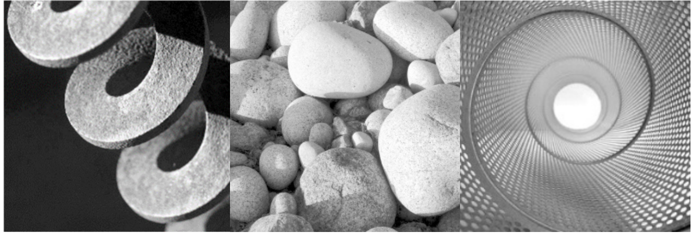


GEI Consultants

Consulting
Engineers and
Scientists

Geotechnical Report

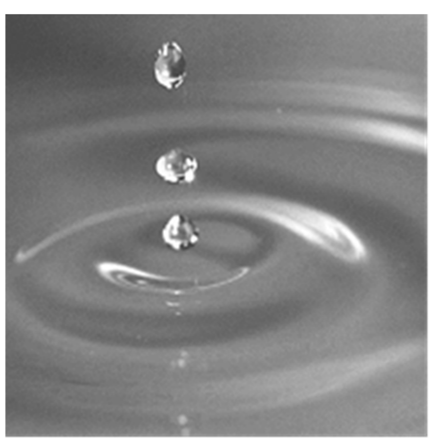
BESS Installation CT8

Skinner Street
East Hampton, Connecticut

Submitted to:
VHB
100 Great Meadow Road, Suite 200
Wethersfield, CT 06109

Submitted by:
GEI Consultants, Inc.
455 Winding Brook Drive, Suite 201
Glastonbury, CT 06033
860-368-5300

June 23, 2023
Project No. 2301203



Matthew Glunt, P.E.
Senior Geotechnical Engineer

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Figures

Appendices

1. Introduction

1.1 Project Summary

The property slated for development is located off of Skinner Street in East Hampton, Connecticut. We understand that the proposed battery storage facility will include multiple arrays of battery units with associated electrical infrastructure and appurtenant site features.

This report was prepared to address foundation and site preparation recommendations for the proposed BESS development.

1.2 Scope of Services

Our scope of work included the following tasks:

- Reviewed provided site plans and layout drawings.
- Oversaw an investigation program consisting of three (3) test borings, six (6) test pits, and in-situ resistivity testing at two (2) locations.
- Observed soil samples recovered from the test borings, took groundwater level measurements, and prepared test boring logs.
- Observed soils removed from test pits, groundwater conditions, and prepared test pit logs.
- Conducted downhole infiltration testing within three (3) of the test pits.
- Conducted in-situ thermal resistivity testing within two (2) of the test pits.
- Engaged a testing laboratory to perform laboratory analyses on soil samples from the test borings and test pits.
- Developed recommendations for earthworks and battery storage unit (BESS) foundation design and construction.
- Prepared this *Geotechnical Report*.

1.3 Authorization

Our work was performed in general accordance with our proposal dated October 10, 2022, and the resulting Subconsultant Agreement executed on January 6, 2023.

1.4 Horizontal and Vertical Reference

Boring locations were located and referenced using handheld GPS with accuracy on the order of 5 to 10 feet. The locations shown on the attached figure should be considered approximate.

Ground surface elevations for test borings and test pits will be provided in a subsequent version of this report.

2. Site and Project Description

2.1 Site Description

The proposed development will occur on a wooded, undeveloped 28-acre parcel located off of Skinner Street in East Hampton, Connecticut, just north of a recently constructed solar array.

2.2 Proposed Construction

We were provided by VHB with a conceptual site plan for the project on March 14, 2023. References to site plan elements and ground surface elevations will be updated in a subsequent version of this report as plans are updated.

We understand a 4.9 MW/19.6 MW-h battery energy storage system (BESS) facility is planned for the referenced site. From provided conceptual plans, we understand this facility is to consist of the following:

- Battery Energy Storage System (BESS) with multiple arrays of battery racks, PCS inverters, and supporting equipment pads.
- Underground or overhead electrical tie-in to existing electrical infrastructure to the north of the site.
- Stormwater management basin(s) along the southern periphery of the project.
- A gravel access road approximately 12 feet in width into the site, connecting to the existing gravel road from Skinner Street servicing the solar array.

We understand the BESS arrays and supporting features will generally follow existing grades where feasible. Though grading plans have not yet been finalized, we expect cuts and fills of up to about 6 feet will likely be required.

3. Exploration Procedures

3.1 Test Borings

The boring locations were laid out on the site from the provided site plan using approximate measurements and a GPS-locator with horizontal accuracy on the order of 5 to 10 feet. Approximate boring locations relative to the site plan are shown on Figure 1.

Five (5) soil test borings were conducted at the site on April 4, 2023, by New England Boring Contractors, Inc., under subcontract to GEI, with a track-mounted drilling rig. The appropriate one-call utility locate service (CBYD) was contacted prior to our arrival. Each boring location was also pre-scanned for utilities using geophysical methods. The borings were advanced to depths of 9 feet to 11 feet each utilizing hollow-stem augering techniques. Soil test boring logs are attached in Appendix A.

Standard Penetration Testing (SPT) and split-spoon sampling were generally performed continuously through the upper 8 feet of the borings and at 5-foot intervals thereafter using an automatic 140-lb. hammer. Representative samples of the soils obtained by the sampler were classified by a GEI representative. The samples were placed in appropriately identified sealed glass jars and transported to our office for storage and laboratory assignment.

3.2 Test Pits

Six (6) test pits were dug at the site on April 4, 2023, using an excavator to depths of approximately 3 feet to 8 feet each. These test pits were logged and photographed by a representative of GEI. After completion, each test pit was backfilled using excavated spoils tamped in lifts.

Test pit logs are attached in Appendix B.

3.3 In-place Permeability Testing

In-situ hydraulic conductivity was measured using a Guelph permeameter within three (3) of the test pits, located within the property as shown on Figure 1. Constant-head test procedures generally followed ASTM D5126 and manufacturer recommendations.

Estimations of in-place permeability from the test measurements are provided in Appendix D.

3.4 Soil Resistivity Testing

In-situ resistivity testing was performed using the Wenner Four-Electrode Method at two (2) locations, as shown on Figure 1, each including two orthogonal traverses using electrode spacings of 1, 2.5, 5, 10, 20, and 40 feet. Measurements were taken using an L & R Industries MiniRes Instrument. Test results are provided in Appendix E.

3.5 Laboratory Testing

Laboratory testing was conducted on representative soil samples to confirm field identification of the soils and establish engineering characteristics for design. Tests performed by GeoTesting Express, under subcontract to GEI, included the following:

- Four (4) grain-size analyses with standard sieve set and hydrometer (ASTM D6913)
- Four (4) natural moisture content (ASTM D2974)

A composite sample obtained between depths of 2 and 8 feet was also subjected to the following tests:

- pH (ASTM G51)
- Laboratory resistivity (ASTM G57)
- Chlorides (ASTM D512)
- Sulfates (ASTM D516)

The laboratory test results are included in Appendix C.

4. Subsurface Conditions

4.1 Geologic Setting

Local geology maps indicate that the site is underlain by upland glacial till, characterized as dense nonsorted, generally nonstratified soils.

Bedrock is mapped by Rodgers (1985) as the Brimfield Schist formation, characterized as gray, medium to coarse-grained interlayered metamorphic schist and gneiss.

4.2 Subsurface Conditions

The generalized subsurface conditions at the site are described below, in order of increasing depth. The subsurface conditions between test locations may differ. The nature and extent of variations between the sampling points will not become evident until construction.

Topsoil – The topsoil and root mat thickness was generally noted as 6 to 16 inches at the test locations.

Glacial Till – Glacial tills common to the area were encountered in each boring to termination depth or drill refusal. The brown to reddish brown glacial till was classified as silty sand in a tight matrix with suspended gravel and cobbles. The non-plastic to low plasticity silt fines proportion generally varied between 15 and 40 percent. Recovered samples generally coarsened with depth, with increased sand, gravel, and cobbles noted. Cobbles to small boulders as well as zones of highly weathered to decomposed rock were encountered in many of the test pits and test borings and should be expected in the site glacial tills.

SPT N-values were generally consistent with medium-dense to very dense conditions, increasing with depth.

Weathered Rock – At many test locations, the drilling augers and excavation bucket proceeded with difficulty before refusal through materials with intrinsic rock characteristics. From our experience, the materials within this zone can most likely be characterized as decomposed to weathered metamorphic rock or very dense soil (“hardpan”).

Refusal Material – Drilling refusal is defined as material that could not be penetrated with the drill rig or excavating equipment used on the project. Refusal of the drilling tools or excavator bucket may have resulted from the presence of tight gravel/cobble beds, boulders or ledges of weathered rock, or continuous, relatively hard competent rock. Diamond core procedures would be necessary to assess the character and apparent strength of materials below refusal.

Drill or dig refusal occurred at the locations and depths noted below. Based on our observations and expectations of rock conditions, these refusal depths may be presumed as relatively intact bedrock for development planning and costing purposes.

Table 1 – Summary of Refusal Depths

Test ID	Refusal Depth (ft)	Note
B1	11.0	Weathered rock at 10.0
B2	9.0	Weathered rock at 6.5
B3	10.0	Weathered rock at 9.0
TP-1	> 7.5	Planned termination depth
TP-2	7.0	Frequent cobbles and boulders at 5.5 to 7.0
TP-3	6.2	Frequent cobbles and boulders at 5.0 to 6.2
TP-4	3.2	--
TP-5	5.0	Weathered rock at 4.0
TP-6	> 8.0	Frequent cobbles at depth; weathered rock at 4.0

4.3 Groundwater Conditions

Groundwater was encountered in boring B-3 at a depth of 8.0 feet and in two of the test pits (TP-1 and TP-2) at depths of 4.5 feet and 6.7 feet, respectively.

Groundwater levels are subject to seasonal and weather-related variations. Groundwater measurements made at different times and different locations may be significantly different than the measurements taken as part of this investigation.

5. Design Recommendations

5.1 General Suitability

The site is underlain by dense, silty glacial till soils with frequent cobble to boulder-laden zones at depth and shallow rock likely within a depth of interest to construction. The primary geotechnical concerns and risk factors for this project would include:

- Limitations of shallow rock and cobbles to boulders with use of drilled-in foundations to support the equipment.
- Relatively low stormwater infiltration rates.
- Though feasible, re-use of similar on-site soils with high silt fines content and oversize material as Structural Fill will likely present challenges.
- Potential for minor to moderate quantities of rock excavation, depending on finished grades.

The influence of shallow rock and cobble to boulder-laden zones on proposed construction will be highly dependent on finished grades, which were not available at the time of this report. This will be discussed in further detail in a subsequent version of this report.

5.2 Soil Properties

Recommended soil properties for design are presented below. We selected these values based on published correlations to SPT N-values, our experience with similar soils in this locale, and our engineering judgment.

Table 2 – In-Place Soil Properties

Stratum	Angle of Internal Friction (ϕ°)	Cohesion (c) (psf)	Moist (Total) Unit Weight (γ_T) (lb/ft^3)	Active Earth Pressure Coeff. (K_a)	Passive Earth Pressure Coeff. (K_p)
New Structural Fill	34	0	125	0.28	3.54
Glacial Till	36	0	125	0.26	3.85

5.3 Foundation Considerations

The proposed battery units may be supported by drilled-in or conventional shallow foundations, subject to the limitations described in more detail below. We provide two options below that we believe are feasible given the subsurface conditions and unit constraints.

Foundation design will be further progressed subsequent to this report and the recommendations updated, in coordination with Key Capture and the design team.

5.3.1 Grade Beams

Grade beams, installed either along each long side of the unit or in a grid format, would be suitable for use in supporting the battery units. Depending on finished grades, difficult excavation and – potentially – rock excavation may be required to install these foundations. Exposed soils will also be susceptible to moisture intrusion and disturbance.

From our review of the current site layout, it appears that bearing conditions for unit foundations will vary from Structural Fill, dense glacial sands (glacial till), to weathered/decomposed rock, or – potentially - sound bedrock. These materials are suitable for support of the units using conventional shallow foundations designed and constructed as recommended below.

