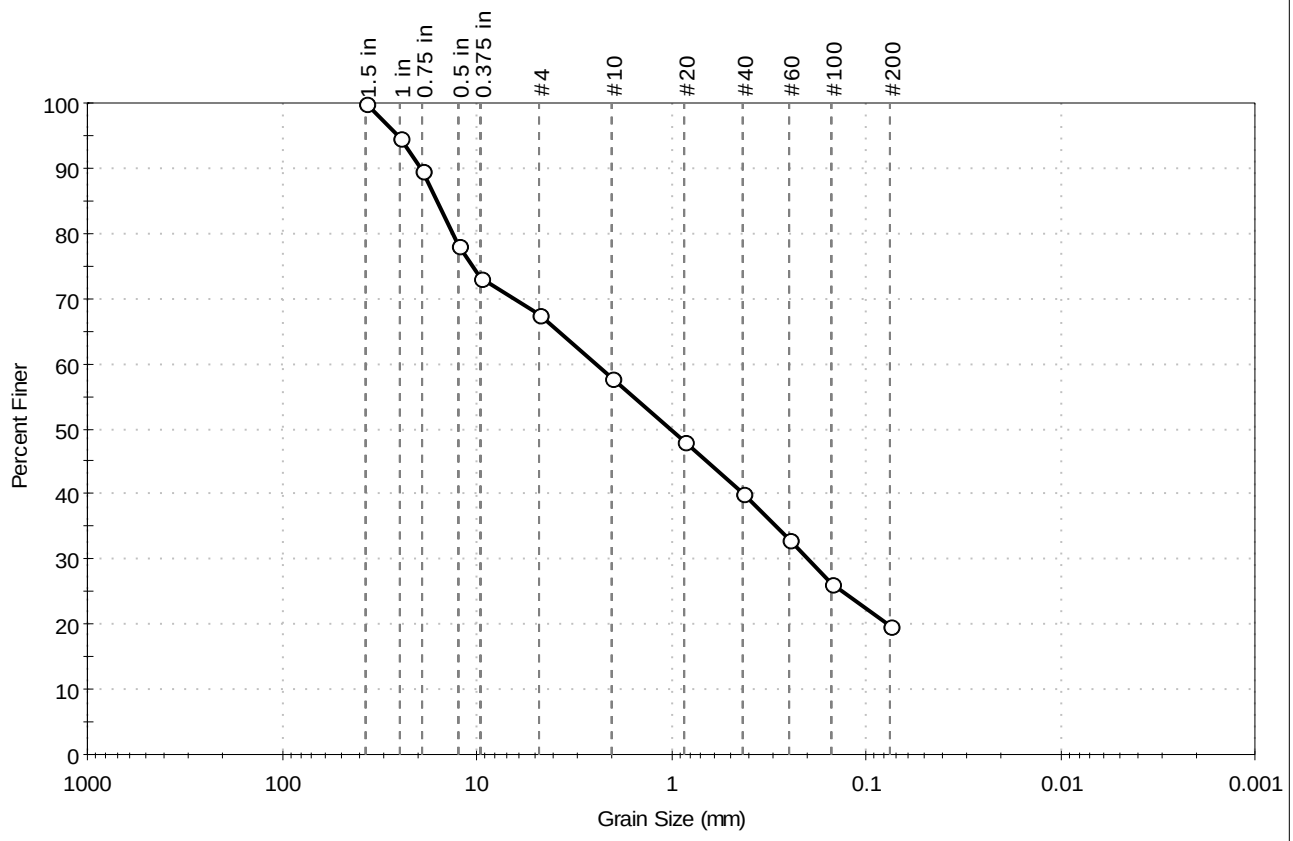
Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	T-B4	Test Date:	05/05/14	Checked By:	jdt
Depth :	0.5-1.0 ft	Test Id:	293661		
Test Comment:	---				
Sample Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	32.6	47.6	19.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	95		
0.75 in	19.00	90		
0.5 in	12.50	78		
0.375 in	9.50	73		
#4	4.75	67		
#10	2.00	58		
#20	0.85	48		
#40	0.42	40		
#60	0.25	33		
#100	0.15	26		
#200	0.075	20		

Coefficients

D_{85} = 16.0569 mm	D_{30} = 0.2003 mm
D_{60} = 2.4402 mm	D_{15} = N/A
D_{50} = 0.9974 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

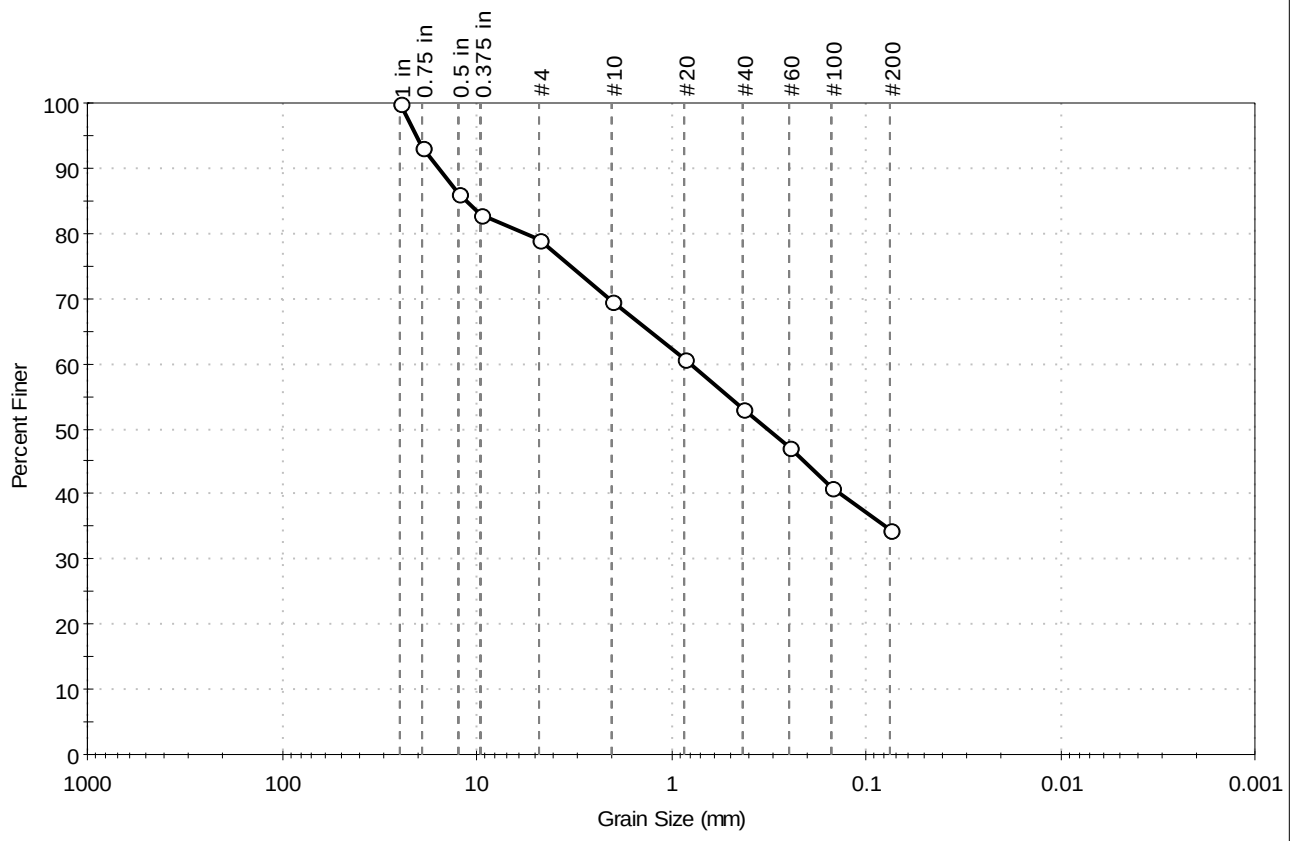
Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting EXPRESS

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	T-E3	Test Date:	05/05/14	Checked By:	jdt
Depth :	1.5-2.5 ft	Test Id:	293662		
Test Comment:	---				
Sample Description:	Moist, dark brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	21.0	44.6	34.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	93		
0.5 in	12.50	86		
0.375 in	9.50	83		
#4	4.75	79		
#10	2.00	70		
#20	0.85	61		
#40	0.42	53		
#60	0.25	47		
#100	0.15	41		
#200	0.075	34		