We recommend that all footing subgrades be evaluated by a GEI representative prior to concrete placement. The maximum allowable bearing pressures for the design of footings are:

Table 3 - Allowable Bearing Pressure

Bearing Stratum	Net Allowable Bearing Pressure
Structural Fill, Glacial Till, Weathered Rock, or Bedrock	4,000 lb/ft^2

Minimum individual grade beam widths should be at least 18 inches. All grade beams should bear at least 42 inches below exterior grade for frost protection. Foundations founded on rock will have no frost depth requirement. Where rock within unit foundation excavations cannot be removed with conventional equipment (i.e. hoe-ramming as required), we recommend assuming a minimum embedment depth of 2 feet below finished grade. Where rock is broken or highly weathered and can be removed, we recommend extending the footings to bear 42 inches below the adjacent exterior grade for frost protection.

Lateral capacity of shallow foundations includes a soil lateral pressure and coefficient of friction as described in CBC/IBC Section 1806. Footings will predominantly be embedded in material similar to those described as class 4 as described in Table 1806.2. Where foundations are cast neat against the sides of excavations, an allowable lateral bearing pressure of 150 psf per foot depth below natural grade may be used in computations.

Assuming subgrades are prepared as recommended herein, an allowable coefficient of friction of 0.45 at the base of the foundations may be used in the calculation of sliding resistance.

5.3.2 Drilled Piers

Individual drilled concrete piers would also be feasible for use in supporting the battery units, so long as suitable embedment can be achieved within the dense and cobble-laden natural soils and weathered rock. As noted elsewhere, cobble to small boulder obstructions that would hinder drilling advancement were frequently encountered at depth during the recent investigation.

For preliminary design and costing, we provide expected capacities for two common pier sizes below. Efficient pier sizing, spacing, and lengths will be further evaluated with the design team in future phases of this project, if this option is pursued. Capacities will also be somewhat dependent on finished grades, which will be further evaluated at a later stage of design.

Table 4 – Drilled Piers – Preliminary Capacities

Pier Diameter	Depth	Ultimate Axial Capacity (kips)	Allowable Axial Capacity (kips)
18 inches	10 feet	69	23
24 inches	10 feet	120	40

Rebar cages or individual center bars would also likely be required for the piers to provide sufficient lateral support. A minimum embedment depth may be required to satisfy uplift requirements.

5.3.3 Helical Piles

Helical, or “screw”, piles consist of round or square steel shafts with welded helixes of specified diameter and at specified intervals along the shaft. Helical piles would be designed and installed by a specialty geotechnical contractor and held to a performance specification that includes a required pile capacity. Based on their experience with similar projects in similar geologic conditions, the specialty contractor would design a system intended to make most efficient use of the piling options.

Based on the prevalence of cobbles to small boulders on this site, and the potential for shallow rock within the embedment zone, we do not recommend utilizing helical piles for support on this project.

If the team desires to pursue this option further, a specialty contractor should be consulted for further information regarding cost, schedule, feasibility and, in particular, methods for dealing with the site limitations listed above.

5.3.4 Equipment Pads

The natural soils will be susceptible to frost heave. We recommend that the proposed equipment pads bear on Structural Fill that extends below the frost depth. If some seasonal movement of the equipment pads is acceptable, we recommend that the top 18 inches of existing frost-susceptible material below the slab be removed and replaced with compacted, well-draining Structural Fill.

For pad subgrades prepared in this manner, a modulus of subgrade reaction of 150 pounds per cubic inch (pci) may be assumed.

5.4 Settlement

Subject to further evaluation, we expect battery units supported by one of the options listed above would be expected to settle less than 1 inch, with differential settlements between each unit of less than ½-inch. We expect nearly all expected settlement will occur during construction or soon after.

5.5 Subsurface Drainage Design

We understand a series of stormwater management basins are planned along the southern periphery of the project. Based on the results of the borings and test pits, these features will likely be founded in dense glacial till soils with limited capacity for infiltration. Infiltration testing was conducted within test pits TP-1, TP-2, and TP-3 at a depth of approximately 4 feet below current grade. Results of all infiltration testing are included in Appendix D.

From our review of the data obtained and experience with similar soils, we recommend using a field-measured infiltration rate of **0.5 inches/hour** when founded in natural glacial till soils. In accordance with CT DEEP policy, a factor of safety of 2.0 must be applied to these values for design.

5.6 Site Slopes

The project is expected to include finished earthen cut and fill slopes on the periphery of the development area and within the stormwater basins. We recommend that all cut and fill slopes on the project be constructed at grades no steeper than 2H:1V. Suitable erosion protection should be established as quickly as possible following construction of slopes.

5.7 Access Roads

We expect that new access ways into the facility will be constructed as unpaved gravel roads. We also understand that, once constructed, traffic on these roadways will consist primarily of maintenance pickup trucks, though the design will also need to accommodate full-size fire trucks. Fully constructed roadways should not be subjected to construction traffic.

Based on the results of this investigation, roadway subgrades are expected to consist predominantly of silty glacial till soils with moderate susceptibility to frost heave.

Assuming new roadways are supported on new Structural Fill or soil subgrades prepared in accordance with Section 6.1, we recommend the following roadway section to support the expected facility traffic:

Facility Roadways (maintenance trucks and fire trucks)
4.0 inches of Gravel Surface (CTDOT Form 818 M02.06, Grading C)
12.0 inches of compacted gravel Subbase (CTDOT Form 818 M.02.06, Grading A)

Roadway materials should conform with and be placed in accordance with the *Connecticut Department of Transportation (CTDOT) Standard Specifications for Road, Bridges, and Incidental Construction (Form 818), 2020.*

5.8 Soil Corrosivity

We summarized our evaluation of the soil corrosivity to structural elements shown in the table below by comparing the laboratory test results to some available corrosivity references.

Table 5 – Soil Corrosivity

Test	Laboratory Results	Reference	Corrosivity to Structural Elements
pH	5.64	Caltrans - Corrosion Guidelines January 2015	Not corrosive
Electrical Resistivity	51,652 Ω-cm	EPRI - Environmental Factors Governing Corrosion Rates, Report 1021854 December 2011	Not corrosive[1]
Chloride	24 mg/kg	Caltrans - Corrosion Guidelines January 2015	Not corrosive
Sulfate	12 mg/kg	Caltrans - Corrosion Guidelines January 2015	Not corrosive

[1]Field-measured resistivity values also indicate a non-corrosive environment.

5.9 Thermal Resistivity Testing

In-situ thermal resistivity tests were conducted within five (5) of the test pits at depths of approximately 3 feet below current grade, as summarized below. Tests were conducted using a Thermtest® TLS-100 meter in accordance with ASTM D5334-22.

Table 6 – Thermal Resistivity

Test Location	Depth (ft)	Thermal Conductivity (W/mK)	Thermal Resistivity (mK/W)	Soil Temp (°C)
TP-4	3.0	1.8232	0.5514	7.3
TP-5	3.0	1.4980	0.6705	7.5
TP-6	3.0	1.9694	0.5138	6.7

6. Construction Considerations

6.1 Subgrade Preparation

6.1.1 General

Site preparation should include the removal of all unsuitable surface materials within the BESS development footprint. This should include surface vegetation, topsoil, and any otherwise unstable surface or subsurface soils.

6.1.2 Unit Foundations

If used to support the battery units, conventional shallow foundations are expected to bear on a subgrade consisting of glacial sands and silts (glacial till), weathered rock, competent bedrock, or Structural Fill.

If bedrock is encountered at or above planned bearing elevation, the top of rock should be excavated to a firm surface, cleaned, and examined. If the bedrock is sloping, below column footings, the rock surface should be cut to an approximately level surface (within 10 degrees of horizontal). Below exterior wall footings, the rock surface can slope in the direction of the wall but should be within 10 degrees of horizontal in the direction perpendicular to the wall. Minimum embedment requirements for rock-bearing foundations are discussed in Section 5.3.1.

Bearing surfaces should be free of standing water, frost, and loose soil before placement of reinforcing steel and concrete. Protruding cobbles, boulders, loose rock, or ledge should be removed a minimum of 12 inches below bearing grade.

All finished bearing surfaces should be free of standing water, frost, and loose soil before placement of reinforcing steel and concrete. We recommend that a GEI representative observe the final preparation of all subgrades prior to footing construction.

6.1.3 Equipment Pads

If some seasonal movement of the equipment pads is acceptable, we recommend that the top 18 inches of existing frost-susceptible material below the slab be removed and replaced with compacted, well-draining Structural Fill. If rock is encountered during this process, 12 inches of Structural Fill would be sufficient.

Excavations to final subgrade for the equipment pads should be performed in such a way that limits disturbing or loosening subgrade soils. After stripping and cutting and prior to placing pad base materials, the resulting subgrade should be firm, stable, and unyielding. Stabilization, where required, may consist of removing unsuitable material and replacement with compacted Structural Fill, or where unsuitable soils are relatively thin, drying and compacting in place.

Soil subgrades for equipment pads should be proof-rolled with at least four (4) passes of a minimum 10-ton vibratory roller in open areas, or a 1-ton vibratory roller or large plate compactor, such as Wacker DPU4545 or equivalent, in trenches. Proof-rolling in close proximity to groundwater may need to be accomplished without vibratory action to reduce the potential for disturbance to the subgrade. Final bearing surfaces should be free of standing water, frost, and loose soil.

6.1.4 Access Roads

Before placing the roadway section, the exposed subgrade (after removing topsoil, organic material, or otherwise unsuitable material) should be proof-rolled with at least four (4) passes of a minimum 10-ton vibratory roller. The resulting subgrade should be firm, stable, and unyielding.

We recommend that the road surface be graded with a minimum cross slope of ½ inch per foot of road width to allow water to drain. Drainage ditches should be provided along the edges of the road to direct surface water and runoff away from the road and subbase.

We recommend that a GEI representative observe the final preparation of all subgrades prior to access road construction.

6.2 Excavation and Dewatering

Mass excavations on upland areas of the site would take place through dense to very dense glacial till soils, minor to moderate cobbles and boulders, and, potentially, weathered to sound rock, and difficult excavation should be anticipated. It is our experience that large excavators can generally remove dense to very dense soils (hardpan) and highly weathered/decomposed metamorphic rock characterized with an SPT N-value of less than 50 blows per 6 inches (or less than 100 blows/foot). Heavy-duty rock teeth and slower, difficult excavation should be expected where the material is characterized as 50 blows per 6 inches (50/6”) to 50 blows per 3 inches (50/3”). Dozer-mounted rippers may also be effective in removing materials of this density. Rock removal using localized hoe-ramming or mass blasting should be expected for any materials exhibiting 50 blows for less than 3 inches or drill refusal.

Based on the results of this investigation, the scale of this project, and our expectations of finished grades, we expect that rock excavation, if required, would be of relatively minor quantities, suitable for the use of pneumatic (i.e. hoe ramming or line drilling) procedures.

All excavations should be sloped or shored in accordance with the local, state, and federal regulations, including Occupational Safety and Health Agency (OSHA 29 CFR Part 1926) excavation trench safety standards.

Stabilized groundwater is not likely to significantly impact construction operations. However, perched water is likely to be encountered near the soil/rock interface, especially after rainfall events. If encountered during foundation or utility excavations or general site grading, groundwater can likely be controlled using conventional methods such as ditching, sumps, and pumps.

6.3 Freezing Conditions

The soils at the sites are frost susceptible. Therefore, if construction is performed during freezing weather, special precautions will be required to prevent the subgrade soils from freezing. Freezing of the soil beneath equipment foundations during construction may result in subsequent settlement.

All subgrades should be free of frost before placement of concrete. Frost-susceptible soils that have frozen should be removed and replaced with compacted Structural Fill. Soil placed as fill should be free of frost, as should the ground on which it is placed.

6.4 Backfilling and Compaction

Recommended specifications for gradation and compaction of backfill soils are provided in the recommended Material Specifications in Appendix F. We understand fill for raising the site grades, where required, will be mined from on-site sources wherever possible.

The native glacial tills found on site are not ideal for compaction as they contain a fairly high percentage of silty fines; however, provided the material can meet the appropriate compaction requirements, does not contain deleterious materials, and is stable under the weight of construction equipment, the material is likely suitable for re-use on site as Structural Fill or Ordinary Fill. We caution that this material will be difficult to near impossible to work if it becomes wet and may require long drying times to obtain the required compaction. As such, careful moisture control will be required to achieve satisfactory compaction. Cobbles and boulders in excess of 4-inches in diameter should be screened out of the native glacial till or crushed to an acceptable size.

Soils to be used as fill imported from off-site should also meet the attached gradation requirements. Fill placed under the BESS arrays, the proposed substation, all access roads, and all equipment pads should meet the compaction requirements for Structural Fill. Backfill placed in areas that will not support structural or paved elements should meet the compaction requirements for Ordinary Fill. Proposed borrow materials that fall slightly outside of these specifications may also be suitable for use, subject to review and approval by GEI.

7. Closure

7.1 Follow-on Services

We recommend that GEI be kept on the project through the final design and construction phases of this project for the following services:

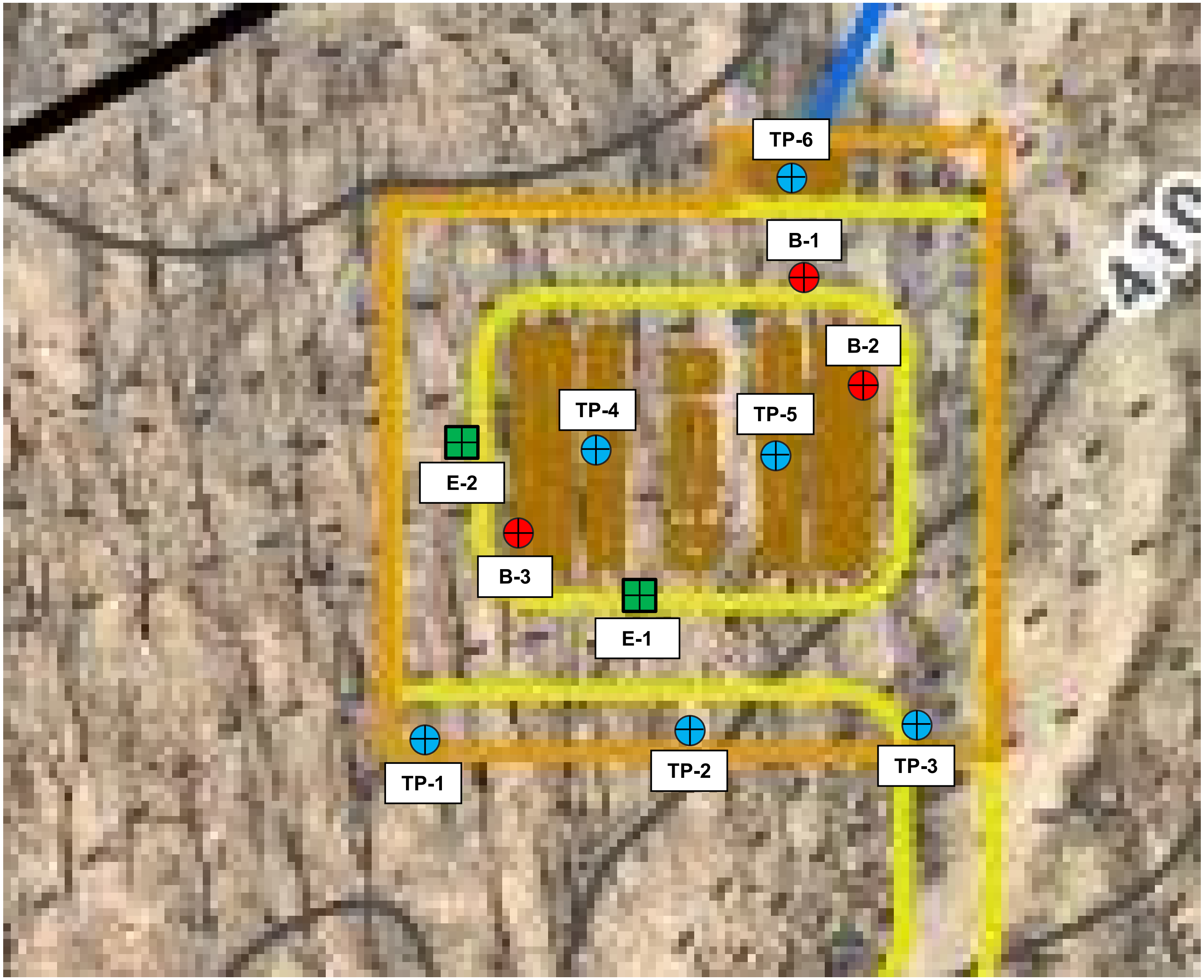
- Review geotechnical-related contractor submittals and assist in developing responses to questions from the contractor (i.e. RFI's).
- Provide periodic site visits during construction to view subgrades and consult on geotechnical-related issues that occur.

7.2 Limitations

This report was prepared for the use of the project team, exclusively. Our recommendations are based on the project information provided to us at the time of this report and may require modification if there are any changes in the nature, design, or location of the proposed building. We cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations, and whether our recommendations have been properly implemented in the design.

Our professional services for this project have been performed in accordance with generally accepted engineering practices. No warranty, expressed or implied, is made.

Figures



LEGEND

- APPROX. TEST PIT LOCATION
- APPROX. BORING LOCATION
- APPROX. RESISTIVITY TEST LOCATION

SOURCE:

PROPOSED PROJECT LAYOUT, (VHB, 03/14/23)

GEI Consultants

TEST LOCATION PLAN
BESS CT8
East Hampton, CT

GEI PROJECT NO: **2300876**

FIGURE NO. 1

Appendix A

Boring Logs

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): NM | **DATE START/END:** 4/4/2023 - 4/4/2023

VERTICAL DATUM: | **DRILLING COMPANY:** New England Boring

TOTAL DEPTH (ft): 11.0 | **DRILLER NAME:** Dave DeAngelis

LOGGED BY: T. Yurman | **RIG TYPE:**

BORING B-1

DRILLING INFORMATION

HAMMER TYPE: Safety Hammer - semi-automatic | **CASING I.D./O.D.:** NA/ NA | **CORE BARREL TYPE:**

AUGER I.D./O.D.: 3.75 inch / NA | **DRILL ROD O.D.:** NM | **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): Free groundwater not encountered.

ABBREVIATIONS:
Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length of Sound Cores>4 in / Pen.,%
WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger
Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter
NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140-lb hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample No.	Sample Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		S1	0 to 2	24/17	1-2-1-1		GLACIAL TILL	S1: SILTY SAND (SM); ~50% F-sand, ~45% NP fines, ~5% F-gravel, organic fibers, dark-brown to brown, dry. (16 inches TOPSOIL)
		S2	2 to 4	24/12	3-7-11-11		GLACIAL TILL	S2: SILTY SAND WITH GRAVEL (SM); 40.8% F-C sand, 29.7% NP fines, 29.5% F-C gravel, with cobbles, brown, dry.
	5	S3	4 to 6	24/0	15-13-11-12		GLACIAL TILL	S3: No recovery, cobbles in sampler.
		S4	6 to 8	24/7	18-26-56-77		GLACIAL TILL	S4: SILTY SAND (SM); ~75% F-sand, ~15% NP fines, ~10% F-C gravel, brown, dry, weathered rock structure.
	10	S5	8 to 10	24/11	20-55-47-72		GLACIAL TILL	S5: Similar to S4, weathered/decomposed rock. Difficult drilling at 10.0 ft.
								Auger Refusal at 11.0 ft. Backfilled with drill cuttings.

NOTES:

PROJECT NAME: VHB-Key Capture CT BESS - CT

CITY/STATE: East Hampton, Connecticut

GEI PROJECT NUMBER: 2301203

GEI Consultants

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): NM | **DATE START/END:** 4/4/2023 - 4/4/2023

VERTICAL DATUM: | **DRILLING COMPANY:** New England Boring

TOTAL DEPTH (ft): 9.0 | **DRILLER NAME:** Dave DeAngelis

LOGGED BY: T. Yurman | **RIG TYPE:**

BORING B-2

DRILLING INFORMATION

HAMMER TYPE: Safety Hammer - semi-automatic | **CASING I.D./O.D.:** NA/ NA | **CORE BARREL TYPE:**

AUGER I.D./O.D.: 3.75 inch / NA | **DRILL ROD O.D.:** NM | **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): Free groundwater not encountered.

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length of Sound Cores>4 in / Pen.,%
WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger
Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter
NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140-lb hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample No.	Sample Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
	0	S1	0 to 2	24/8	4-4-3-2		GLACIAL TILL	S1: SILTY SAND (SM); ~55% F-sand, ~40% NP fines, ~5% F-gravel, organic fibers, brown, dry to moist. (12 inches TOPSOIL)
		S2	2 to 4	24/16	4-10-13-12		GLACIAL TILL	S2: SILTY SAND (SM); 63.3% F-C sand, 31.3% NP fines, 5.4% F-C gravel (up to 1-in.), gray-brown, dry.
	5	S3	4 to 6	24/17	11-13-19-45		GLACIAL TILL	S3: SILTY SAND (SM); ~80% F-C sand, ~15% NP fines, ~5% F-gravel, light-brown, dry to moist.
		S4	6 to 6.5	6/6	102		GLACIAL TILL	S4: Similar to S3. Difficult driling at 6.5 ft.
	9							Auger Refusal at 9.0 ft. Backfilled with drill cuttings.
	10							

NOTES:

PROJECT NAME: VHB-Key Capture CT BESS - CT

CITY/STATE: East Hampton, Connecticut

GEI PROJECT NUMBER: 2301203

GEI Consultants

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): NM

DATE START/END: 4/4/2023 - 4/4/2023

VERTICAL DATUM:

DRILLING COMPANY: New England Boring

TOTAL DEPTH (ft): 10.0

DRILLER NAME: Dave DeAngelis

LOGGED BY: T. Yurman

RIG TYPE:

BORING B-3

DRILLING INFORMATION

HAMMER TYPE: Safety Hammer - semi-automatic

CASING I.D./O.D.: NA/ NA

CORE BARREL TYPE:

AUGER I.D./O.D.: 3.75 inch / NA

DRILL ROD O.D.: NM

CORE BARREL I.D./O.D. NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): ▼ 8.0

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length of Sound Cores>4 in / Pen.,%
WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger
Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter
NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140-lb hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information				Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		Sample No.	Depth (ft)	Pen./ Rec. (in)	Blows per 6 in. or RQD			
		S1	0 to 2	24/9	WOH 1/12"-5-4		GLACIAL TILL	S1: SILTY SAND (SM); ~50% NP fines, ~45% F-sand, ~5% F-gravel, organic fibers, brown, dry to moist. (12 inches TOPSOIL)
		S2	2 to 4	24/21	5-14-13-9			S2: SILTY SAND (SM); ~60% F-sand, ~30% NP fines, ~10% F-gravel, with cobbles, brown, dry to moist.
	5	S3	4 to 6	24/19	5-10-10-12			S3: SILTY SAND WITH GRAVEL (SM); ~65% F-C sand, ~20% NP fines, ~15% F-C gravel, with cobbles and decomposed rock, brown, dry to moist.
		S4	6 to 8	24/18	9-6-3-15			S4: SILTY SAND WITH GRAVEL (SM); ~60% F-M sand, ~25% NP fines, ~15% F-C gravel, brown, moist to wet.
		S5	8 to 9.3	16/16	35-65-75/4"			S5: SILTY SAND WITH GRAVEL (SM); ~60% F-M sand, ~25% NP fines, ~15% F-C gravel, reddish-brown to dark-gray, moist, weathered rock structure. Difficult drilling at 9.0 ft.
	10							Auger Refusal at 10.0 ft. Backfilled with drill cuttings.

NOTES:

PROJECT NAME: VHB-Key Capture CT BESS - CT

CITY/STATE: East Hampton, Connecticut

GEI PROJECT NUMBER: 2301203

GEI Consultants

Appendix B

Test Pit Logs

GEI Consultants	GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB** **PROJECT: Key Capture BESS (CT8)** **CITY/STATE: East Hampton, CT** **GEI PROJECT NUMBER: 2301203-3.1**	**TEST PIT LOG** **PAGE** 1 **TP-1**

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	7.5 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	11.5 FT
CHECKED BY:		**TOTAL WIDTH:**	3 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

DEPTH FT.	SAMPLE TYPE & ID	SAMPLE DEPTH (FT)	SOIL DESCRIPTION
0	G-1	(0.0-0.5)	SANDY SILT (ML); ~80% LP fines, ~20% F- sand, frequent organic fibers and roots, black, moist. TOPSOIL
1 2 3	G-2	(0.5-3.5)	SILTY SAND WITH GRAVEL (SM); 53.1% F-C sand, 27.6% NP fines, 19.3% F-C gravel, brown, moist.
4 5 6 7	G-3	(3.5-7.5)	SAND WITH GRAVEL (SW); ~65% F-C sand, ~30% F-C gravel (subround to round), ~5% NP fines, gray-brown, moist to damp.
8			Planned depth.