Coefficients

D_{85} = 11.2619 mm D_{30} = N/A
D_{60} = 0.7989 mm D_{15} = N/A
D_{50} = 0.3207 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

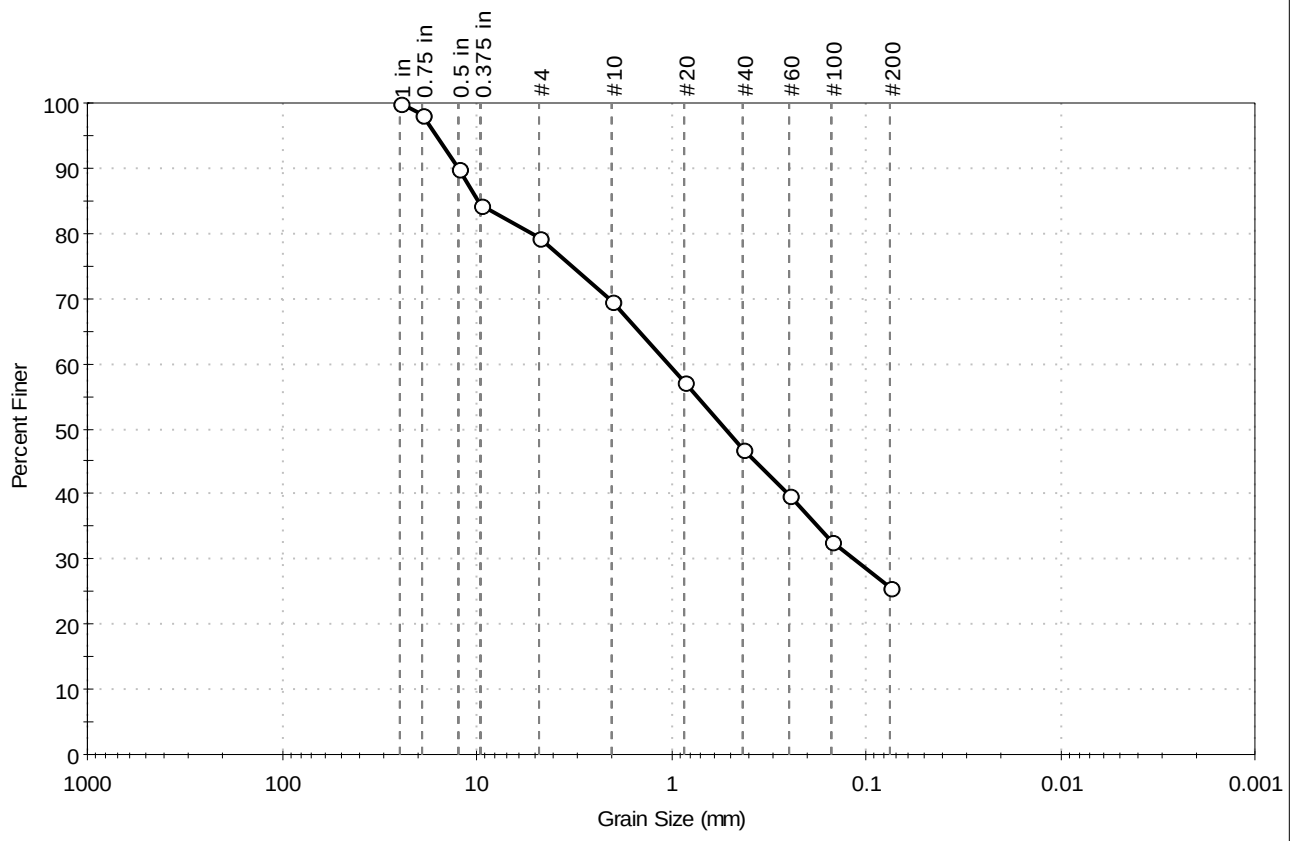
Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting EXPRESS

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	T-G3	Test Date:	05/05/14	Checked By:	jdt
Depth :	2.0-3.0 ft	Test Id:	293663		
Test Comment:	---				
Sample Description:	Moist, brown clayey sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	20.5	53.8	25.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	98		
0.5 in	12.50	90		
0.375 in	9.50	84		
#4	4.75	79		
#10	2.00	70		
#20	0.85	57		
#40	0.42	47		
#60	0.25	40		
#100	0.15	33		
#200	0.075	26		

Coefficients

D_{85} = 9.8480 mm
D_{30} = 0.1150 mm
D_{60} = 1.0231 mm
D_{15} = N/A
D_{50} = 0.5233 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

ANALYTICAL REPORT

Lab Number:	L1408760
Client:	Geo Testing Express 125 Nagog Park Acton, MA 01720
ATTN:	Joe Tomei
Phone:	(978) 893-1241
Project Name:	PROJECT ORANGE/GEOTECHNICAL
Project Number:	GTX: 301711
Report Date:	05/02/14

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1408760
Report Date: 05/02/14

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1408760-01	B-1, SS-3, 4.0-6.0 FT.	Not Specified	04/25/14 00:00
L1408760-02	T-B2, 1.0-2.0 FT.	Not Specified	04/25/14 00:00
L1408760-03	T-E1, 2.5-3.5 FT.	Not Specified	04/25/14 00:00
L1408760-04	T-F2, 1.0-2.0 FT.	Not Specified	04/25/14 00:00
L1408760-05	T-G4, 1.0-2.0 FT.	Not Specified	04/25/14 00:00

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1408760
Project Number:	GTX: 301711	**Report Date:**	05/02/14

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1408760
Project Number:	GTX: 301711	**Report Date:**	05/02/14

Case Narrative (continued)

Sulfate

L1408760-03 has an elevated detection limit due to the dilution required by the sample matrix.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly Stenstrom

Title: Technical Director/Representative Date: 05/02/14

INORGANICS
&
MISCELLANEOUS

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711
Lab Number: L1408760
Report Date: 05/02/14

SAMPLE RESULTS

Lab ID: L1408760-01
Client ID: B-1, SS-3, 4.0-6.0 FT.
Sample Location: Not Specified
Matrix: Soil
Date Collected: 04/25/14 00:00
Date Received: 04/25/14
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	89.1		%	0.100	NA	1	-	04/25/14 19:12	30,2540G	RT
Chloride	ND		mg/kg	11	--	1	-	04/30/14 10:49	1,9251	LA
Sulfate	180		mg/kg	110	--	1	-	04/30/14 16:45	1,9038	MP

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1408760
Report Date: 05/02/14

SAMPLE RESULTS

Lab ID: L1408760-02
Client ID: T-B2, 1.0-2.0 FT.
Sample Location: Not Specified
Matrix: Soil

Date Collected: 04/25/14 00:00
Date Received: 04/25/14
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	82.6		%	0.100	NA	1	-	04/25/14 19:12	30,2540G	RT
Chloride	ND		mg/kg	11	--	1	-	04/30/14 10:50	1,9251	LA
Sulfate	ND		mg/kg	120	--	1	-	04/30/14 16:45	1,9038	MP

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711
Lab Number: L1408760
Report Date: 05/02/14

SAMPLE RESULTS

Lab ID: L1408760-03
Client ID: T-E1, 2.5-3.5 FT.
Sample Location: Not Specified
Matrix: Soil
Date Collected: 04/25/14 00:00
Date Received: 04/25/14
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	78.1		%	0.100	NA	1	-	04/25/14 19:12	30,2540G	RT
Chloride	ND		mg/kg	13	--	1	-	04/30/14 10:50	1,9251	LA
Sulfate	ND		mg/kg	320	--	2.5	-	04/30/14 16:45	1,9038	MP

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711
Lab Number: L1408760
Report Date: 05/02/14

SAMPLE RESULTS

Lab ID: L1408760-04
Client ID: T-F2, 1.0-2.0 FT.
Sample Location: Not Specified
Matrix: Soil
Date Collected: 04/25/14 00:00
Date Received: 04/25/14
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	88.8		%	0.100	NA	1	-	04/25/14 19:12	30,2540G	RT
Chloride	ND		mg/kg	10	--	1	-	04/30/14 10:51	1,9251	LA
Sulfate	ND		mg/kg	110	--	1	-	04/30/14 16:45	1,9038	MP

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711
Lab Number: L1408760
Report Date: 05/02/14

SAMPLE RESULTS

Lab ID: L1408760-05
Client ID: T-G4, 1.0-2.0 FT.
Sample Location: Not Specified
Matrix: Soil
Date Collected: 04/25/14 00:00
Date Received: 04/25/14
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	87.4		%	0.100	NA	1	-	04/25/14 19:12	30,2540G	RT
Chloride	ND		mg/kg	11	--	1	-	04/30/14 10:55	1,9251	LA
Sulfate	ND		mg/kg	110	--	1	-	04/30/14 16:45	1,9038	MP

Project Name: PROJECT ORANGE/GEOTECHNICAL **Lab Number:** L1408760

Project Number: GTX: 301711 **Report Date:** 05/02/14

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-05 Batch: WG686105-1										
Chloride	ND		mg/kg	10	--	1	-	04/30/14 11:26	1,9251	LA
General Chemistry - Westborough Lab for sample(s): 01-05 Batch: WG686251-1										
Sulfate	ND		mg/kg	100	--	1	-	04/30/14 16:45	1,9038	MP

Lab Control Sample Analysis

Batch Quality Control

Project Name: PROJECT ORANGE/GEOTECHNICAL

Project Number: GTX: 301711

Lab Number: L1408760

Report Date: 05/02/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-05 Batch: WG686105-2								
Chloride	93		-		89-109	-		35
General Chemistry - Westborough Lab Associated sample(s): 01-05 Batch: WG686251-2								
Sulfate	90		-		80-121	-		12

Matrix Spike Analysis
Batch Quality Control

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1408760
Report Date: 05/02/14

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG686105-4 QC Sample: L1408760-04 Client ID: T-F2, 1.0-2.0 FT.												
Chloride	ND	426	360	87		-	-		62-129	-		35
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG686251-4 QC Sample: L1408760-02 Client ID: T-B2, 1.0-2.0 FT.												
Sulfate	ND	239	340	140		-	-		22-183	-		12

Lab Duplicate Analysis
Batch Quality Control

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1408760
Report Date: 05/02/14

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG685240-1 QC Sample: L1408603-01 Client ID: DUP Sample						
Solids, Total	82.7	81.3	%	2		20
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG686105-3 QC Sample: L1408760-04 Client ID: T-F2, 1.0-2.0 FT.						
Chloride	ND	ND	mg/kg	NC		35
General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG686251-3 QC Sample: L1408760-02 Client ID: T-B2, 1.0-2.0 FT.						
Sulfate	ND	ND	mg/kg	NC		12

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1408760
Report Date: 05/02/14

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information **Custody Seal**

Cooler	
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1408760-01A	Bag	A	N/A	4.7	Y	Absent	CL-9251(28),SO4-9038(28),TS(7)
L1408760-02A	Bag	A	N/A	4.7	Y	Absent	CL-9251(28),SO4-9038(28),TS(7)
L1408760-03A	Bag	A	N/A	4.7	Y	Absent	CL-9251(28),SO4-9038(28),TS(7)
L1408760-04A	Bag	A	N/A	4.7	Y	Absent	CL-9251(28),SO4-9038(28),TS(7)
L1408760-05A	Bag	A	N/A	4.7	Y	Absent	CL-9251(28),SO4-9038(28),TS(7)

*Values in parentheses indicate holding time in days

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1408760
Project Number:	GTX: 301711	**Report Date:**	05/02/14

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1408760
Project Number:	GTX: 301711	**Report Date:**	05/02/14

Data Qualifiers

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1408760
Project Number:	GTX: 301711	**Report Date:**	05/02/14

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

Last revised April 15, 2014

The following analytes are not included in our NELAP Scope of Accreditation:

Westborough Facility
EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.
EPA 8260C: 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.
EPA 8330A/B: PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.
EPA 8270D: 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 625: 4-Chloroaniline, 4-Methylphenol.
SM4500: Soil: Total Phosphorus, TKN, NO2, NO3.
EPA 9071: Total Petroleum Hydrocarbons, Oil & Grease.

Mansfield Facility
EPA 8270D: Biphenyl.
EPA 2540D: TSS
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

Drinking Water
EPA 200.8: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

Non-Potable Water
EPA 200.8: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
EPA 200.7: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 4/25/14

ALPHA Job #: L1408760

ALPHA ANALYTICAL
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: GeoTesting Express
Address: 125 Nagog Park
Acton, MA 01720
Phone: 978-635-0424
Fax: 978-635-0266
Email: emarro@geotesting.com
jtomei@geotesting.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Project Orange / Geotechnical
Project Location:
Project #: GTX: 301711
Project Manager: Joe Tomei
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due: 05/2/14 Time:

Report Information - Data Deliverables

☐ FAX ☒ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: Chlorides	ANALYSIS: Sulfates	Sample Specific Comments	TOTAL # BOTTLES
08760 - 01	B-1, SS-3, 4.0-6.0 ft.			Soil		X	X		1
02	T-B2, 1.0-2.0 ft.			Soil		X	X		1
03	T-E1, 2.5-3.5 ft.			Soil		X	X		1
04	T-F2, 1.0-2.0 ft.			Soil		X	X		1
05	T-G4, 1.0-2.0 ft.			Soil		X	X		1

SAMPLE HANDLING

Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

Container Type	Bag																		
Preservative	NA																		

Relinquished By:	Date/Time	Received By:	Date/Time
[signature] GTX	4/25/14 1300	[signature]	4/25/14 1300
[signature]	4/25/14 1346	[signature]	4/25/14 1346

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

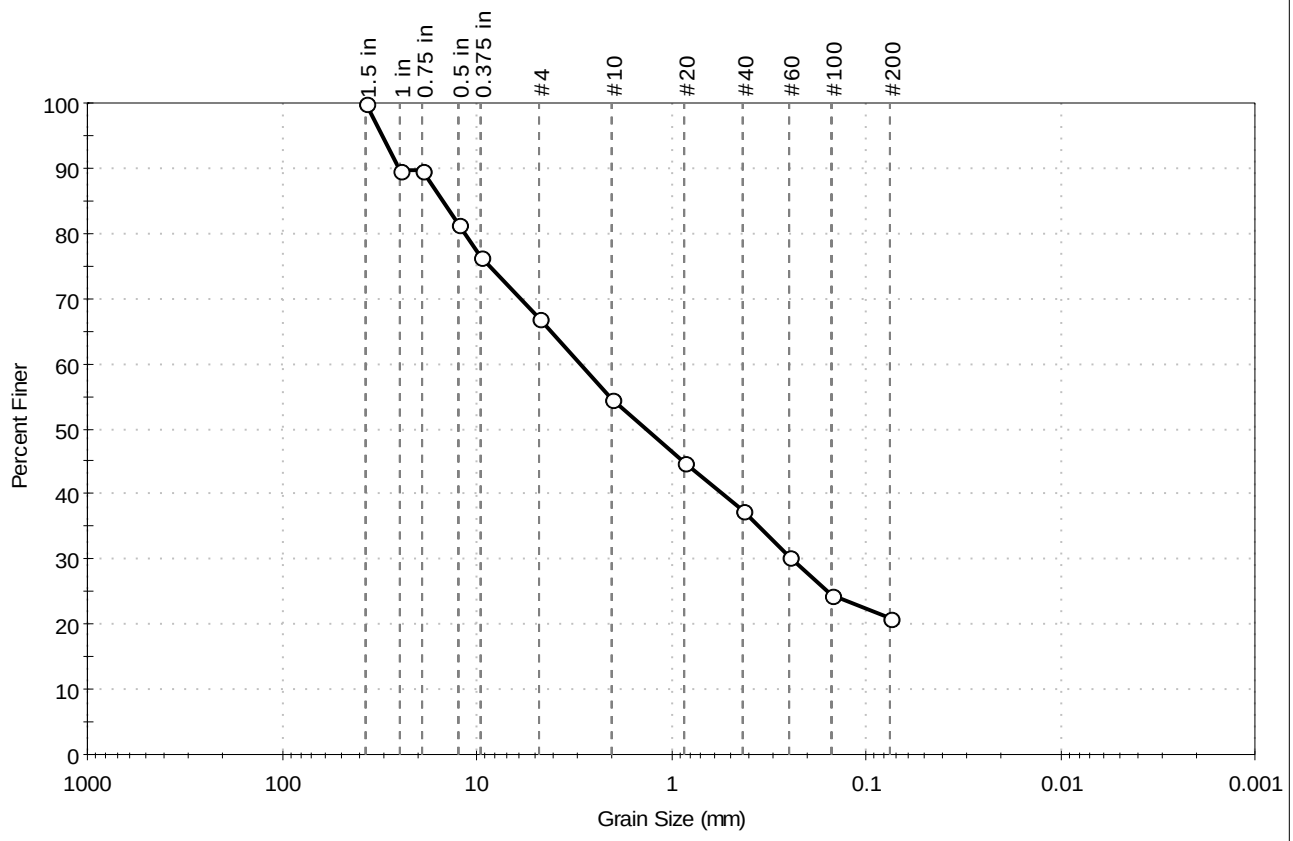
Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	---	Sample Type:	---	Tested By:	jbr
Sample ID:	---	Test Date:	05/08/14	Checked By:	n/a
Depth :	---	Test Id:	294879		