Bottom of test pit at 7.5 feet. Backfilled with excavated soil placed in lifts and tamped with excavator bucket.

Note: Groundwater intrusion observed at 4.5 feet. No apparent soil mottling noted.

F=FINE M=MEDIUM NP= NONPLASTIC NM= NOT MEASURED
C=COARSE LP=LOW PLASTICITY MP=MEDIUM PLASTICITY

GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB** **PROJECT: Key Capture BESS (CT8)** **CITY/STATE: East Hampton, CT** **GEI PROJECT NUMBER: 2301203-3.1**	**TEST PIT LOG**	
		PAGE 2	**TP-1**

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	7.5 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	11.5 FT
CHECKED BY:		**TOTAL WIDTH:**	3 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

PHOTOGRAPHIC LOG

Bottom of test pit at 7.5 feet.
Picture showing soil strata at Test Pit 1

NOTES:

IN. = INCHES NM= NOT MEASURED

FT. = FEET

GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	CLIENT: VHB	TEST PIT LOG	
	PROJECT: Key Capture BESS (CT8)	PAGE	TP-2
	CITY/STATE: East Hampton, CT	1	
	GEI PROJECT NUMBER: 2301203-3.1		

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	7 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	12 FT
CHECKED BY:		**TOTAL WIDTH:**	4 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

DEPTH FT.	SAMPLE TYPE & ID	SAMPLE DEPTH (FT)	SOIL DESCRIPTION
0	G-1	(0.0-0.5)	SANDY SILT (ML); ~80% LP fines, ~20% F- sand, frequent organic fibers and roots, black, moist. TOPSOIL
1 2	G-2	(0.5-2.5)	SILTY SAND WITH GRAVEL (SM); ~45% F-C sand, ~40% NP fines, ~15% F-C gravel, brown, moist.
3 4 5 6 7	G-3	(2.5-7.0)	SILTY SAND WITH GRAVEL (SM); ~65% F-M sand, ~20% F-C gravel, ~15% NP fines, gray-brown moist. Frequent boulders at 5.5 to 7.0 ft. Dig refusal at 7.0 ft. (presumed rock)
8			Terminated due to dig refusal.

Bottom of test pit at 7.0 feet. Backfilled with excavated soil placed in lifts and tamped with excavator bucket.

Note: Groundwater intrusion observed at 6.7 feet. No apparent soil mottling noted.

F=FINE M=MEDIUM NP= NONPLASTIC NM= NOT MEASURED
C=COARSE LP=LOW PLASTICITY MP=MEDIUM PLASTICITY

GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB**	**TEST PIT LOG**	
	PROJECT: Key Capture BESS (CT8)	**PAGE**	**TP-2**
	CITY/STATE: East Hampton, CT	2	
	GEI PROJECT NUMBER: 2301203-3.1		

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM **EASTING:** NM		**TOTAL DEPTH:**	7 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	12 FT
CHECKED BY:		**TOTAL WIDTH:**	4 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HOR**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

PHOTOGRAPHIC LOG

Bottom of test pit at 7.0 feet.
Picture showing soil strata at Test Pit 2

NOTES:
IN. = INCHES NM= NOT MEASURED
FT. = FEET

GEI Consultants, Inc.
455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: VHB	**TEST PIT LOG**
PROJECT: Key Capture BESS (CT8)	**PAGE** 1 — **TP-3**
CITY/STATE: East Hampton, CT	
GEI PROJECT NUMBER: 2301203-3.1	

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	6.2 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	10.9 FT
CHECKED BY:		**TOTAL WIDTH:**	3.2 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

DEPTH FT.	SAMPLE TYPE & ID	SAMPLE DEPTH (FT)	SOIL DESCRIPTION
0	G-1	(0.0-0.25)	SANDY SILT (ML); ~80% LP fines, ~20% F- sand, frequent organic fibers and roots, black, moist. TOPSOIL
1, 2	G-2	(0.25-2.5)	SILTY SAND WITH GRAVEL (SM); ~45% F- sand, ~40% LP fines, ~15% F-C gravel, brown, moist.
3, 4, 5, 6	G-3	(2.5-6.2)	SILTY SAND WITH GRAVEL (SM); ~60% F-C sand, ~25% F-C gravel, ~15% NP-LP fines, gray-brown, moist. Frequent boulders at 5.0 to 6.2 ft. Dig refusal at 6.2 ft. (presumed rock)
7			Terminated due to dig refusal.

Bottom of test pit at 6.2 feet. Backfilled with excavated soil placed in lifts and tamped with excavator bucket.

Note: Groundwater intrusion not observed. Apparent soil mottling observed at 4.0 feet.

F=FINE M=MEDIUM NP= NONPLASTIC NM= NOT MEASURED
C=COARSE LP=LOW PLASTICITY MP=MEDIUM PLASTICITY

GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB**	**TEST PIT LOG**	
	PROJECT: Key Capture BESS (CT8)	**PAGE**	**TP-3**
	CITY/STATE: East Hampton, CT	2	
	GEI PROJECT NUMBER: 2301203-3.1		

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	6.2 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	10.9 FT
CHECKED BY:		**TOTAL WIDTH:**	3.2 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

PHOTOGRAPHIC LOG

Bottom of test pit at 6.2 feet.
Picture showing soil strata at Test Pit 3

NOTES:
IN. = INCHES   NM= NOT MEASURED
FT. = FEET

GEI Consultants	GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB** **PROJECT: Key Capture BESS (CT8)** **CITY/STATE: East Hampton, CT** **GEI PROJECT NUMBER: 2301203-3.1**	**TEST PIT LOG** **PAGE** 1	**TP-4**

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	3.2 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	11 FT
CHECKED BY:		**TOTAL WIDTH:**	3 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

DEPTH FT.	**SAMPLE TYPE & ID**	**SAMPLE DEPTH (FT)**	**SOIL DESCRIPTION**
0	G-1	(0.0-0.25)	SANDY SILT (ML); ~80% LP fines, ~20% F- sand, frequent organic fibers and roots, black, moist. TOPSOIL
1 2	G-2	(0.25-2.0)	SILTY SAND WITH GRAVEL (SM); ~45% F- sand, ~40% NP-LP fines, ~15% F-C gravel, with roots, brown, moist.
3	G-3	(2.0-3.2)	SILTY SAND (SM); ~75% F-C sand, ~15% NP fines, ~10% F-C gravel, gray-brown, moist to damp. Dig refusal at 3.2 ft. (presumed rock)
4			Terminated due to dig refusal.

Bottom of test pit at 3.2 feet. Backfilled with excavated soil placed in lifts and tamped with excavator bucket.

Note: Groundwater intrusion not observed. No apparent soil mottling noted.

F=FINE M=MEDIUM NP= NONPLASTIC NM= NOT MEASURED
C=COARSE LP=LOW PLASTICITY MP=MEDIUM PLASTICITY

GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB**	**TEST PIT LOG**	
	PROJECT: Key Capture BESS (CT8)	**PAGE**	**TP-4**
	CITY/STATE: East Hampton, CT	2	
	GEI PROJECT NUMBER: 2301203-3.1		

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	3.2 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	11 FT
CHECKED BY:		**TOTAL WIDTH:**	3 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

PHOTOGRAPHIC LOG

Bottom of test pit at 3.2 feet.
Picture showing soil strata at Test Pit 4

NOTES:
IN. = INCHES NM= NOT MEASURED
FT. = FEET

GEI Consultants	GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB** **PROJECT: Key Capture BESS (CT8)** **CITY/STATE: East Hampton, CT** **GEI PROJECT NUMBER: 2301203-3.1**	**TEST PIT LOG** **PAGE** 1	**TP-5**

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	5 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	10.5 FT
CHECKED BY:		**TOTAL WIDTH:**	3.5 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

DEPTH FT.	SAMPLE TYPE & ID	SAMPLE DEPTH (FT)	SOIL DESCRIPTION
0	G-1	(0.0-0.5)	SANDY SILT (ML); ~80% LP fines, ~20% F- sand, frequent organic fibers and roots, black, moist. TOPSOIL
1	G-2	(0.5-1.5)	SILTY SAND (SM); ~70% F- sand, ~25% NP fines, ~5% F- gravel, some roots and organic fibers, brown, moist.
2 3 4 5	G-3	(1.5-5.0)	SILTY SAND (SM); ~70% F-M sand, ~20% NP fines, ~10% F- gravel, gray-brown, moist. Frequent boulders at 2.5 to 4.0 ft. Weathered rock at 4.0 ft. Dig refusal at 5.0 ft. (presumed rock)
6			Terminated due to dig refusal.

Bottom of test pit at 5.0 feet. Backfilled with excavated soil placed in lifts and tamped with excavator bucket.

Note: Groundwater intrusion not observed. No apparent soil mottling noted.

F=FINE M=MEDIUM NP= NONPLASTIC NM= NOT MEASURED
C=COARSE LP=LOW PLASTICITY MP=MEDIUM PLASTICITY

GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	**CLIENT: VHB**	**TEST PIT LOG**	
	PROJECT: Key Capture BESS (CT8)	**PAGE**	**TP-5**
	CITY/STATE: East Hampton, CT	2	
	GEI PROJECT NUMBER: 2301203-3.1		

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM **EASTING:**	NM	**TOTAL DEPTH:**	5 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	10.5 FT
CHECKED BY:		**TOTAL WIDTH:**	3.5 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

PHOTOGRAPHIC LOG

Bottom of test pit at 5.0 feet.
Picture showing soil strata at Test Pit 5

NOTES:
IN. = INCHES NM= NOT MEASURED
FT. = FEET

GEI Consultants, Inc.
455 Winding Brook Drive
Glastonbury, CT 06033
(860) 368-5300

CLIENT: VHB	TEST PIT LOG	
PROJECT: Key Capture BESS (CT8)	PAGE	TP-6
CITY/STATE: East Hampton, CT	1	
GEI PROJECT NUMBER: 2301203-3.1		

GROUND SURFACE ELEVATION (FT):	TBD	LOCATION:	See Plan.
NORTHING: NM	EASTING: NM	TOTAL DEPTH:	8 FT
OBSERVED BY:	Majid Mahmoodabadi	TOTAL LENGTH:	11.5 FT
CHECKED BY:		TOTAL WIDTH:	3.3 FT
EQUIPMENT:	Hitachi ZX 160LC	DATUM VERT. / HORZ.:	
WEATHER:	60°F, Sunny	DATE START / END	4/4/2023

DEPTH FT.	SAMPLE TYPE & ID	SAMPLE DEPTH (FT)	SOIL DESCRIPTION
0	G-1	(0.0-0.7)	SANDY SILT (ML); ~80% LP fines, ~20% F- sand, frequent organic fibers and roots, black, moist. TOPSOIL
1 2 3	G-2	(0.7-3.0)	SILTY SAND WITH GRAVEL (SM); ~65% F- sand, ~20% NP fines, ~15% F-C gravel, some roots and organic fibers, brown, moist.
4 5 6 7 8	G-3	(3.0-8.0)	SILTY SAND WITH GRAVEL (SM); 47.0% F-C sand, 25.3% F-C gravel, 27.7% NP fines, gray-brown, moist. Frequent cobbles at depth. Weathered rock at 4.0 ft.
			Planned depth.

Bottom of test pit at 8.0 feet. Backfilled with excavated soil placed in lifts and tamped with excavator bucket.

Note: Groundwater intrusion not observed. Apparent soil mottling observed at 3.5 feet.

F=FINE M=MEDIUM NP= NONPLASTIC NM= NOT MEASURED
C=COARSE LP=LOW PLASTICITY MP=MEDIUM PLASTICITY

GEI Consultants, Inc. 455 Winding Brook Drive Glastonbury, CT 06033 (860) 368-5300	CLIENT: VHB	TEST PIT LOG	
	PROJECT: Key Capture BESS (CT8)	PAGE	TP-6
	CITY/STATE: East Hampton, CT	2	
	GEI PROJECT NUMBER: 2301203-3.1		

GROUND SURFACE ELEVATION (FT):	TBD	**LOCATION:**	See Plan.
NORTHING: NM	**EASTING:** NM	**TOTAL DEPTH:**	8 FT
OBSERVED BY:	Majid Mahmoodabadi	**TOTAL LENGTH:**	11.5 FT
CHECKED BY:		**TOTAL WIDTH:**	3.3 FT
EQUIPMENT:	Hitachi ZX 160LC	**DATUM VERT. / HORZ.:**	
WEATHER:	60°F, Sunny	**DATE START / END**	4/4/2023

PHOTOGRAPHIC LOG

Bottom of test pit at 8.0 feet.
Picture showing soil strata at Test Pit 6

NOTES:
IN. = INCHES NM= NOT MEASURED
FT. = FEET

Appendix C

Laboratory Test Results

Client:	GEI Consultants, Inc.				
Project:	Key Capture Energy Battery Storage				
Location:	Windsor Locks, CT			Project No:	GTX-317151
Boring ID:	---	Sample Type:	---	Tested By:	ckg
Sample ID:	---	Test Date:	05/04/23	Checked By:	ank
Depth :	---	Test Id:	714130		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
EH-B-1	S- 2	2-4'	Moist, brown silty sand with gravel	10.2
EH-B-2	S- 2	2-4'	Moist, brown silty sand	8.3
EH-TP-1	G- 2	2.5'	Moist, dark yellowish brown silty sand with gravel	16.2
EH-TP-6	G- 3	3'	Moist, grayish brown silty sand with gravel	9.2
HA-B-1	S- 3	4-6'	Moist, reddish brown sand with silt	3.7
HA-B-2	S- 2	2-4'	Moist, brown sand with silt	4.2
HA-TP-3	G- 2	2'	Moist, reddish brown sand with silt	5.9
HA-TP-5	G- 2	3'	Moist, dark reddish brown silty sand	18.6
WI-B-1	S- 3	4-6'	Moist, dark brown silty sand with gravel	8.4
WI-B-3	S- 2	2-4'	Molist, brown silty sand with gravel	9.0

Notes: Temperature of Drying : 110º Celsius

Client:	GEI Consultants, Inc.
Project Name:	Key Capture Energy Battery Storage
Project Location:	Windsor Locks, CT
GTX #:	317151
Test Date:	05/01/23
Tested By:	NLB
Checked By:	ank

Laboratory pH of Soil by ASTM G51

Boring ID	Sample ID	Depth, ft	Description	Soil Temperature, ° C	Average pH Reading
EH-B-3	EH-Composite	2-8'	Moist, dark yellowish brown silty sand with gravel	21.8	5.64
WI-B-2	WI-Composite	2-8'	Moist, yellowish brown silty sand with gravel	21.8	5.39
WL-B-2	WL-Composite	2-8'	Moist, dark reddish brown silty sand	22.2	6.61
HA-B-5	HA-Composite	2-8'	Moist, dark reddish brown silty sand	22.5	6.85

Notes:

Client:	GEI Consultants, Inc.
Project:	Key Capture Energy Battery Storage
Location:	Windsor locks, CT
GTX#:	317151
Test Date:	05/05/23
Tested By:	nlb
Checked By:	ank

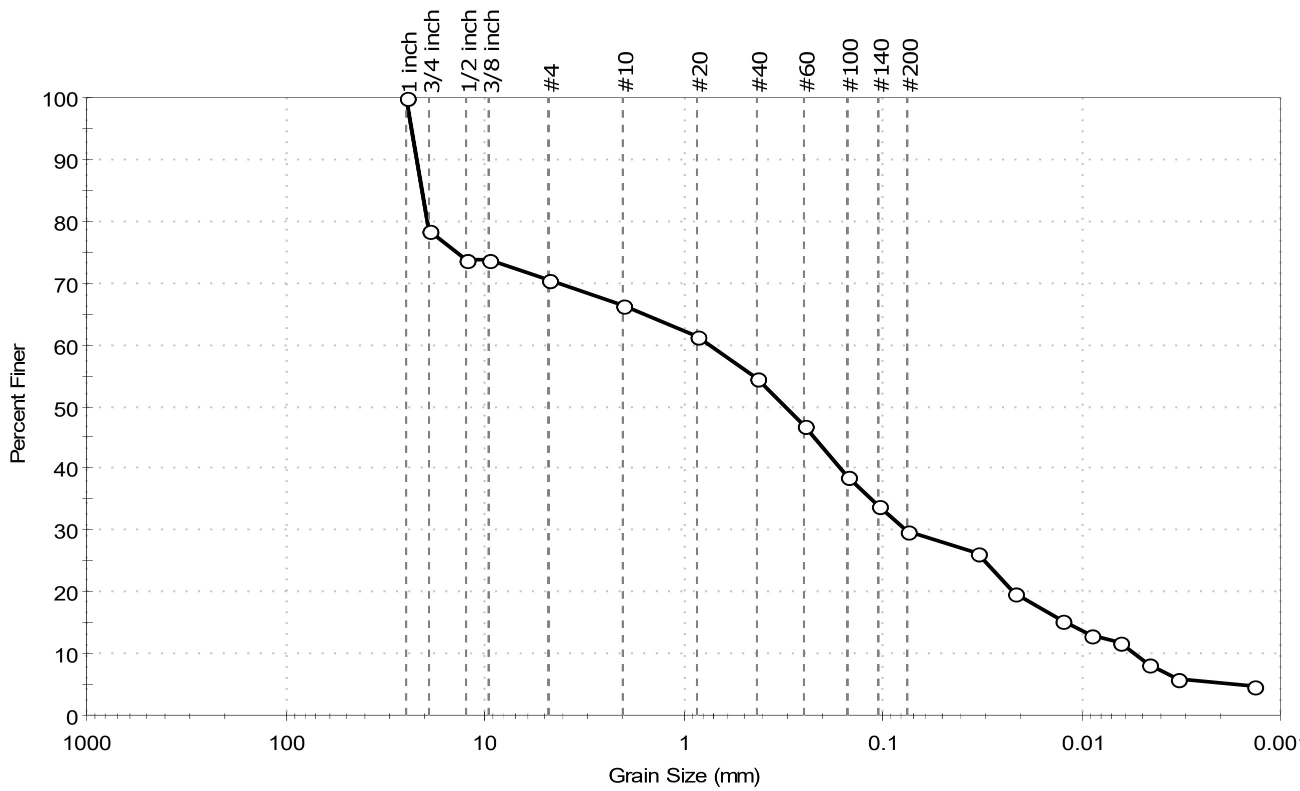
Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G57 (Laboratory Measurement)

Boring ID	Sample ID	Depth, ft.	Sample Description	Electrical Resistivity, ohm-cm	Electrical Conductivity, $(\text{ohm-cm})^{-1}$
EH-B-3	EH-Composite	2-8'	Moist, dark yellowish brown silty sand with gravel	51,652	1.94E-05
WI-B-2	WI-Composite	2-8'	Moist, yellowish brown silty sand with gravel	33,057	3.03E-05
WL-B-2	WL-Composite	2-8'	Moist, dark reddish brown silty sand	10,330	9.68E-05
HA-B-5	HA-composite	2-8'	Moist, dark reddish brown silty sand	10,537	9.49E-05

Notes:
Test Equipment: Nilsson Model 400 Soil Resistance Meter, MC Miller Soil Box
Water added to sample to create a thick slurry prior to testing (saturated condition).
Electrical Conductivity is calculated as inverse of Electrical Resistivity (per ASTM G57)
Test conducted in standard laboratory atmosphere: 68-73 F

Client:	GEI Consultants, Inc.		
Project:	Key Capture Energy Battery Storage		
Location:	Windsor Locks, CT	Project No:	GTX-317151
Boring ID: EH-B-1	Sample Type: bag	Tested By:	ckg
Sample ID: S-2	Test Date: 05/04/23	Checked By:	ank
Depth : 2-4'	Test Id: 714038		
Test Comment:	---		
Visual Description:	Moist, brown silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	29.5	40.8	29.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 inch	25.00	100		
3/4 inch	19.00	78		
1/2 inch	12.50	74		
3/8 inch	9.50	74		
#4	4.75	71		
#10	2.00	66		
#20	0.85	61		
#40	0.42	55		
#60	0.25	47		
#100	0.15	39		
#140	0.11	34		
#200	0.075	30		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0336	26		
---	0.0215	20		
---	0.0126	15		
---	0.0090	13		
---	0.0064	12		
---	0.0046	8		
---	0.0033	6		
---	0.0014	5		

Coefficients

D_{85} =20.6531 mm D_{30} =0.0771 mm

D_{60} =0.7356 mm D_{15} =0.0118 mm

D_{50} =0.3096 mm D_{10} =0.0054 mm

C_u =136.222 C_c =1.496

Classification

ASTM N/A

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

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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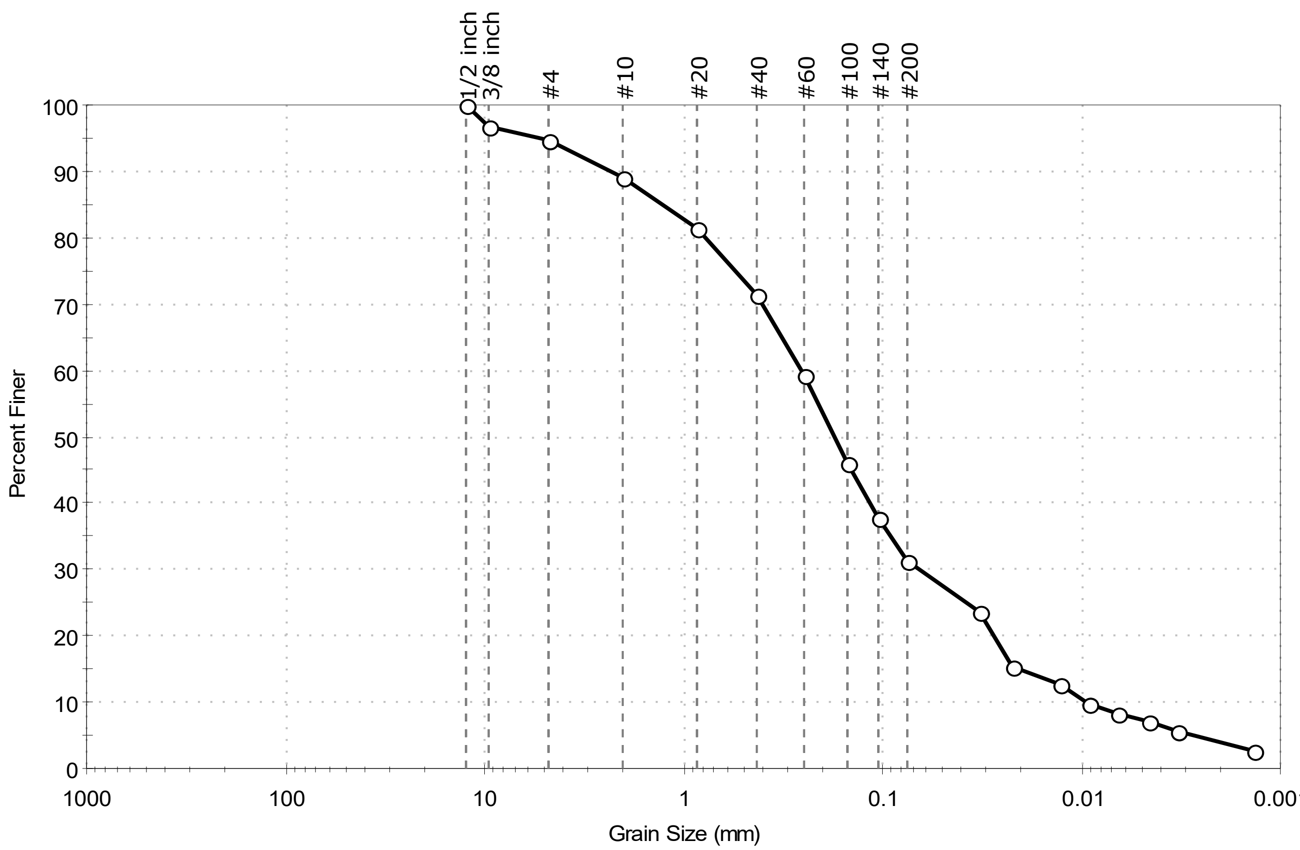
Client:	GEI Consultants, Inc.
Project:	Key Capture Energy Battery Storage
Location:	Windsor Locks, CT
Project No:	GTX-317151
Boring ID:	EH-B-2
Sample Type:	bag
Tested By:	ckg
Sample ID:	S-2
Test Date:	05/04/23
Checked By:	ank
Depth :	2-4'
Test Id:	714039
Test Comment:	---
Visual Description:	Moist, brown silty sand
Sample Comment:	removed 1in rock