Amount of Material Passing #200 Sieve - ASTM D1140

Boring ID	Sample ID	Depth	Visual Description	Fines, %
B2	SS-5	8-10 ft	Moist, gray silt	94.3
B3	SS-4	19-21 ft	Moist, gray silt	99.5

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	B2	Sample Type:	jar	Tested By:	jbr
Sample ID:	SS-7	Test Date:	05/08/14	Checked By:	mpd
Depth :	15-17 ft	Test Id:	294880		
Test Comment:	---				
Sample Description:	Moist, grayish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	33.0	46.1	20.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	90		
0.75 in	19.00	90		
0.5 in	12.50	81		
0.375 in	9.50	76		
#4	4.75	67		
#10	2.00	55		
#20	0.85	45		
#40	0.42	37		
#60	0.25	31		
#100	0.15	24		
#200	0.075	21		

Coefficients

D_{85} = 15.0041 mm	D_{30} = 0.2392 mm
D_{60} = 2.9212 mm	D_{15} = N/A
D_{50} = 1.3387 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

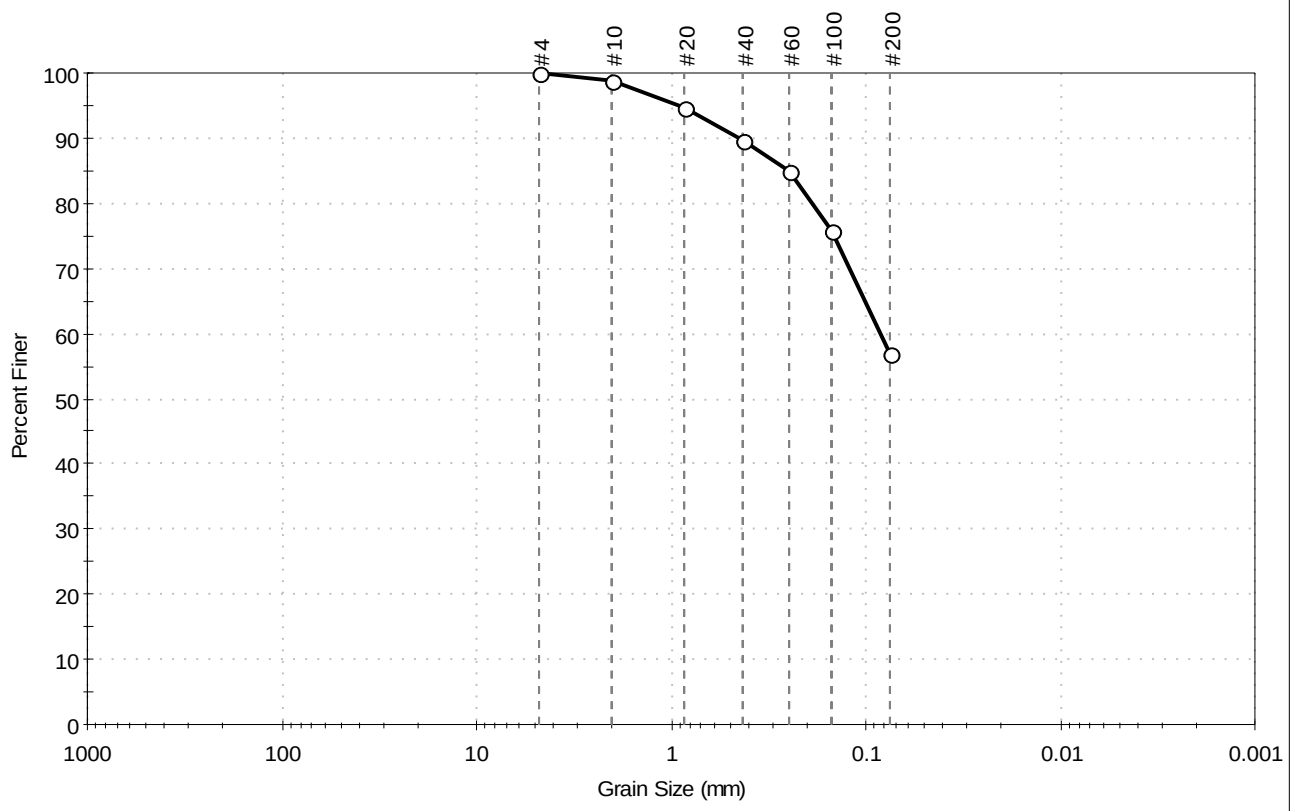
Sample / Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	B3	Sample Type:	jar	Tested By:	jbr
Sample ID:	SS-2	Test Date:	05/08/14	Checked By:	mpd
Depth :	9-11 ft	Test Id:	294881		
Test Comment:	---				
Sample Description:	Moist, gray sandy clay				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	43.0	57.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	95		
#40	0.42	90		
#60	0.25	85		
#100	0.15	76		
#200	0.075	57		

Coefficients

D_{85} = 0.2517 mm	D_{30} = N/A
D_{60} = 0.0838 mm	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	The Louis Berger Group, Inc.				
Project:	Project Orange / Geotechnical				
Location:	NY			Project No:	GTX-301711
Boring ID:	---	Sample Type:	---	Tested By:	jbr
Sample ID:	---	Test Date:	05/08/14	Checked By:	n/a
Depth :	---	Test Id:	294883		

pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
B2	SS-4	6-8 ft	Moist, gray clay	8.0	7.4
B3	SS-1	4-6 ft	Moist, olive gray clay with sand	7.4	7.3

Notes: Sample Preparation: screened through #10 sieve

Method A, pH meter used

ANALYTICAL REPORT

Lab Number:	L1409429
Client:	Geo Testing Express 125 Nagog Park Acton, MA 01720
ATTN:	Joe Tomei
Phone:	(978) 893-1241
Project Name:	PROJECT ORANGE/GEOTECHNICAL
Project Number:	GTX: 301711
Report Date:	05/08/14

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1409429
Report Date: 05/08/14

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1409429-01	B-2, SS-4, 6-8 FT.	Not Specified	05/05/14 00:00
L1409429-02	B-3, SS-1, 4-6 FT.	Not Specified	05/05/14 00:00

Project Name: PROJECT ORANGE/GEOTECHNICAL **Lab Number:** L1409429
Project Number: GTX: 301711 **Report Date:** 05/08/14

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

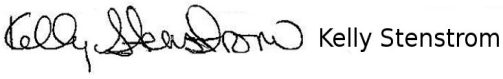
In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Kelly Stenstrom

Title: Technical Director/Representative Date: 05/08/14

INORGANICS
&
MISCELLANEOUS

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711
Lab Number: L1409429
Report Date: 05/08/14