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	5.4	63.3	31.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1/2 inch	12.50	100		
3/8 inch	9.50	97		
#4	4.75	95		
#10	2.00	89		
#20	0.85	82		
#40	0.42	71		
#60	0.25	59		
#100	0.15	46		
#140	0.11	38		
#200	0.075	31		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0324	24		
---	0.0223	15		
---	0.0129	13		
---	0.0092	10		
---	0.0065	8		
---	0.0047	7		
---	0.0033	6		
---	0.0014	3		

Coefficients

D_{85} = 1.2653 mm
D_{30} = 0.0646 mm
D_{60} = 0.2589 mm
D_{15} = 0.0208 mm
D_{50} = 0.1754 mm
D_{10} = 0.0095 mm
C_u = 27.253
C_c = 1.697

Classification

ASTM N/A

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

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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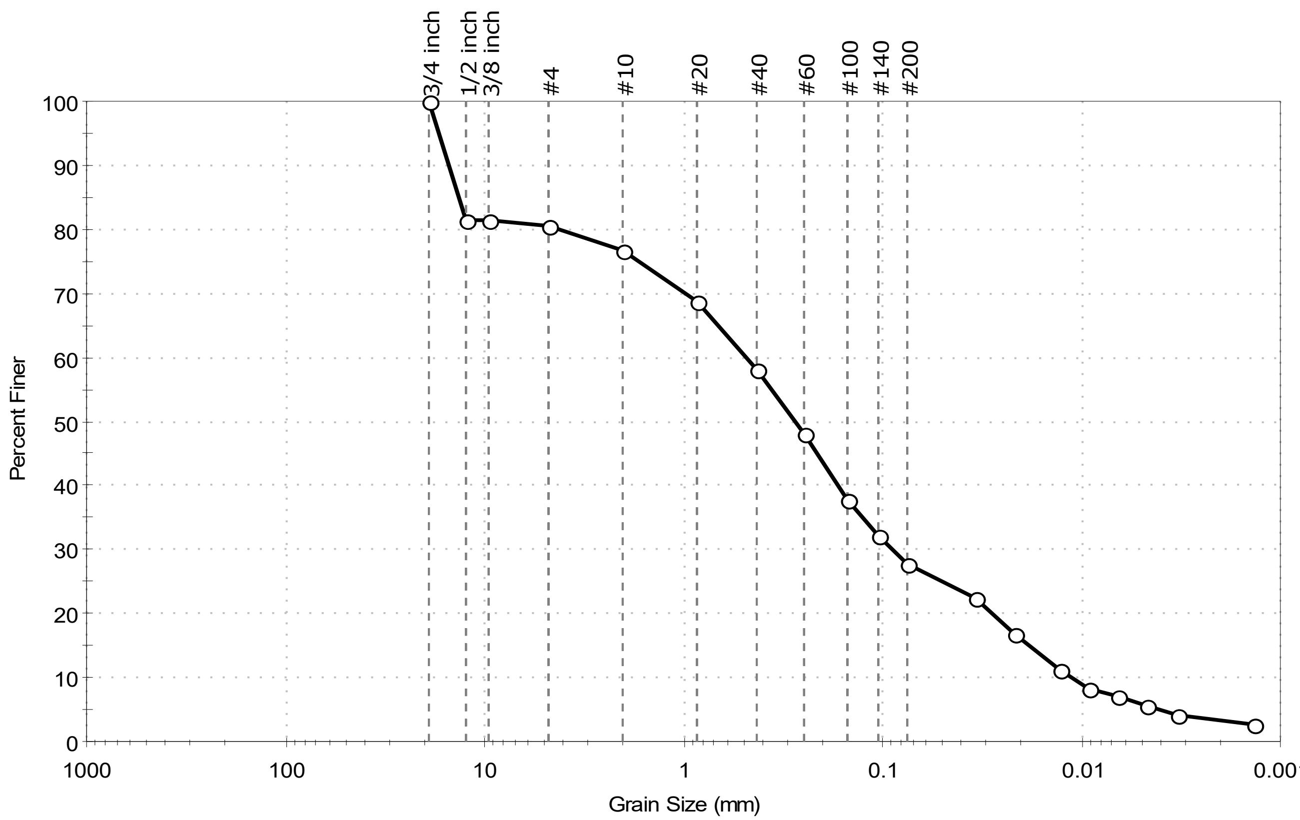
Client:	GEI Consultants, Inc.
Project:	Key Capture Energy Battery Storage
Location:	Windsor Locks, CT
Project No:	GTX-317151
Boring ID:	EH-TP-1
Sample ID:	G-2
Depth :	2.5'
Sample Type:	bag
Test Date:	05/04/23
Test Id:	714040
Tested By:	ckg
Checked By:	ank
Test Comment:	---
Visual Description:	Moist, dark yellowish brown silty sand with gravel
Sample Comment:	---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	19.3	53.1	27.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 inch	12.50	82		
3/8 inch	9.50	82		
#4	4.75	81		
#10	2.00	77		
#20	0.85	69		
#40	0.42	58		
#60	0.25	48		
#100	0.15	38		
#140	0.11	32		
#200	0.075	28		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0344	22		
---	0.0216	17		
---	0.0129	11		
---	0.0092	8		
---	0.0066	7		
---	0.0047	6		
---	0.0033	4		
---	0.0014	3		

Coefficients

D_{85} =13.5160 mm
D_{30} =0.0897 mm
D_{60} =0.4777 mm
D_{15} =0.0183 mm
D_{50} =0.2774 mm
D_{10} =0.0112 mm
C_u =42.652
C_c =1.504

Classification

ASTM N/A

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

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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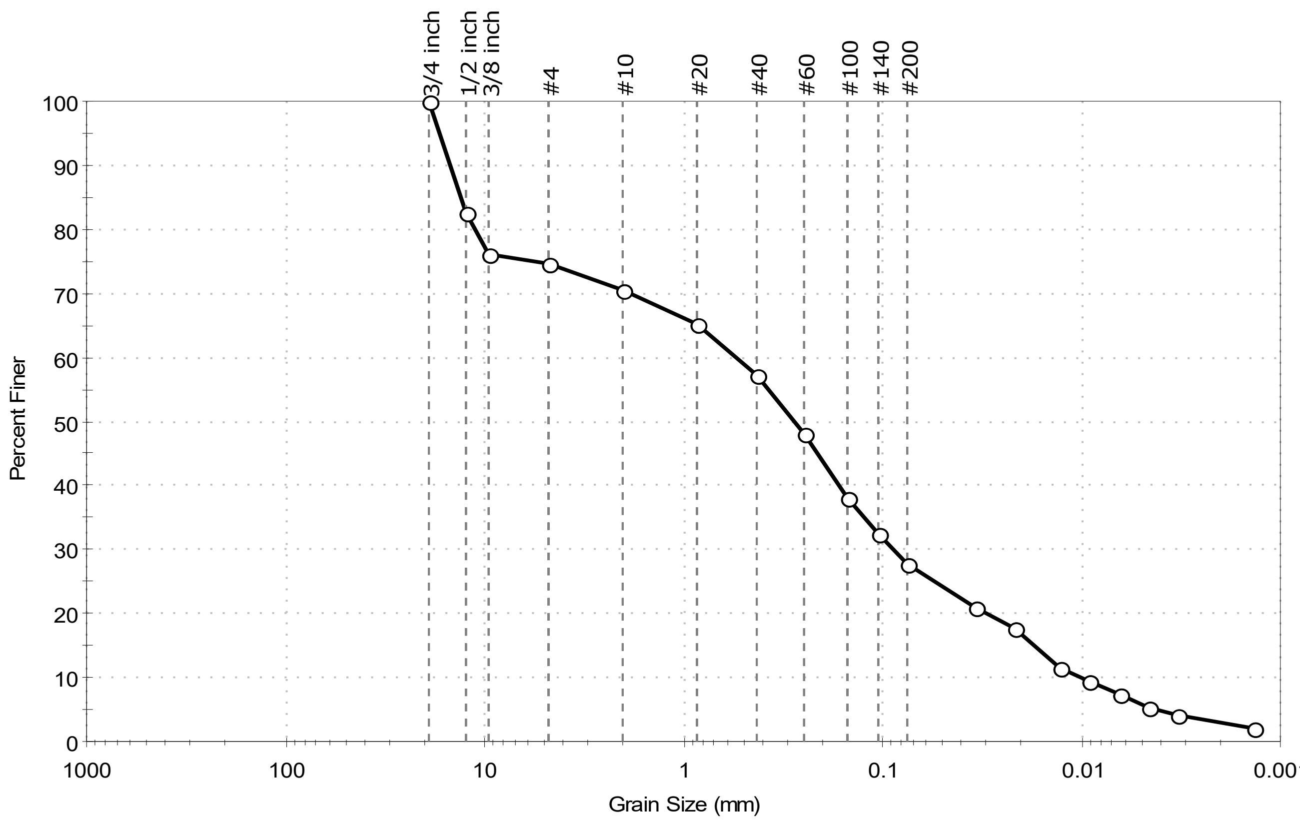
Client:	GEI Consultants, Inc.
Project:	Key Capture Energy Battery Storage
Location:	Windsor Locks, CT
Project No:	GTX-317151
Boring ID:	EH-TP-6
Sample Type:	bag
Tested By:	ckg
Sample ID:	G-3
Test Date:	05/04/23
Checked By:	ank
Depth :	3'
Test Id:	714041
Test Comment:	---
Visual Description:	Moist, grayish brown silty sand with gravel
Sample Comment:	---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	25.3	47.0	27.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/4 inch	19.00	100		
1/2 inch	12.50	83		
3/8 inch	9.50	76		
#4	4.75	75		
#10	2.00	71		
#20	0.85	65		
#40	0.42	57		
#60	0.25	48		
#100	0.15	38		
#140	0.11	32		
#200	0.075	28		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0340	21		
---	0.0215	18		
---	0.0128	11		
---	0.0091	9		
---	0.0065	7		
---	0.0046	5		
---	0.0033	4		
---	0.0014	2		

Coefficients

D_{85} =13.2400 mm
D_{30} =0.0888 mm
D_{60} =0.5424 mm
D_{15} =0.0172 mm
D_{50} =0.2798 mm
D_{10} =0.0101 mm
C_u =53.703
C_c =1.439

Classification

ASTM N/A

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

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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GEOTESTING EXPRESS INCORPORATED
125 NAGOG PARK
ACTON MA 01720-3451
USA

Analysis No.	TS-A2311113
Report Date	04 May 2023
Date Sampled	28 April 2023
Date Received	03 May 2023
Where Sampled	Acton, MA USA
Sampled By	Client

This is to attest that we have examined: Soil: Project: Key Capture Energy Battery Storage; Site Location: - — -; Job Number: GTX-317151

When examined to the applicable requirements of:

ASTM D 512-12*	“Standard Test Methods for Chloride Ion in Water” Method B
ASTM D 516-16	“Standard Test Method for Sulfate Ion in Water”

Results:

ASTM D 512 - Chloride Method B

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
EH-B-3		24.	0.0024	10.
EH-Composite	2 – 8’			
HA-B-5		15.	0.0015	
HA-Composite	2 – 8’			
WI-B-2		12.	0.0012	
WI-Composite	2 – 8’			
WL-B-2		19.	0.0019	
WL-Composite	2 – 8’			

NOTE: [1]Percent by weight after drying and prepared as per the Standard. *Withdrawn 2021 without Replacement

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ASTM D 516– Sulfates (Soluble)

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
EH-B-3		12.	0.0012	10.
EH-Composite	2 – 8'			
HA-B-5		< 10.	< 0.0010	
HA-Composite	2 – 8'			
WI-B-2		14.	0.0014	
WI-Composite	2 – 8'			
WL-B-2		16.	0.0016	
WL-Composite	2 – 8'			

NOTE: [1]Percent by weight after drying and prepared as per the Standard.