SAMPLE RESULTS

Lab ID: L1409429-01
Client ID: B-2, SS-4, 6-8 FT.
Sample Location: Not Specified
Matrix: Soil
Date Collected: 05/05/14 00:00
Date Received: 05/05/14
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	80.2		%	0.100	NA	1	-	05/06/14 00:06	30,2540G	RT
Chloride	17		mg/kg	11	--	1	-	05/05/14 15:51	1,9251	LA
Sulfate	170		mg/kg	120	--	1	-	05/07/14 17:00	1,9038	MP

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711
Lab Number: L1409429
Report Date: 05/08/14

SAMPLE RESULTS

Lab ID: L1409429-02
Client ID: B-3, SS-1, 4-6 FT.
Sample Location: Not Specified
Matrix: Soil
Date Collected: 05/05/14 00:00
Date Received: 05/05/14
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	89.7		%	0.100	NA	1	-	05/06/14 00:06	30,2540G	RT
Chloride	22		mg/kg	11	--	1	-	05/05/14 15:54	1,9251	LA
Sulfate	ND		mg/kg	110	--	1	-	05/07/14 17:00	1,9038	MP

Project Name: PROJECT ORANGE/GEOTECHNICAL **Lab Number:** L1409429

Project Number: GTX: 301711 **Report Date:** 05/08/14

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG687317-1										
Chloride	ND		mg/kg	10	--	1	-	05/05/14 15:44	1,9251	LA
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG687611-1										
Sulfate	ND		mg/kg	100	--	1	-	05/07/14 17:00	1,9038	MP

Lab Control Sample Analysis

Batch Quality Control

Project Name: PROJECT ORANGE/GEOTECHNICAL

Project Number: GTX: 301711

Lab Number: L1409429

Report Date: 05/08/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG687317-2								
Chloride	102		-		89-109	-		35
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG687611-2								
Sulfate	100		-		80-121	-		12

Matrix Spike Analysis
Batch Quality Control

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1409429
Report Date: 05/08/14

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG687317-4 QC Sample: L1409051-01 Client ID: MS Sample												
Chloride	ND	421	430	102		-	-		62-129	-		35
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG687611-4 QC Sample: L1409429-02 Client ID: B-3, SS-1, 4-6 FT.												
Sulfate	ND	225	320	140		-	-		22-183	-		12

Lab Duplicate Analysis
Batch Quality Control

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1409429
Report Date: 05/08/14

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG687317-3 QC Sample: L1409051-01 Client ID: DUP Sample						
Chloride	ND	ND	mg/kg	NC		35
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG687422-1 QC Sample: L1409276-18 Client ID: DUP Sample						
Solids, Total	85.4	85.1	%	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG687611-3 QC Sample: L1409429-02 Client ID: B-3, SS-1, 4-6 FT.						
Sulfate	ND	ND	mg/kg	NC		12

Project Name: PROJECT ORANGE/GEOTECHNICAL
Project Number: GTX: 301711

Lab Number: L1409429
Report Date: 05/08/14

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information **Custody Seal**

Cooler	
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1409429-01A	Bag	A	N/A	5.5	Y	Absent	CL-9251(28),SO4-9038(28),TS(7)
L1409429-02A	Bag	A	N/A	5.5	Y	Absent	CL-9251(28),SO4-9038(28),TS(7)

*Values in parentheses indicate holding time in days

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1409429
Project Number:	GTX: 301711	**Report Date:**	05/08/14

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1409429
Project Number:	GTX: 301711	**Report Date:**	05/08/14

Data Qualifiers

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	PROJECT ORANGE/GEOTECHNICAL	**Lab Number:**	L1409429
Project Number:	GTX: 301711	**Report Date:**	05/08/14

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

Last revised April 15, 2014

The following analytes are not included in our NELAP Scope of Accreditation:

Westborough Facility
EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.
EPA 8260C: 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.
EPA 8330A/B: PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.
EPA 8270D: 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 625: 4-Chloroaniline, 4-Methylphenol.
SM4500: Soil: Total Phosphorus, TKN, NO2, NO3.
EPA 9071: Total Petroleum Hydrocarbons, Oil & Grease.

Mansfield Facility
EPA 8270D: Biphenyl.
EPA 2540D: TSS
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

Drinking Water
EPA 200.8: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

Non-Potable Water
EPA 200.8: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
EPA 200.7: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 5/5/14

ALPHA Job #: L1409429

Client Information

Client: GeoTesting Express
Address: 125 Nagog Park
Acton, MA 01720
Phone: 978-635-0424
Fax: 978-635-0266
Email: emarro@geotesting.com
jtomei@geotesting.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Project Orange / Geotechnical
Project Location:
Project #: GTX: 301711
Project Manager: Joe Tomei
ALPHA Quote #:

Turn-Around Time

☐ Standard ☒ RUSH (only confirmed if pre-approved!)
Date Due: 05/8/14 Time:

Report Information - Data Deliverables

☐ FAX ☒ EMAIL
☐ ADEx ☐ Add'l Deliverables

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	Criteria

Other Project Specific Requirements/Comments/Detection Limits:

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: Chlorides	ANALYSIS: Sulfates	Sample Specific Comments	TOTAL # BOTTLES
09429 01	B-2, SS-4, 6-8 ft.			Soil		X	X		1
02	B-3, SS-1, 4-6 ft.			Soil		X	X		1

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

Container Type	Bag																		
Preservative	NA																		

Relinquished By:	Date/Time	Received By:	Date/Time
	5/5 1033	AAL	5/5/14 1033
	5/5/14 1155		5/5/14 1155

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

APPENDIC C: TEMPORARY MONITORING WELL CONSTRUCTION DATA & SCHEMATIC WELL DIAGRAMS

Table 2: Well Construction Information

Well Construction Information							
Well-ID	**X Coordinate**	**Y Coordinate**	**Ground Elevation (ft.)**	**Top of Casing Elevation (ft)**	**Top of Protective Cover Elevation (ft)**	**Well Total Depth (feet below surface)**	**Screened Interval (feet below surface)**
MW-1*	530795.5	455183.2	722.63	725.14	725.42	41.21	27.21 – 41.21 (screen in bedrock)
MW-2*	530802.0	455184.1	722.65	725.44	725.65	26.72	21.72 – 26.72 (screen in sand and gravel)
MW-3	530751.9	454887.8	719.71	722.29	722.74	30.81	25.81 – 30.81 (screen in sand and gravel)
MW-4*	530860.3	454400.8	717.16	719.78	720.10	59.1	54.1 – 59.1 (screen in very dense till)
MW-5*	530852.5	454401.8	716.84	719.72	720.11	25.95	20.95 – 25.95 (screen in sand and gravel)

*Indicates well is part of a couplet. Couplet 1 includes MW-1 and MW-2. Couplet 2 includes MW-4 and MW-5.

The Louis Berger Group, Inc. 412 Mt Kemble Ave Morristown, NJ 07960	**PIEZOMETER CONSTRUCTION DIAGRAM** Page 1 of 5	**WELL NO: MW-1**

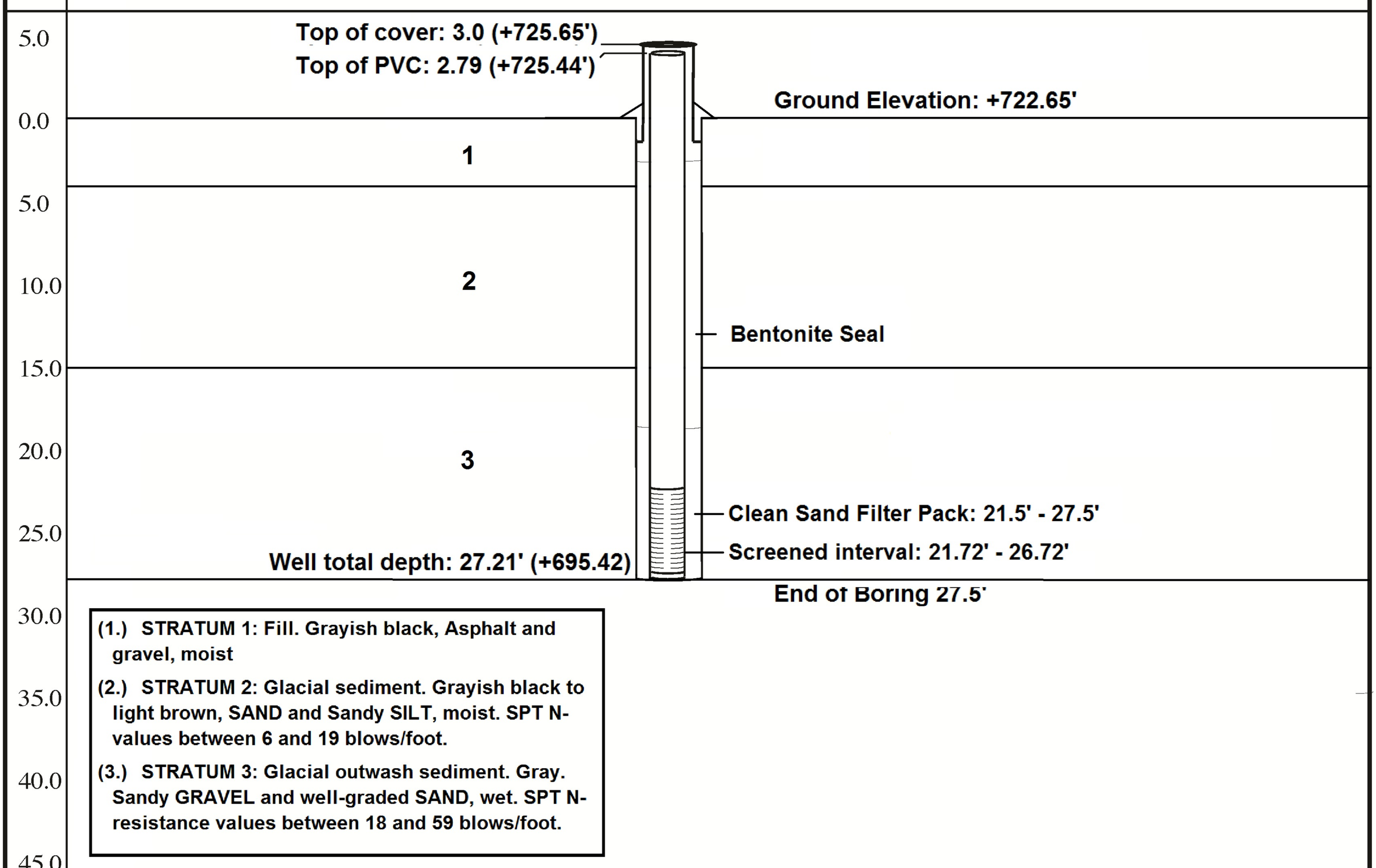
STERLING FOREST RESORT			**PROJECT NO:**	**2000907**
PROJECT: Geotechnical Investigation			**DATE STARTED:**	**4/19/2014**
BOREHOLE DATA	**WELL DATA**		**DATE FINISHED:**	**4/19/2014**
Diameter (in): 4.0	**Screen Length (ft):**	14.0	**INSPECTOR:**	**D. Cuomo**
Total Depth (ft): 41.5	**PVC Inner Diameter (in):**	2.0	**NORTHING:**	**455183.17**
Depth to Rock (ft): 27.5	**Top of Cover Elevation (ft):**	725.42	**EASTING:**	**530795.54**
Depth to Water (ft): 2.94	**Top of PVC Elevation (ft):**	725.14	**GROUND ELEVATION (ft):**	**722.63**

Notes: Well construction diagram not to scale.

The Louis Berger Group, Inc. 412 Mt Kemble Ave Morristown, NJ 07960	PIEZOMETER CONSTRUCTION DIAGRAM Page 2 of 5	WELL NO.: MW-2

STERLING FOREST RESORT		PROJECT NO: 2000900
PROJECT: Geotechnical Investigation		DATE STARTED: 4/27/2014
BOREHOLE DATA	WELL DATA	DATE FINISHED: 4/27/2014
Diameter (in): 4	Screen Length (ft): 5.0	INSPECTOR: D. Cuomo
Total Depth (ft): 27.5	PVC Inner Diameter (in): 2.0	NORTHING: 455184.11
Depth to Rock (ft): 27.5	Top of Cover Elevation (ft): 725.65	EASTING: 530301.99
Depth to Water (ft): 2.97	Top of PVC Elevation (ft): 725.44	GROUND ELEVATION (ft): 722.65

Notes: Well construction diagram not to scale.



(1.) STRATUM 1: Fill. Grayish black, Asphalt and gravel, moist

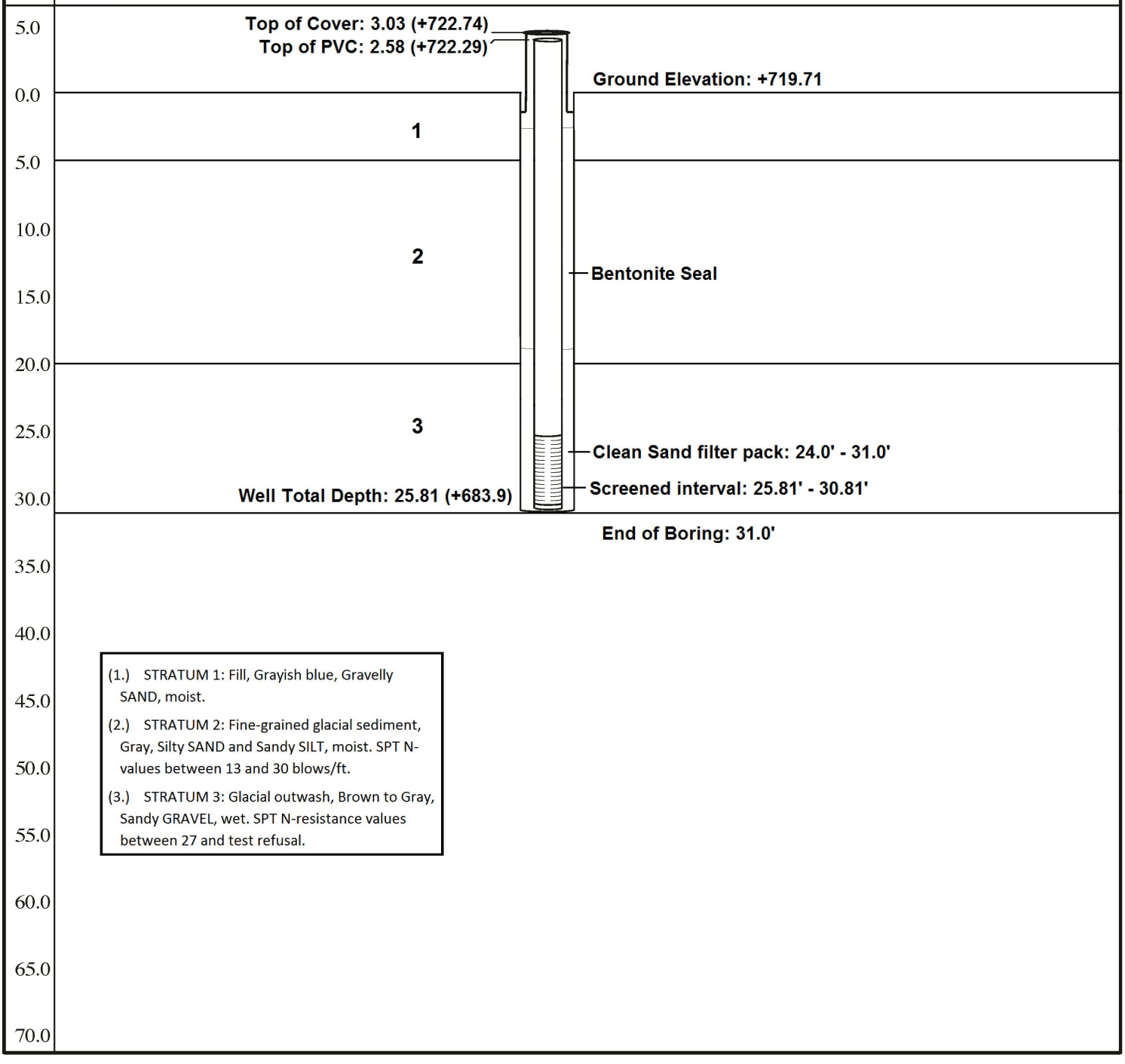
(2.) STRATUM 2: Glacial sediment. Grayish black to light brown, SAND and Sandy SILT, moist. SPT N-values between 6 and 19 blows/foot.