END OF ANALYSIS

USEPA Laboratory ID UT00930

Merrill Gee P.E. – Engineer in Charge

Appendix D

Infiltration Testing Results

GEI Consultants, Inc.
GEI Proj # 2301203- 3.1
Guelph Permeameter Testing
CT 8 - East Hampton, CT

Test Date	4/4/2023
<u>Field Data</u>	TP-1
Reservoir	Combined
Unit Set	6"
Depth of Test	3'-6"
Depth to GW	4'-6"
GEI Rep.	Majid Mahmoodabadi
Soil Type	SILTY SAND WITH GRAVEL (SM); 53.1% F-C sand, 19.3% F-C gravel, 27.6% NP fines, gray-brown, moist to damp.

Water Level in Well 6.35 cm *

Time (min)	Time Change (min)	Water Level in Res. (cm)	Change in Res. Water Level (cm)	Rate of Change (cm/min)
0.0000		5.25		
0.167	0.17	5.30	0.05	0.30
0.333	0.17	5.30	0.00	0.00
0.500	0.17	5.40	0.10	0.60
0.667	0.17	5.50	0.10	0.60
0.833	0.17	5.60	0.10	0.60
1.000	0.17	5.70	0.10	0.60
1.167	0.17	5.80	0.10	0.60
	Steady Rate of Change, R_1 (cm/min)			**0.60**

Water Level in Well 13 cm

Time (min)	Time Change (min)	Water Level in Res. (cm)	Change in Res. Water Level (cm)	Rate of Change (cm/min)
0.000		12.7		
0.083	0.08	12.8	0.10	1.20
0.167	0.08	13.1	0.30	3.60
0.250	0.08	13.2	0.10	1.20
0.333	0.08	13.4	0.20	2.40
0.417	0.08	13.5	0.10	1.20
0.500	0.08	13.6	0.10	1.20
0.583	0.08	13.7	0.10	1.20
0.667	0.08	13.8	0.10	1.20
0.750	0.08	13.8	0.00	0.00
0.833	0.08	13.9	0.10	1.20
0.917	0.08	14.0	0.10	1.20
1.000	0.08	14.1	0.10	1.20
1.083	0.08	14.2	0.10	1.20
1.167	0.08	14.3	0.10	1.20
1.250	0.08	14.3	0.00	0.00
1.333	0.08	14.4	0.10	1.20
1.417	0.08	14.4	0.00	0.00
1.500	0.08	14.5	0.10	1.20
	Steady Rate of Change, R2 (cm/min)			**0.93**

GEI Consultants, Inc.	**Calc. by:** M. Mahmoodabadi	**Date:** 4/11/2023	
GEI Proj # 2301203- 3.1	**Check by:** M. Glunt	**Date:** 5/8/2023	

CT 8 - East Hampton, CT

Guelph Permeameter Testing - TP-1

Single Head Method - Test 1

Test Data and Information

• Reservoir		-	Combined		
• Reservoir Cross-Sectional Area		-	35.22	cm^2	(Provided on Permeameter)
• Water Head Height	H_1	-	6.35	cm	
• Borehole Radius	a	-	3.2	cm	Assumed slightly larger than 3cm rad. hand auger
• Soil Texture-Structure Category		-	3		(Table 2)
• Steady State Rate of Water Level Change	R_1	-	0.60	cm/min	(Obtained during testing)

Test Calculations and Results

• Microscopic Capillary Length Factor	α*	-	0.12	cm^{-1}	(Table 2: Based on Soil Texture-Structure Category)
• Shape Factor	C_1	-	0.907		(Table 2: Based on Soil Texture-Structure Category)
• Volumetric Flow Rate	Q_1	-	0.3522	cm^3/sec	(Table 3: One Head, Combined Reservoir)
• Soil Saturated Hydraulic Conductivity	K_{fs}	-	5.194E-04	cm/sec	(Table 3: One Head, Combined Reservoir)
• Soil Matrix Flux Potential	Φ_m	-	4.329E-03	cm^2/sec	(Table 3: One Head, Combined Reservoir)

Single Head Method - Test 2

Test Data and Information

• Reservoir		-	Combined		
• Reservoir Cross-Sectional Area		-	35.22	cm^2	(Provided on Permeameter)
• Water Head Height	H_2	-	13	cm	
• Borehole Radius	a	-	3.2	cm	Assumed slightly larger than 3cm rad. hand auger
• Soil Texture-Structure Category		-	3		(Table 2)
• Steady State Rate of Water Level Change	R_2	-	0.93	cm/min	(Obtained during testing)

Test Calculations and Results

• Microscopic Capillary Length Factor	α*	-	0.12	cm^{-1}	(Table 2: Based on Soil Texture-Structure Category)
• Shape Factor	C_2	-	1.463		(Table 2: Based on Soil Texture-Structure Category)
• Volumetric Flow Rate	Q_2	-	0.547866667	cm^3/sec	(Table 3: One Head, Combined Reservoir)
• Soil Saturated Hydraulic Conductivity	K_{fs}	-	4.480E-04	cm/sec	(Table 3: One Head, Combined Reservoir)
• Soil Matrix Flux Potential	Φ_m	-	3.733E-03	cm^2/sec	(Table 3: One Head, Combined Reservoir)

Test Averages

• Soil Saturated Hydraulic Conductivity	K_{fs}	-	**4.837E-04**	cm/sec
			0.7	in/hour

GEI Consultants, Inc.
GEI Proj # 2301203- 2.1
Guelph Permeameter Testing
CT 8 - East Hampton, CT
Test Date 4/4/2023

Field Data TP-2

Reservoir Combined
Unit Set 6"
Depth of Test 3'-6"
Depth to GW 6'-8"
GEI Rep. Majid Mahmoodabadi

Soil Type SILTY SAND WITH GRAVEL (SM); ~65% F-M sand, ~20% F-C gravel, ~15% NP fines, gray-brown, moist.

Water Level in Well 6.03 cm *

Time (min)	Time Change (min)	Water Level in Res. (cm)	Change in Res. Water Level (cm)	Rate of Change (cm/min)
0.00		2.30		
0.17	0.17	2.30	0.00	0.00
0.33	0.17	2.30	0.00	0.00
0.50	0.17	2.30	0.00	0.00
0.67	0.17	2.40	0.10	0.60
0.83	0.17	2.50	0.10	0.60
1.00	0.17	2.70	0.20	1.20
1.17	0.17	2.80	0.10	0.60
1.33	0.17	2.90	0.10	0.60
1.50	0.17	3	0.10	0.60
1.67	0.17	3.1	0.10	0.60
1.83	0.17	3.2	0.10	0.60
2.00	0.17	3.3	0.10	0.60
2.17	0.17	3.5	0.20	1.20
2.33	0.17	3.6	0.10	0.60
2.50	0.17	3.7	0.10	0.60
2.67	0.17	3.8	0.10	0.60
2.83	0.17	3.9	0.10	0.60
3.00	0.17	4.1	0.20	1.20
3.17	0.17	4.2	0.10	0.60
3.33	0.17	4.3	0.10	0.60
	Steady Rate of Change, R_1 (cm/min)			**0.75**

Water Level in Well 12.38 cm

Time (min)	Time Change (min)	Water Level in Res. (cm)	Change in Res. Water Level (cm)	Rate of Change (cm/min)
0.000		11.3		
0.167	0.17	11.3	0.00	0.00
0.333	0.17	11.3	0.00	0.00
0.500	0.17	11.3	0.00	0.00
0.667	0.17	12.0	0.70	4.20
0.833	0.17	12.1	0.10	0.60
1.000	0.17	12.6	0.50	3.00
1.167	0.17	12.7	0.10	0.60
1.333	0.17	12.8	0.10	0.60
1.500	0.17	13.1	0.30	1.80
1.667	0.17	13.2	0.10	0.60
1.833	0.17	13.4	0.20	1.20
2.000	0.17	13.6	0.20	1.20
2.167	0.17	13.9	0.30	1.80
2.333	0.17	14.1	0.20	1.20
2.500	0.17	14.2	0.10	0.60
2.667	0.17	14.4	0.20	1.20
2.833	0.17	14.6	0.20	1.20
3.000	0.17	14.8	0.20	1.20
3.167	0.17	15	0.20	1.20
3.333	0.17	15.2	0.20	1.20
	Steady Rate of Change, R2 (cm/min)			**1.15**

GEI Consultants, Inc.	**Calc. by:** M. Mahmoodabadi	**Date:** 4/11/2023
GEI Proj # 2301203- 3.1	**Check by:** M. Glunt	**Date:** 5/8/2023

CT 8 - East Hampton, CT
Guelph Permeameter Testing - TP-2

Single Head Method - Test 1

Test Data and Information

• Reservoir		-	Combined		
• Reservoir Cross-Sectional Area		-	35.22	cm^2	(Provided on Permeameter)
• Water Head Height	H_1	-	6.03	cm	
• Borehole Radius	a	-	3.2	cm	Assumed slightly larger than 3cm rad. hand auger
• Soil Texture-Structure Category		-	3		(Table 2)
• Steady State Rate of Water Level Change	R_1	-	0.75	cm/min	(Obtained during testing)

Test Calculations and Results

• Microscopic Capillary Length Factor	α*	-	0.12	cm^{-1}	(Table 2: Based on Soil Texture-Structure Category)
• Shape Factor	C_1	-	0.875		(Table 2: Based on Soil Texture-Structure Category)
• Volumetric Flow Rate	Q_1	-	0.4403	cm^3/sec	(Table 3: One Head, Combined Reservoir)
• Soil Saturated Hydraulic Conductivity	K_{fs}	-	6.731E-04	cm/sec	(Table 3: One Head, Combined Reservoir)
• Soil Matrix Flux Potential	Φ_m	-	5.609E-03	cm^2/sec	(Table 3: One Head, Combined Reservoir)

Single Head Method - Test 2

Test Data and Information

• Reservoir		-	Combined		
• Reservoir Cross-Sectional Area		-	35.22	cm^2	(Provided on Permeameter)
• Water Head Height	H_2	-	12.38	cm	
• Borehole Radius	a	-	3.2	cm	Assumed slightly larger than 3cm rad. hand auger
• Soil Texture-Structure Category		-	3		(Table 2)
• Steady State Rate of Water Level Change	R_2	-	1.15	cm/min	(Obtained during testing)

Test Calculations and Results

• Microscopic Capillary Length Factor	α*	-	0.12	cm^{-1}	(Table 2: Based on Soil Texture-Structure Category)
• Shape Factor	C_2	-	1.418		(Table 2: Based on Soil Texture-Structure Category)
• Volumetric Flow Rate	Q_2	-	0.672381818	cm^3/sec	(Table 3: One Head, Combined Reservoir)
• Soil Saturated Hydraulic Conductivity	K_{fs}	-	5.756E-04	cm/sec	(Table 3: One Head, Combined Reservoir)
• Soil Matrix Flux Potential	Φ_m	-	4.797E-03	cm^2/sec	(Table 3: One Head, Combined Reservoir)

Test Averages

• Soil Saturated Hydraulic Conductivity	K_{fs}	-	**6.243E-04**	cm/sec
			0.9	in/hour

GEI Consultants, Inc.
GEI Proj # 2301203- 2.1
Guelph Permeameter Testing
CT 8 - East Hampton, CT

Test Date	4/4/2023
Field Data	TP-3
Reservoir	Combined
Unit Set	6"
Depth of Test	3'-6"
Depth to GW	Not Encountered
GEI Rep.	Majid Mahmoodabadi
Soil Type	SILTY SAND WITH GRAVEL (SM); ~65% F-C sand, ~25% F-C gravel, ~15% NP-LP fines, gray-brown, moist.

Water Level in Well 5.97 cm *

Time (min)	Time Change (min)	Water Level in Res. (cm)	Change in Res. Water Level (cm)	Rate of Change (cm/min)
0.00		2.20		
0.17	0.17	2.20	0.00	0.00
0.33	0.17	2.20	0.00	0.00
0.50	0.17	2.20	0.00	0.00
0.67	0.17	2.30	0.10	0.60
0.83	0.17	2.30	0.00	0.00
1.00	0.17	2.40	0.10	0.60
1.17	0.17	2.50	0.10	0.60
1.33	0.17	2.80	0.30	1.80
1.50	0.17	3	0.20	1.20
1.67	0.17	3.1	0.10	0.60
1.83	0.17	3.2	0.10	0.60
2.00	0.17	3.3	0.10	0.60
2.17	0.17	3.5	0.20	1.20
2.33	0.17	3.7	0.20	1.20
2.50	0.17	3.8	0.10	0.60
2.67	0.17	4	0.20	1.20
2.83	0.17	4.2	0.20	1.20
3.00	0.17	4.3	0.10	0.60
3.17	0.17	4.4	0.10	0.60
3.33	0.17	4.5	0.10	0.60
3.50	0.17	4.7	0.20	1.20
3.67	0.17	4.8	0.10	0.60
3.83	0.17	4.9	0.10	0.60
4.00	0.17	5	0.10	0.60
4.17	0.17	5.1	0.10	0.60
	Steady Rate of Change, R_1 (cm/min)			**0.78**

Water Level in Well 12.38 cm

Time (min)	Time Change (min)	Water Level in Res. (cm)	Change in Res. Water Level (cm)	Rate of Change (cm/min)
0.00		11.0		
0.08	0.08	13.4	2.40	28.80
0.17	0.08	13.8	0.40	4.80
0.25	0.08	14.3	0.50	6.00
0.33	0.08	14.5	0.20	2.40
0.42	0.08	14.9	0.40	4.80
0.50	0.08	15.3	0.40	4.80
0.58	0.08	15.7	0.40	4.80
0.67	0.08	16.0	0.30	3.60
0.75	0.08	16.2	0.20	2.40
0.83	0.08	16.6	0.40	4.80
0.92	0.08	16.9	0.30	3.60
1.00	0.08	17.2	0.30	3.60
1.08	0.08	17.4	0.20	2.40
1.17	0.08	17.6	0.20	2.40
1.25	0.08	18.0	0.40	4.80
1.33	0.08	18.3	0.30	3.60
1.42	0.08	18.5	0.20	2.40
1.50	0.08	18.7	0.20	2.40
1.58	0.08	18.9	0.20	2.40
1.75	0.17	19.7	0.80	4.80
1.83	0.08	20	0.30	3.60
	Steady Rate of Change, R2 (cm/min)			**3.20**

GEI Consultants, Inc. **Calc. by:** M. Mahmoodabadi **Date:** 4/11/2023
GEI Proj # 2301203- 3.1 **Check by:** M. Glunt **Date:** 5/8/2023
CT 8 - East Hampton, CT
Guelph Permeameter Testing - TP-3

Single Head Method - Test 1

Test Data and Information

• Reservoir		-	Combined		
• Reservoir Cross-Sectional Area		-	35.22	cm^2	(Provided on Permeameter)
• Water Head Height	H_1	-	5.97	cm	
• Borehole Radius	a	-	3.2	cm	Assumed slightly larger than 3cm rad. hand auger
• Soil Texture-Structure Category		-	3		(Table 2)
• Steady State Rate of Water Level Change	R_1	-	0.78	cm/min	(Obtained during testing)

Test Calculations and Results

• Microscopic Capillary Length Factor	α^*	-	0.12	cm^{-1}	(Table 2: Based on Soil Texture-Structure Category)
• Shape Factor	C_1	-	0.869		(Table 2: Based on Soil Texture-Structure Category)
• Volumetric Flow Rate	Q_1	-	0.4579	cm^3/sec	(Table 3: One Head, Combined Reservoir)
• Soil Saturated Hydraulic Conductivity	K_{fs}	-	7.049E-04	cm/sec	(Table 3: One Head, Combined Reservoir)
• Soil Matrix Flux Potential	Φ_m	-	5.874E-03	cm^2/sec	(Table 3: One Head, Combined Reservoir)

Single Head Method - Test 2

Test Data and Information

• Reservoir		-	Combined		
• Reservoir Cross-Sectional Area		-	35.22	cm^2	(Provided on Permeameter)
• Water Head Height	H_2	-	12.38	cm	
• Borehole Radius	a	-	3.2	cm	Assumed slightly larger than 3cm rad. hand auger
• Soil Texture-Structure Category		-	3		(Table 2)
• Steady State Rate of Water Level Change	R_2	-	3.20	cm/min	(Obtained during testing)

Test Calculations and Results

• Microscopic Capillary Length Factor	α^*	-	0.12	cm^{-1}	(Table 2: Based on Soil Texture-Structure Category)
• Shape Factor	C_2	-	1.418		(Table 2: Based on Soil Texture-Structure Category)
• Volumetric Flow Rate	Q_2	-	1.8784	cm^3/sec	(Table 3: One Head, Combined Reservoir)
• Soil Saturated Hydraulic Conductivity	K_{fs}	-	1.608E-03	cm/sec	(Table 3: One Head, Combined Reservoir)
• Soil Matrix Flux Potential	Φ_m	-	1.340E-02	cm^2/sec	(Table 3: One Head, Combined Reservoir)

Test Averages

• Soil Saturated Hydraulic Conductivity	K_{fs}	-	**1.156E-03**	cm/sec
			1.6	in/hour

Table 2

Soil Texture-Structure Category	α^*(cm^{-1})	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121(H_2/a)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091(H_1/a)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091(H_2/a)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Table 3

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{a^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)a^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_2 = \frac{H_1 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), a^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and $C$is Shape factor (from Table 2).

Appendix E

In-situ Resistivity Testing Results

Resistivity Testing Results
GEI Project Number 2301203-3.1
Site Name: East Hampton

Tested By: Majid Mahmoodabadi
Date: 4/7/23
Location: ER-1 (See Plan)
Orientation: Southwest-Northeast
Weather: Sunny, 60°F
Surface: TOPSOIL, dry

Spacing (feet)			Readings			Apparent Resistivity E-W (Ohm-cm)	Notes
"a"	Potential	Current	Potential (Volts)	Current (mAmp)	Resistivity E-W (Ohms)		
1	0.5	1.5	400	10	1131.7	216,734	High range.
2.5	1.25	3.75	400	10	1359.4	650,852	High range.
5	2.5	7.5	400	10	630.6	603,836	High range.
10	5	15	400	10	185.3	354,871	High range.
20	10	30	400	10	41.3	158,188	High range.
40	20	60	400	10	10.5	80,435	High range.

Resistivity Testing Results
GEI Project Number 2301203-3.1
Site Name: East Hampton

Tested By: Majid Mahmoodabadi
Date: 4/7/23
Location: ER-1 (See Plan)
Orientation: Northwest-Southeast
Weather: Sunny, 60°F
Surface: TOPSOIL, dry

Spacing (feet)			Readings			Apparent Resistivity E-W (Ohm-cm)	Notes
"a"	Potential	Current	Potential (Volts)	Current (mAmp)	Resistivity E-W (Ohms)		
1	0.5	1.5	400	10	NA	NA	High range. Resistivity is too high (out of range).
2.5	1.25	3.75	400	10	1028.5	492,424	High range.
5	2.5	7.5	400	10	566.2	542,169	High range.
10	5	15	400	10	164.2	314,462	High range.
20	10	30	400	10	40.3	154,358	High range.
40	20	60	400	10	4.8	36,770	High range.

Resistivity Testing Results
GEI Project Number 2301203-3.1
Site Name: East Hampton

Tested By: Majid Mahmoodabadi
Date: 4/7/23
Location: ER-2 (See Plan)
Orientation: Northeast-Southwest
Weather: Sunny, 60°F
Surface: TOPSOIL, dry

Spacing (feet)			Readings			Apparent Resistivity E-W (Ohm-cm)	Notes
"a"	Potential	Current	Potential (Volts)	Current (mAmp)	Resistivity E-W (Ohms)		
1	0.5	1.5	400	10	NA	NA	High range. Resistivity is too high (out of range).
2.5	1.25	3.75	400	10	1511.3	723,578	High range.
5	2.5	7.5	400	10	551.8	528,380	High range.
10	5	15	400	10	162.7	311,589	High range.
20	10	30	400	10	33.0	126,398	High range.
40	20	60	400	10	13.7	104,948	High range.

Resistivity Testing Results
GEI Project Number 2301203-3.1
Site Name: East Hampton

Tested By: Majid Mahmoodabadi
Date: 4/7/23
Location: ER-2 (See Plan)
Orientation: Southeast-Northwest
Weather: Sunny, 60°F
Surface: TOPSOIL, dry

Spacing (feet)			Readings			Apparent Resistivity E-W (Ohm-cm)	Notes
"a"	Potential	Current	Potential (Volts)	Current (mAmp)	Resistivity E-W (Ohms)		
1	0.5	1.5	400	10	NA	NA	High range. Resistivity is too high (out of range).
2.5	1.25	3.75	400	10	1178.0	564,001	High range.
6	3	9	400	10	508.3	584,072	High range.
10	5	15	400	10	227.1	434,923	High range.
20	10	30	400	10	47.1	180,404	High range.
40	20	60	400	10	15.5	118,737	High range.

Appendix F

Recommended Material Specifications

Recommended Material Specifications
CT BESS CT 8
East Hampton, CT

Per the Geotechnical Report, the native glacial tills found on site are not ideal for compaction as they contain a fairly high percentage of silty fines; however, provided the material can meet the appropriate compaction requirements, does not contain deleterious materials, and is stable under the weight of construction equipment, the material is likely suitable for re-use on site as Structural Fill or Ordinary Fill. We caution that this material will be difficult to near impossible to work if it becomes wet and may require long drying times to obtain the required compaction. As such, careful moisture control will be required to achieve satisfactory compaction. Cobbles and boulders in excess of 4-inches in diameter should be screened out of the native glacial till or crushed to an acceptable size.

Soils to be used as fill imported from off-site should also meet the below gradation requirements. Fill placed under the BESS arrays, the proposed substation, all access roads, and all equipment pads should meet the compaction requirements for Structural Fill. Backfill placed in areas that will not support structural or paved elements should meet the compaction requirements for Ordinary Fill. Proposed borrow materials that fall slightly outside of these specifications may also be suitable for use, subject to review and approval by GEI.

Structural Fill

Structural Fill should consist of hard, durable sand and gravel. It should be free of clay, organic matter, surface coatings, and other deleterious materials. Soil finer than the No. 200 sieve (the “fines”) should be nonplastic. Structural Fill shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
3 inches	100
1 - ½ inch	55 – 100
No. 4	35 – 85
No. 16	20 – 65
No. 50	5 – 40
No. 200 (fines)	0 – 10

Structural Fill should be compacted in maximum 12-inch-thick, loose lifts to at least 95 percent of the maximum dry density determined in accordance with ASTM D1557 (Modified AASHTO Compaction). The moisture content should be held to within +/- 3 percent of optimum moisture content (as determined by ASTM D1557).

Ordinary Fill

Ordinary fill should consist of hard, durable sand and gravel, free of clay, organic matter, surface coatings, and other deleterious materials. Soil finer than the No. 200 sieve (the "fines") should be nonplastic. Ordinary Fill shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
6 inches	100
3 inches	80 – 100
No. 4	20 – 100
No. 200 (fines)	0 – 20

Ordinary fill should be compacted in maximum 12-inch-thick, loose lifts to at least 92 percent of the maximum dry density determined in accordance with ASTM D1557 (Modified AASHTO Compaction). The moisture content should be held to within +/- 3 percent of optimum moisture content (as determined by ASTM D1557).

Crushed Stone

Crushed Stone should consist of a ¾-inch size durable crushed rock or durable crushed gravel stone and shall conform to the requirements of the ConnDOT Form 818, Section M.01.01, No. 6. Crushed stone should be compacted with at least four passes of a vibratory compactor.

Geotextile Fabric

Geotextile fabric should be a non-woven fabric, consisting of Mirafi 140N or an approved equivalent product.