(3.) STRATUM 3: Glacial outwash sediment. Gray. Sandy GRAVEL and well-graded SAND, wet. SPT N-resistance values between 18 and 59 blows/foot.

The Louis Berger Group, Inc. 412 Mt Kemble Ave Morristown, NJ 07960	PIEZOMETER CONSTRUCTION DIAGRAM Page 3 of 5	WELL NO.: MW-3

STERLING FOREST RESORT		PROJECT NO: 2000900
PROJECT: Geotechnical Investigation		DATE STARTED: 4/27/2014
BOREHOLE DATA	WELL DATA	DATE FINISHED: 4/27/2014
Diameter (in): 4	Screen Length (ft): 5.0	INSPECTOR: D. Cuomo
Total Depth (ft): 31.0	PVC Inner Diameter (in): 2.0	NORTHING: 454400.76
Depth to Rock (ft): 31.0	Top of Cover Elevation (ft): 722.74	EASTING: 530860.26
Depth to Water (ft): 1.18	Top of PVC Elevation (ft): 722.26	GROUND ELEVATION (ft): 719.71

Notes: Well construction diagram not to scale.



(1.) STRATUM 1: Fill, Grayish blue, Gravelly SAND, moist.

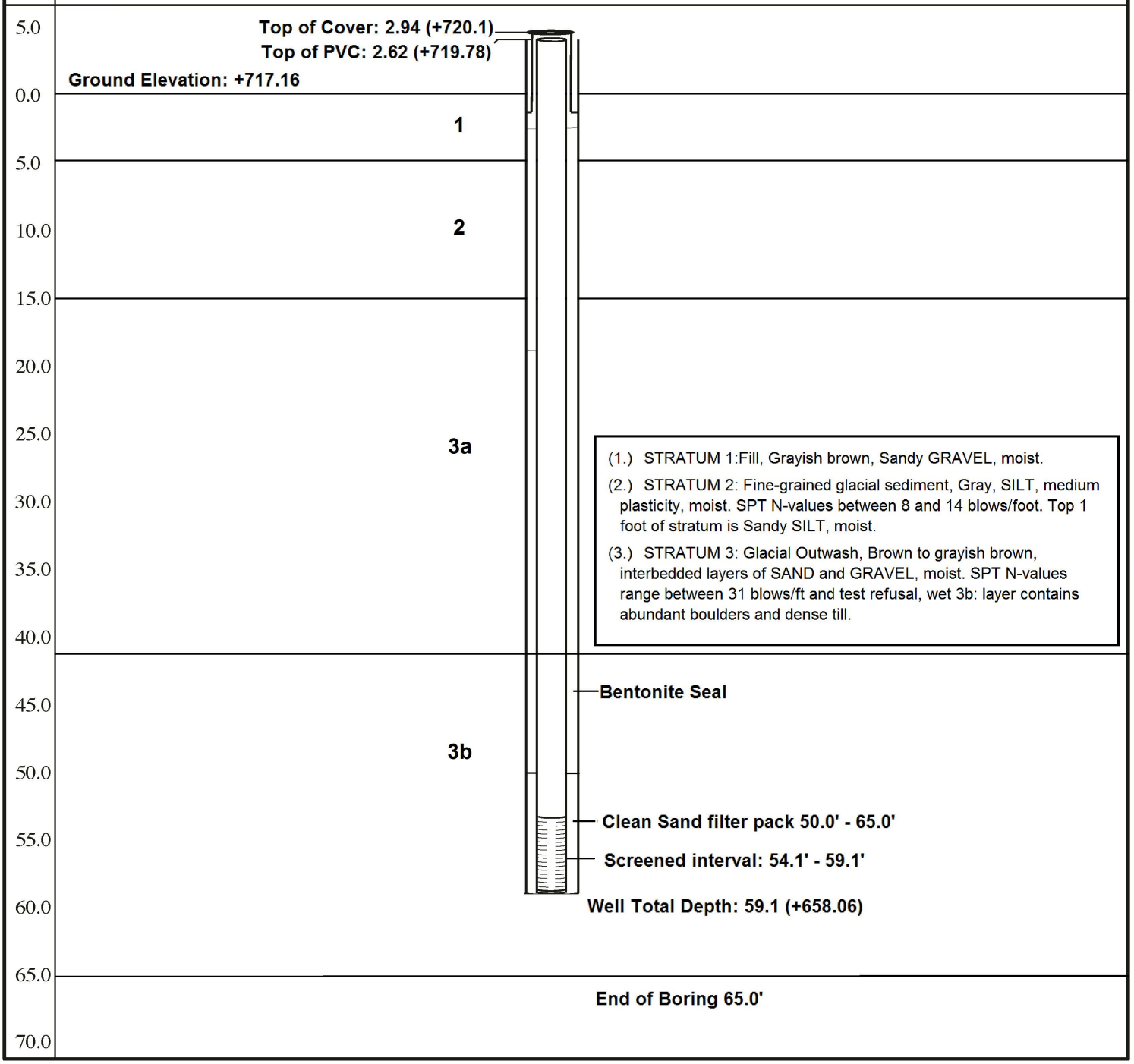
(2.) STRATUM 2: Fine-grained glacial sediment, Gray, Silty SAND and Sandy SILT, moist. SPT N-values between 13 and 30 blows/ft.

(3.) STRATUM 3: Glacial outwash, Brown to Gray, Sandy GRAVEL, wet. SPT N-resistance values between 27 and test refusal.

The Louis Berger Group, Inc. 412 Mt Kemble Ave Morristown, NJ 07960	**PIEZOMETER CONSTRUCTION DIAGRAM** Page 4 of 5	**WELL NO.: MW-4**

STERLING FOREST RESORT		**PROJECT NO:** 2000900
PROJECT: Geotechnical Investigation		**DATE STARTED:** 4/27/2014
BOREHOLE DATA	**WELL DATA**	**DATE FINISHED:** 4/27/2014
Diameter (in): 4	**Screen Length (ft):** 5.0	**INSPECTOR:** D. Cuomo
Total Depth (ft): 65.0	**PVC Inner Diameter (in):** 2.0	**NORTHING:** 454400.76
Depth to Rock (ft): N/A	**Top of Cover Elevation (ft):** 720.1	**EASTING:** 530860.26
Depth to Water (ft): -0.1	**Top of PVC Elevation (ft):** 719.78	**GROUND ELEVATION (ft):** 717.16

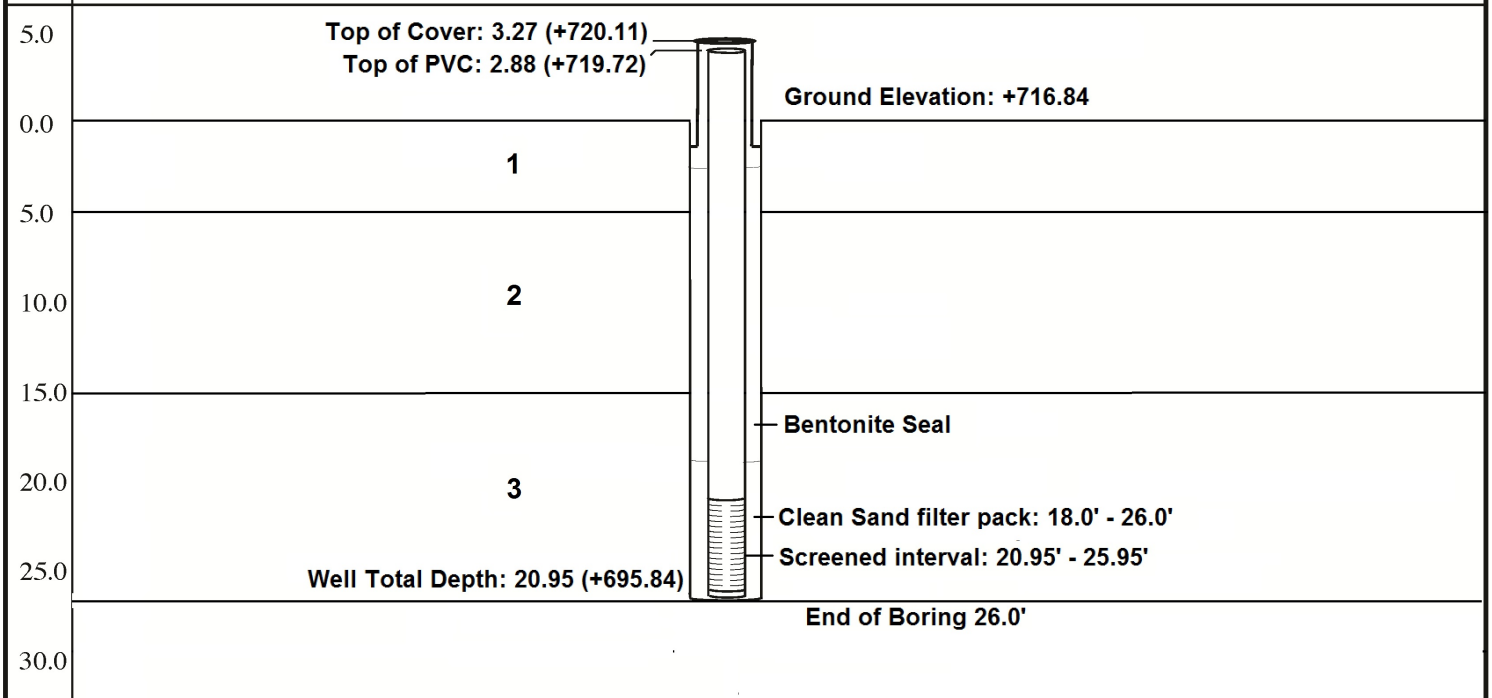
Notes: Well construction diagram not to scale.



The Louis Berger Group, Inc. 412 Mt Kemble Ave Morristown, NJ 07960	PIEZOMETER CONSTRUCTION DIAGRAM Page 5 of 5	WELL NO.: MW-5

STERLING FOREST RESORT		PROJECT NO: 2000900
PROJECT: Geotechnical Investigation		DATE STARTED: 4/27/2014
BOREHOLE DATA	WELL DATA	DATE FINISHED: 4/27/2014
Diameter (in): 4	Screen Length (ft): 5.0	INSPECTOR: D. Cuomo
Total Depth (ft): 26.0	PVC Inner Diameter (in): 2.0	NORTHING: 454401.81
Depth to Rock (ft): N/A	Top of Cover Elevation (ft): 720.11	EASTING: 530852.54
Depth to Water (ft): -0.12	Top of PVC Elevation (ft): 719.72	GROUND ELEVATION (ft): 716.84

Notes: Well construction diagram not to scale.



(1.) STRATUM 1:Fill, Grayish brown, Sandy GRAVEL, moist.

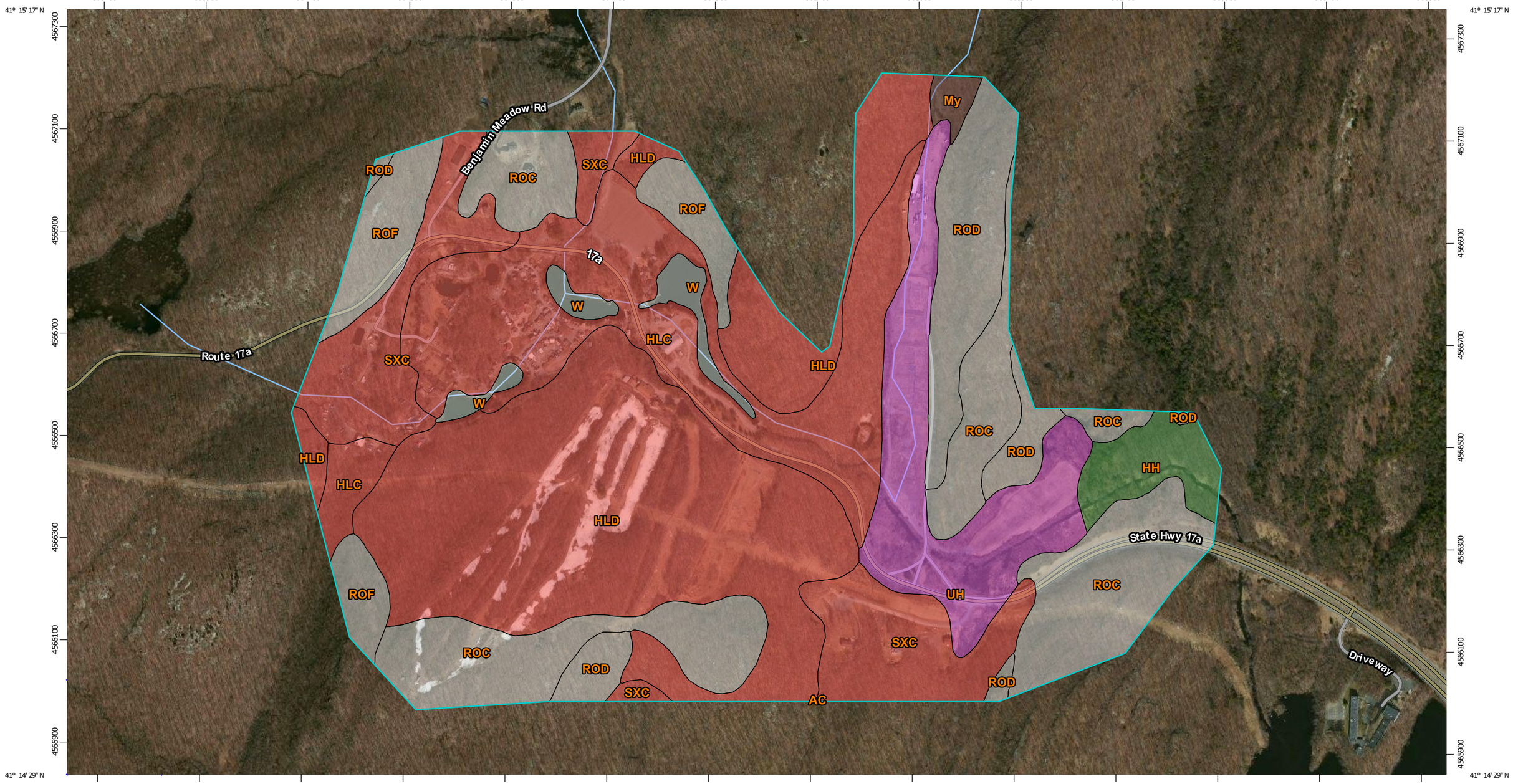
(2.) STRATUM 2: Fine-grained glacial sediment, Gray, SILT, medium plasticity, moist. SPT N-values between 8 and 14 blows/foot. Top 1 foot of stratum is Sandy SILT, moist.

(3.) STRATUM 3: Glacial Outwash, Brown to grayish brown, interbedded layers of SAND and GRAVEL, moist. SPT N-values range between 31 blows/ft and test refusal, wet

DESCRIPTION OF LAND

APPENDIX VIII. C.1.e-2. WEB SOIL SURVEY

Hydrologic Soil Group—Orange County, New York



Map Scale: 1:7,300 if printed on B landscape (17" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, New York
Survey Area Data: Version 14, Dec 15, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 20, 2011—Apr 16, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Orange County, New York (NY071)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
AC	Alden extremely stony soils	C/D	0.0	0.0%
HH	Histic Humaquepts, ponded	A/D	9.4	2.4%
HLC	Hollis soils, sloping	D	66.0	16.7%
HLD	Hollis soils, moderately steep	D	119.8	30.3%
My	Middlebury silt loam	B/D	2.0	0.5%
ROC	Rock outcrop-Hollis complex, sloping		66.4	16.8%
ROD	Rock outcrop-Hollis complex, moderately steep		27.8	7.0%
ROF	Rock outcrop-Hollis complex, very steep		20.0	5.1%
SXC	Swartswood and Mardin very stony soils, sloping	D	42.6	10.8%
UH	Udorthents, smoothed	A	34.5	8.7%
W	Water		6.4	1.6%
Totals for Area of Interest			**395.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher