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Geotechnical Report

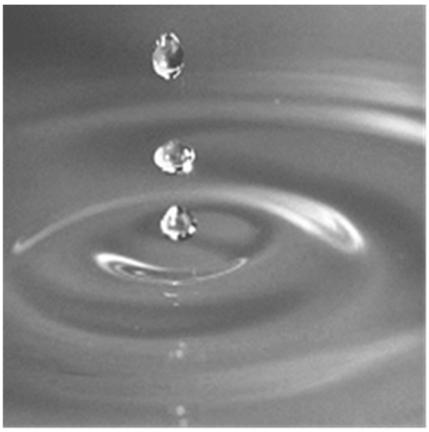
Charlestown Elementary School

363 Carolina Back Road
Charlestown, Rhode Island

Submitted to:
Garofalo & Associates, Inc.
85 Corliss Street
Providence, RI 02940

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

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Project No. 2603682



Thomas Rezzani, P.E. (CT)
Geotechnical Engineer

Matthew Glunt, P.E.
Senior Geotechnical Engineer

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1. Introduction

1.1 Project Summary

The project under consideration is a new elementary school campus located at 363 Carolina Back Road in Charlestown, Rhode Island. GEI previously conducted a preliminary geotechnical investigation and submitted a *Preliminary Geotechnical Report* on February 14, 2024, covering a previous iteration of this project.

The development is to include two (2) standalone buildings, a Pre-K through Grade 1 to the east and a Grade 2 through 5 facility to the west. Features to support the reconfigured site will include new parking, driveways, and stormwater management features.

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

1.2 Scope of Services

Our scope of work included the following tasks:

- Reviewed provided Site Layout Plans, prepared by Garofalo & Associates dated May 2026.
- Engaged a subcontractor to drill ten (10) test borings in total, between the 2024 and 2026 investigations.
- Engaged an excavation crew to conduct eleven (11) test pits.
- Observed soil samples recovered from the test borings and test pits, took groundwater level measurements, and prepared test boring and test pit logs.
- Engaged a testing laboratory to perform laboratory analyses on soil samples from the test borings.
- Developed recommendations for earthworks, pavements, and foundation design and construction.
- Prepared this *Geotechnical Report*.

1.3 Authorization

Our work was performed in general accordance with our proposal dated May 12, 2026, and the associated Standard Professional Services agreement.

1.4 Horizontal Reference

Boring and test pit 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.

2. Site and Project Description

2.1 Site Description

The site is located at 363 Carolina Back Road in Charlestown, Rhode Island, and is occupied by a one-story elementary school facility with paved parking lots and drives around the periphery. The site is bounded by Old Shannock Road to the north, Carolina Back Road (Route 112) to the west, and wooded land to the south and east.

Total topographic relief is on the order of about 38 feet across the development area, dominated by an elevated knoll on the southeast portion. It appears that a significant cut was required to construct the southeastern portion of the current facility. Visible rock outcroppings were noted within this area during our visits to the site.

2.2 Proposed Construction

We understand that site plans are not finalized and proposed grades are still being developed. To date, we have reviewed the "Site Grading Plan, C-400" prepared by Garofalo & Associated, dated May 2026.

New construction is to include two (2) elementary schools built on the east and west sides of the site. The buildings are expected to be one to two-stories in height and similar in size to the existing building. The east building will be built into the hillside with drive-up access to the upper level. Upper and lower-level finished floor elevations will be 154.0 ft. and 140.0 ft., respectively. The west building will be primarily constructed over the existing building footprint and parking lot. Upper and lower-level floor elevations of 150.0 ft. and 136.0 ft. are indicated. Based on our experience with similar structures, we expect the buildings will be steel-framed, slab-on-grade, and supported by conventional shallow foundations.

Appurtenant features will include paved parking east of each building, two (2) driveways, bus loops, and parent pick-up drives. Stormwater will be managed by subsurface detention chambers located beneath paved and landscaped areas of the site.

We expect that cuts and fills up to about 12 feet will be required to meet final grades. Grading plans show the use of a retaining wall adjacent to the south driveway, elsewhere we expect final grades will be achieved by earthen slopes.

3. Exploration Procedures

3.1 Test Borings

The boring locations were laid out on the site from the provided plan using approximate measurements from site features and a handheld GPS unit. Approximate boring locations relative to the site plan are shown on Figure 1.

Five (5) soil test borings (C-1 through C-5) were conducted at the site on January 19, 2024, by Seaboard Drilling Inc., under subcontract to GEI, with a truck-mounted drilling rig. Five (5) additional test borings (B-1 through B-5) were conducted on July 1, 2026, by Northern Drill Service, Inc. The appropriate one-call utility locate service (DigSafe) was contacted prior to our arrival. Each boring was also pre-scanned for utilities using geophysical methods. The borings were advanced to depths of 2.5 to 19.0 feet each, terminating at auger refusal, utilizing hollow-stem augering techniques. Test boring logs are attached in Appendix A.

Standard Penetration Testing (SPT) and split-spoon sampling was generally performed continuously through the upper 6 to 8 feet of borings, using an automatic 140-pound hammer. Representative samples of the soils obtained by the sampler were classified by the on-site GEI representative. All borings were backfilled with drill cuttings upon completion and patched at the surface with cold-patch asphalt where necessary.

3.2 Test Pits

Eleven (11) test pits were dug at the site between June 29 and June 30, 2026, using an excavator to depths of 3.0 to 10.0 feet each. The test pits were logged and photographed by GEI, the results of which are attached in Appendix B. Approximate test pit locations relative to the site plan are shown on Figure 1.

All test pits were backfilled with excavated spoils tamped into place in lifts using the backhoe bucket.

3.3 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:

- Two (2) grain-size analysis with standard sieve set (ASTM D422)
- Two (2) moisture content analyses (ASTM D2216)

Results of the laboratory testing program are included in Appendix C.

4. Subsurface Conditions

4.1 Geologic Setting

Local geologic maps indicate that the site lies in a transitional area, from a broad plain underlain by coarse sands and gravels to the north, to upland dense and stony glacial tills to the south.

Bedrock at the site is mapped as Hope Valley alaskite gneiss, generally characterized as pink to gray, medium- to coarse-grained, massive metamorphic rock (Moore Jr., 1959). As previously noted, bedrock outcroppings are visible beyond the southeast corner of the property.

4.2 Subsurface Conditions

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

Surface Materials – Asphalt thickness was measured at 3 to 4 inches in the borings conducted within paved areas. A dedicated stone base was not observed. Topsoil in the landscaped areas was measured at between 2 and 3 inches.

Gravelly Sand – Coarse gravelly sands to silty sands were encountered below the surface materials and continuing until drill refusal. Recovered soil samples were typically characterized with about 5 to 30 percent non-plastic silt fines, with occasional silt zones up to 55 percent fines, and frequent cobbles and boulders up to 24 inches in size.

SPT N-values ranged from 6 to over 50 blows/foot, with a typical range of 10 to 21 blows/foot, consistent with medium-dense conditions and occasional loose or very dense zones.

Refusal Material –Drilling and digging refusal was encountered within all borings at depths ranging from 2.5 to 19.0 feet. Refusal depths are summarized below in Table 1. Refusal is defined as material that could not be penetrated with the equipment used on the project. *Practical auger refusal* was defined as minimal advancement of the augers. Refusal may have resulted from the presence of tight gravel/cobble beds, boulders, 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.

Table 1: Summary of Drill and Dig Refusals

Boring ID	Current El. (ft)	Refusal Depth (ft)	Refusal El. (ft)	Notes/Interpreted Conditions
C-1	147	19.0	128.0	Sampler refusal at 15.9 ft, practical auger refusal at 19.0 ft. *Presumed bedrock.*
C-2	144	15.6	128.4	Practical auger refusal at 15.0 ft, sampler refusal at 15.6 ft. *Presumed bedrock.*
C-3	137	10.0	127.0	Difficult drilling at 7.0 ft, practical auger refusal at 9.0 ft., sampler advanced to 10.0 ft. *Presumed bedrock.*
C-4	144	2.5	141.5	Auger refusal at 2.5 ft, auger refusal at 2.0 ft at offset location. *Presumed bedrock.*
C-5	142	5.5	136.5	Auger refusal at 4.0 ft, auger refusal at 5.5 ft at offset location. *Presumed bedrock.*
B-1/B-1A	150	5.0/6.0	145/144	Auger refusal at 5.0 ft, auger refusal at 6.0 ft at offset location. *Presumed bedrock.*
B-2	150	15.5	134.5	Sampler refusal at 15.5 ft, difficult drilling at 13.0 ft. *Presumed bedrock.*
B-3	143	7.5	135.5	Auger refusal. *Presumed bedrock*
B-4	143	7.5	135.5	Auger refusal at 7.5 ft, auger refusal at 7.5 ft at offset location. *Presumed bedrock*
B-5	148	4.0	144	Auger refusal at 4.0 ft, sampler refusal at 3.5 ft. *Presumed boulder.*
TP-1	154	>10	<144	*Digging refusal not encountered.*
TP-2	166	7.0	159	*Presumed hardpan or boulders.*
TP-3	162	6.0	156	*Presumed large boulder or bedrock.*
TP-4	156	4.5	151.5	*Presumed large boulder or bedrock.*
TP-5	162	6.5	155.5	*Presumed bedrock.*
TP-6	165	7.0	158	*Presumed bedrock.*
TP-7	168	7.0	161	*Presumed bedrock.*
TP-8A/8B	165	3.5/3.0	161.5/162	*Presumed bedrock.*
TP-9	148	3.5	144.5	*Presumed large boulder or bedrock.*
TP-10	144	3.5	140.5	*Presumed large boulder or bedrock.*
TP-11	152	8.0	144	*Presumed bedrock.*

Based on observations and expectations of rock conditions, we expect most drilling and digging refusals resulted from encountering bedrock.

4.3 Groundwater Conditions

Groundwater, as noted by the presence of a wet sampler, was observed in boring C-1 in 2024

at a depth of about 10 feet at the time of drilling. Groundwater was not encountered in the other borings or test pits. Due to the dense conditions and high fines contents of site soils, groundwater may not have had time to equilibrate inside the open boreholes. Groundwater within these types of soils also tend to concentrate within discontinuous sandy seams.

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 proposed building footprints will be over the existing building/parking area and the eastern hillside. In general, the site conditions are well suited for structures to bear on conventional shallow foundations; however, consideration should be given to the following:

1. Difficult excavation associated with boulder-laden soils and shallow bedrock should be anticipated at the site. We expect rock was previously excavated to construct the existing building and difficult excavations will primarily occur within the east building and appurtenances.
2. Site soils will be highly susceptible to moisture disturbance and softening when exposed to inclement weather conditions.
3. Existing below grade elements such as foundations, tanks, or drainage features beneath proposed building areas are to be removed or grouted in place.
4. Most overburden soils can likely be re-used as backfill with exception of directly behind retaining walls. Screening or crushing boulders will also be required for re-using on-site soils.

5.2 Foundation Design

Based on the results of this investigation, it appears that building foundation subgrades will vary from native sands and gravels, Structural Fill, to weathered to sound bedrock. These materials are suitable for support of the buildings using conventional shallow foundations designed and constructed as recommended below.

We caution that native soils will be highly susceptible to moisture disturbance; therefore, protection of exposed subgrades will be critical. Bearing conditions will be variable across the proposed buildings. In this regard, all footings should be designed to bear on a "cushion" of crushed stone placed over a prepared soil or rock bearing surface. This would also serve to improve expediency of foundation construction. Where on soil or weathered rock, 6 inches (min.) of crushed stone underlain by a separation geotextile fabric. Where on rock, 12 inches (min.) of crushed stone should be placed directly on the prepared rock surface.

We recommend that all footing subgrades be evaluated by a GEI representative prior to placement of crushed stone. The maximum allowable bearing pressure for design of footings may be assumed as:

Table 2: Allowable Bearing Pressure

Bearing Stratum	Net Allowable Bearing Pressure
Native Sands and Gravels, Structural Fill, Weathered Rock, or Bedrock	4,000 lb/ft^2

Minimum individual column footing and wall footing widths should be at least 36 and 18 inches, respectively. Exterior footings should bear at least 3'-4" below the adjacent exterior grade for frost protection, per the Rhode Island Building Code. Exterior footings founded on rock, if this situation occurs, will have no frost depth requirement. Interior footings should be founded at least 18 inches below the bottom of the floor slab. The tops of all footings should be at least 6 inches below the bottom of the overlying floor slab.

5.3 Floor Slab Design

We recommend that floor slabs bear on a minimum 12-inch layer of compacted crushed stone placed over a soil subgrade prepared in accordance with Section 6.1. Large cobbles or small boulders, if encountered, should be removed a minimum of 12 inches below the bottom of the floor slab.

Design of the slab-on-grade floors may assume a modulus of subgrade reaction of 200 pounds per cubic inch (pci). We recommend that contraction joints be incorporated between the slab-on-grade and the columns and perimeter walls of the proposed building to accommodate minor differential settlements.

To limit moisture infiltration into finished spaces, a 15-mil (min.) polyethylene vapor barrier should be placed beneath all moisture sensitive floor slabs. The vapor barrier should be sealed at the foundation walls, columns, and utility penetrations, and panels should be overlapped and joints sealed.

5.4 Settlement

Assuming the design and construction recommendations herein are followed, we estimate total settlement of the building will be less than 1 inch, and differential settlement across adjacent columns will be less than ½ inch. We expect nearly all expected settlements will occur during construction or soon after.

5.5 Seismic Design

The current edition of the Rhode Island Building Code mirrors the 2021 International Building Code, with exception of the revisions and supplemental information provided by state building officials.

Based on the criteria of Building Code Section 1613.3.2 and the SPT N-values measured on site, we recommend the use of Site Class C for seismic design. The Site Class was used in conjunction with the seismic hazard (S_S, S_1) for this location to determine spectral design values, as follows:

Table 3: Seismic Design Values

Rhode Island Building Code	
Site Class	C
S_S	0.185 g
S_1	0.052 g
S_{DS}	0.161 g
S_{D1}	0.052 g
PGA_M	0.131 g
Seismic Design Category (Risk Category I, II, or III)	A

We calculated the spectral response parameters for the Site using general procedures outlined in Building Code Section 1613. Peak ground acceleration (PGA_M) is adjusted for Site Class effects, per ASCE 7.

The soils below the foundation level at this site are not considered susceptible to liquefaction.

5.6 Retaining Wall Design

Current site plans include a retaining wall along the south driveway. Based on the grading shown, we expect this wall will be up to 12 feet in height. Site soils would be generally well-suited to retaining wall construction and most commercial systems rated for the heights expected should be suitable for use on this project.

Building foundation design criteria, including allowable bearing pressure and resistance to sliding, may be applied to retaining wall design. Well-draining granular soils should be used to backfill the areas directly behind the walls. This may require segregation and stockpiling of favorable on-site soils or, potentially, import of soils directly for this purpose.

Retaining wall designs, including all necessary details, plans, and internal stability computations, shall be by a Rhode Island-licensed Professional Engineer engaged by the chosen wall manufacturer.

All earth retaining structures used on the project should be designed using the earth pressures shown in Table 4. Note that no factor of safety has not been applied to these values. Retaining walls free to rotate at the top should be designed for active earth pressures. In addition to the lateral loads exerted by the soil against the walls, allowance should be included for lateral stresses imposed by any temporary or long-term surcharge loads, such as cars or trucks adjacent to the walls or adjacent footing loads.

Table 4: Wall Design Parameters

Material	Unit Weight (γ, pcf)	Friction Angle (Φ)	Cohesion (c)	At-Rest Earth Pressure Coeff (K_o)	Active Earth Pressure Coeff, (K_a)	Passive Earth Pressure Coeff, (K_p)
Native Sand and Gravel	125	34º	0	0.44	0.28	3.0
Structural Fill	125	32º	0	0.47	0.31	3.0

We recommend limiting the passive pressure coefficient to 3.0 as shown above, due to the relatively high movement required to fully engage passive resistance. The minimum factors of safety for sliding and overturning under static loads should be 1.5 and 2.0, respectively.

The recommended wall design parameters do not consider the development of hydrostatic pressure behind the walls. As such, backfill must be well-draining, and positive wall drainage must be provided for all earth retaining structures. These drainage systems can be constructed of open-graded washed stone isolated from the soil backfill with a geosynthetic filter fabric and drained by perforated pipe, or several wall drainage products made specifically for this application. Where backfill soils are not drained using an appropriately designed drainage system, the lateral soil pressure on proposed retaining walls must consider hydrostatic forces and submerged soil unit weight.

The earth pressures given in Table 4 assume placement and compaction of the backfill in accordance with recommendations elsewhere in this report. Compact backfill directly behind walls with light, hand-operated compactors. Heavy compactors and grading equipment should not be allowed to operate within 10 feet of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

5.7 Pavement Design

New pavement subgrades are expected to consist of native sand and gravel or Structural Fill consisting of on-site soils. The on-site soils can be considered moderately frost susceptible, due to elevated silt fines content. As noted below, we recommend that a minimum 12-inch

processed aggregate base course be placed below all rigid and bituminous pavements to account for differing subgrade conditions and to allow for sufficient drainage.

We expect traffic to this facility will consist predominantly of passenger vehicles and school buses. Assuming preparation of the subgrade in accordance with Section 6.1, we recommend the following pavement section:

Standard-Duty Asphalt - Parking and Drive Areas
4.0 inches bituminous concrete
- 1.5 inches wearing course
- 2.5 inches binder course

12.0 inches of processed aggregate base *(RIDOT Standard Specifications for Road and Bridge Construction, 2026, Section 301 and M.0109, Table I, Column Ia)*

For areas expected to be subjected to repeated, heavy traffic loads, such as dumpster pads, we recommend a rigid concrete section as such:

Heavy-Duty Rigid Concrete Section
6.0 inches of 4,000-psi jointed concrete
12.0 inches of processed aggregate base *(RIDOT Standard Specifications for Road and Bridge Construction, 2026, Section 301 and M.0109, Table I, Column Ia)*

Underdrains should be provided where pavement sections will bear directly on impermeable bedrock.

Pavement materials should conform with and be placed in accordance with the most recent edition of the *Rhode Island Department of Transportation (RIDOT) Standard Specifications for Road and Bridge Construction (Blue Book)*. Rigid pavement sections should be designed and constructed in accordance with appropriate American Concrete Institute (ACI) recommendations and with the applicable specifications of the *RIDOT Standard Specifications*.

The recommended pavement sections shown above are generally suitable for a 20-year design life; however, maintenance such as sealing of cracks and localized patching due to normal weathering should be expected within the first 5 to 10 years of life.

5.8 Site Slopes

Final earthen cut and fill slopes on the project should be limited to a maximum grade of 2H:1V and be suitably vegetated very soon after construction to limit erosion.

5.9 Subsurface Drainage

Current site plans show the use of multiple subsurface detention features beneath parking lots and landscaped areas. Bottom of system elevations are not yet finalized.

Based on the results of this investigation, per Table 1, we expect these features would likely be founded at most locations at or near the bedrock surface. We thereby expect that minimal infiltration capacity will be available for the proposed systems.

Should this development proceed in its current configuration, supplemental test pits and infiltration testing at selected stormwater feature locations may be warranted.

6. Construction Considerations

6.1 Subgrade Preparation

6.1.1 General

To prepare the site for grading operations, topsoil, organic matter, and other deleterious material should be stripped from the building and site improvement areas. Soft, wet, loose, or otherwise un-suitable soils should be removed and replaced, or potentially re-compacted in-place.

6.1.2 Site Demolition

All existing structures should be removed in their entirety from within the building footprint and the area backfilled with compacted Structural Fill to finished grade. Where existing structures fall at least 10 feet from the exterior line of building footings, below-grade portions of these structures may remain in place. However, where this occurs below new pavements, below-grade structural features should be cut off at least 2 feet below the pavement base course, to reduce the potential for a hard spot developing.

Existing utilities to remain in use should be rerouted around the proposed building footprint. If not removed, any pipes over 3 inches in diameter should be filled with flowable fill or grout. Otherwise, these pipes may serve as conduits for subsurface erosion resulting in formation of voids below foundations or floor slabs. Where existing utilities are left in place and plugged in the building footprint, it may be necessary to undercut poorly compacted backfill to provide adequate support for footings or slabs.

6.1.3 Grade Slabs and Pavements

Following the required stripping, excavation to rough grade, and before placing any new fill to achieve design grades, 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 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 Foundations

Footings should bear on a subgrade consisting of natural sands and gravels, Structural Fill, or a prepared bedrock surface.

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

All footings should be designed to bear on a "cushion" of crushed stone placed over a prepared soil or rock bearing surface to protect subgrades and reduce potential for abrupt differential settlements. Where on soil or weathered rock, 6 inches (min.) of crushed stone underlain by a separation geotextile fabric. Where on rock, 12 inches (min.) of crushed stone should be placed directly on the prepared rock surface.

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. Where on rock, 12 inches (min.) of crushed stone should be placed directly on the prepared rock surface.

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

6.2 Excavation and Dewatering

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.

Based on the results of this investigation, mass rock excavation should be expected, at minimum, at the locations noted in Table 1. Rock removal to general line and grade and for new footings and utilities may utilize pneumatic (i.e. hoe ramming), controlled blasting procedures, or a combination of both. The means and methods used for rock removal should ultimately be determined by the earthwork contractor, and could include mass blasting if deemed to be appropriate, efficient, and safe to nearby structures.

Any blasting planned for this project should be conducted in accordance with all local, state, and federal regulations as well as any specific permits required. We recommend that pre-condition surveys and vibration monitoring be enacted for any structure within about 500 feet of blasting operations. A blasting plan should be developed for this project and a copy

forwarded to GEI for review. Perimeter control measures (e.g., line drilling, pre-splitting, or cushion blasting) should be utilized where permanent rock slopes are planned. Excavation of rock should be controlled to reduce overbreak at bearing surfaces, such as can occur when blast holes are loaded too deeply.

Temporary slopes constructed adjacent to the existing structure, if planned, should be constructed to a slope no steeper than 2H:1V. If this occurs, there must also be frequent observations made of existing structures to detect unacceptable movements at an early stage.

Groundwater is not likely to significantly impact construction of the building pad and appurtenances. However, groundwater may be encountered in deeper excavations or near the soil/rock interface during wet weather patterns. If and where encountered, we expect groundwater intrusion can be suitably managed using sumps and ditches.

Maintaining proper site drainage during initial grading may become very difficult unless measures to control surface water are put in place before grading starts and maintained throughout.

6.3 Freezing Conditions

The soils at the site 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 the foundation during construction may result in subsequent settlement of the structure.

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. The footing and the soil adjacent to the footing should be insulated until they are backfilled. Soil placed as fill should be free of frost, as should the ground on which it is placed.

If slabs-on-grade or footings are built and left exposed during the winter, precautions should be taken to prevent freezing of the underlying soil.

6.4 Backfilling and Compaction

Recommended specifications for gradation and compaction of backfill soils are provided in the attached recommended Material Specifications (Appendix D).

The native soils 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 6-inches in diameter should be screened out of the native soils or crushed to an acceptable size. Rock removed as part of mechanical excavation can likely be crushed and screened to meet requirements for project re-use, if so desired. Mixing processed rock with site soils may also be considered to improve workability.

Soils to be used as fill imported from off-site should also meet the attached gradation requirements. Fill placed within the building limits, within a 3-foot-wide zone outside foundation walls, and under all pavements and slabs 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.

If existing asphalt pavements are milled, these materials (recycled asphalt pavements/RAP) may be suitable for use, subject to review by the geotechnical engineer, as recycled base beneath new pavements or mixed into general grade-raise fills at a proportion of no more than 50 percent by weight.

7. Closure

7.1 Follow-on Services

We recommend that GEI be kept on the project through the final design and construction phases 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

TEST LOCATIONS

Legend

- Test Boring
- Test Pit

Notes:

Source: Nearmap 2026

0 50 100 150 200

Feet

GEI Consultants

N

NAD 1983 StatePlane Rhode Island FIPS 3800 Feet

Created by: PMD 8/5/2026
Checked by: MG 8/5/2026

Subsurface Investigation
Chariho RSD Improvements
Charlestown, RI

Garofalo & Associates, Inc.
Providence, RI

Project 2603682	August 2026	Fig. 1

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B:\Working\GAROFALO & ASSOCIATES\2603682 Chariho Charlestown ES Revised Stage II\01_GIS\2603682-BoringLocationFigures\2603682-BoringLocationFigures.aprx 1 - TestLocationsFigure

Latest Imagery (Nearmap): Nearmap US
TRANS_Roads_E911_24r3: RI E 9-1-1 and AK Associates

Appendix A

Boring Logs

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): 147 **DATE START/END:** 1/19/2024 - 1/19/2024

VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling, Inc.

TOTAL DEPTH (ft): 19.0 **DRILLER NAME:** D. Griffin

LOGGED BY: T. Rezzani **RIG TYPE:** Mobile B-53 Truck

BORING C-1

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 2.25 inch / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow-stem Auger

WATER LEVEL DEPTHS (ft): Wet sample @ 10 ft.

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: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		S1	0.5 to 2.5	24/14	8-13-8-5		GRAVELLY SAND	3 in. ASPHALT S1: WIDELY GRADED SAND WITH GRAVEL (SW); ~60% F-C sand, ~35% F-C gravel, ~5% NP fines, brown, dry.
		S2	2.5 to 4.5	24/10	7-6-4-3			S2: SILTY SAND WITH GRAVEL (SM); ~60% F-C sand, ~20% F-C gravel, ~20% NP fines. thin organic layer (less than 1 inch), light brown to brown to black, moist.
	5	S3	4.5 to 6.5	24/11	4-3-6-13			S3: SILTY SAND (SM); 50.9% F-C sand, 30.8% NP fines, 18.3% F gravel, brown, moist.
140		S4	6.5 to 8.5	24/14	11-14-16-16	Auger grinding		S4: WIDELY GRADED SAND WITH GRAVEL (SW); ~75% F-C sand, ~20% F-C gravel, ~5% NP fines, brown, dry.
	10	S5	10 to 12	24/13	8-28-23-16			S5: WIDELY GRADED SAND WITH SILT AND GRAVEL (SW); ~70% F-C sand, ~20% F-C gravel, ~10% NP fines, brown, wet.
	15	S6	15 to 15.9	11/10	7-50/5"	Auger grinding		S6: WIDELY GRADED SAND WITH GRAVEL (SW); ~50% F-C sand, ~50% F-C gravel, cobbles to small boulders, brown, wet.
130								
	20							Practical auger refusal at 19.0 ft. Backfilled with drill cuttings and cold patch asphalt.

NOTES:

PROJECT NAME: Charlestown ES

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2400235

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2400235 - GAROFALO-CHARIHO ES 2024_RICHMOND.GPJ GEI DATA TEMPLATE 2013.GDT 2/13/24

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): 144 **DATE START/END:** 1/19/2024 - 1/19/2024

VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling, Inc.

TOTAL DEPTH (ft): 15.6 **DRILLER NAME:** D. Griffin

LOGGED BY: T. Rezzani **RIG TYPE:** Mobile B-53 Truck

BORING C-2

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 2.25 inch / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow-stem Auger

WATER LEVEL DEPTHS (ft): 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 Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
								3 in. ASPHALT
		S1	0.5 to 2.5	24/6	8-10-7-5			S1: SILTY SAND WITH GRAVEL (SM); ~40% F-C sand, ~30% F-C gravel, ~30% NP fines, olive, moist.
		S2	2.5 to 4.5	24/0	5-6-4-2			S2: No recovery.
140	5	S3	4.5 to 6.5	24/12	3-3-3-3			S3: SILTY SAND WITH GRAVEL (SM); ~60% F-C sand, ~25% F-C gravel, ~15% NP fines, brown, dry.
		S4	6.5 to 8.5	24/4	4-3-2-3		GRAVELLY SAND	S4: Similar to S3.
	10	S5	10 to 12	24/18	3-4-6-7			S5: SANDY SILT (ML); ~55% NP fines, ~35% F sand, ~10% F gravel, gray, moist.
130	15	S6	15 to 15.6	7/7	36-50/1"			S6: WIDELY GRADED GRAVEL WITH SAND (GW); ~50% F-C gravel, ~45% F-C sand, ~5% NP fines, frequent cobbles to small boulders, light brown, dry.
								Practical auger refusal at 15.0 ft, sampler refusal at 15.6 ft. Backfilled with drill cuttings.
	20							
120								

NOTES:

PROJECT NAME: Charlestown ES

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2400235

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2400235 - GAROFALO-CHARIHO ES 2024_RICHMOND.GPJ GEI DATA TEMPLATE 2013.GDT 2/13/24

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): 137 **DATE START/END:** 1/19/2024 - 1/19/2024

VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling, Inc.

TOTAL DEPTH (ft): 10.0 **DRILLER NAME:** D. Griffin

LOGGED BY: T. Rezzani **RIG TYPE:** Mobile B-53 Truck

BORING C-3

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 2.25 inch / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow-stem Auger

WATER LEVEL DEPTHS (ft): 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 Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		S1	0.5 to 2.5	24/10	7-6-7-4		GRAVELLY SAND	3 in. ASPHALT S1: WIDELY GRADED SAND WITH GRAVEL (SW); ~60% F-C sand, ~35% F-C gravel, ~5% NP fines, gray, moist.
		S2	2.5 to 4.5	24/9	6-5-3-4			S2: SILTY SAND WITH GRAVEL (SM); ~40% F-C sand, ~40% F-C gravel, ~20% NP fines, brown to dark brown.
	5	S3	4.5 to 6.5	24/11	11-5-4-3			S3: WIDELY GRADED SAND WITH GRAVEL (SW); ~65% F-C sand, ~30% F-C gravel, ~5% NP fines, orangish brown, dry.
130						Slow advancement		
		S4	8 to 10	24/21	18-26-28-31			S4: WIDELY GRADED SAND WITH SILT AND GRAVEL (SW-SM); 73.3% F-C sand, 14.1% F-C gravel, 12.6% NP fines, light brown with pink, dry.
	10							Practical auger refusal at 9.0 ft. Backfilled with drill cuttings and cold patch asphalt.
	15							
120								
	20							

NOTES:

PROJECT NAME: Charlestown ES

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2400235

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2400235 - GAROFALO-CHARIHO ES 2024_RICHMOND.GPJ GEI DATA TEMPLATE 2013.GDT 2/13/24

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): 144 **DATE START/END:** 1/19/2024 - 1/19/2024

VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling, Inc.

TOTAL DEPTH (ft): 2.5 **DRILLER NAME:** D. Griffin

LOGGED BY: T. Rezzani **RIG TYPE:** Mobile B-53 Truck

BORING

C-4

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 2.25 inch / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow-stem Auger

WATER LEVEL DEPTHS (ft): 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 Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		S1	0.5 to 2.5	24/14	26-22-28-25	Auger grinding	GRAVELLY SAND	4 in. ASPHALT S1: WIDELY GRADED GRAVEL WITH SAND (GW); ~55% F-C gravel, ~40% F-C sand, ~5% NP fines, frequent cobbles to small boulders, gray, dry.
140	5					Auger refusal (2.5 FT), boring offset to confirm refusal (2.0 FT)		Auger refusal at 2.5 ft. Backfilled with drill cuttings and cold patch asphalt.
130	10							
120	15							
	20							

NOTES:

PROJECT NAME: Charlestown ES

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2400235

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2400235 - GAROFALO-CHARIHO ES 2024_RICHMOND.GPJ GEI DATA TEMPLATE 2013.GDT 2/13/24

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): 142 **DATE START/END:** 1/19/2024 - 1/19/2024

VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling, Inc.

TOTAL DEPTH (ft): 5.5 **DRILLER NAME:** D. Griffin

LOGGED BY: T. Rezzani **RIG TYPE:** Mobile B-53 Truck

BORING C-5

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 2.25 inch / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow-stem Auger

WATER LEVEL DEPTHS (ft): 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 Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
140	0	S1	0 to 2	24/14	7-11-10-7	Auger refusal (4.0 FT), boring offset to confirm refusal (5.5 FT)	GRAVELLY SAND	S1: WIDELY GRADED SAND WITH GRAVEL (SW); ~60% F-C sand, ~35% F-C gravel, ~5% NP fines, brown, moist.
		S2	2 to 4	24/3	7-10-8-5			S2: Similar to S1, pinkish rock fragment in sampler.
	5	S3	4 to 4.2	2/0	50/2"			S3: No recovery.
130	10							Auger refusal at 5.5 ft. Backfilled with drill cuttings.
	15							
120	20							

NOTES:

PROJECT NAME: Charlestown ES

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2400235

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2400235 - GAROFALO-CHARIHO ES 2024_RICHMOND.GPJ GEI DATA TEMPLATE 2013.GDT 2/13/24

BORING INFORMATION

LOCATION: See Plan
GROUND SURFACE EL. (ft): 150
VERTICAL DATUM:
TOTAL DEPTH (ft): 5.0
LOGGED BY: J. Kharel
DATE START/END: 7/1/2026 - 7/1/2026
DRILLING COMPANY: Northern Drill Service, Inc.
DRILLER NAME: Jon Beirholm
RIG TYPE:

BORING

B1

DRILLING INFORMATION

HAMMER TYPE: Automatic
AUGER I.D./O.D.: 5 inch / 4.5 inch
DRILLING METHOD: Hollow Stem Auger
WATER LEVEL DEPTHS (ft): Not Encountered
CASING I.D./O.D.: NA/ NA
DRILL ROD O.D.: NM
CORE BARREL TYPE:
CORE BARREL I.D./O.D. NA / NA

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: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		S1	0.5 to 2	18/10	15-15-22		SAND	(Top 0-3") : Asphalt S1 (0"-7") : NARROWLY GRADED SAND (SP); ~90% fine to coarse sand, ~5% fine to medium gravel, ~5% nonplastic fines, brown, dry. S1 (7"-10") : NARROWLY GRADED SAND WITH SILT (SP-SM); ~80% fine to coarse sand, ~10% fine to medium gravel, ~10% nonplastic fines, light brown, dry.
		S2	2 to 4	24/15	23-23-14-25			S2 : NARROWLY GRADED SAND (SP); ~85% fine to coarse sand, ~10% fine to medium gravel, ~5% nonplastic fines, light brown, dry.
		S3	4 to 5	12/8	27-50/2"			S3 : Similar to S2 with rock fragments.
	5							Auger refusal at 5.0 ft. Offset 3 ft southeast and continued as B1A.
140	10							
	15							
130	20							

NOTES:

PROJECT NAME: Charlestown ES Revised Stage II
CITY/STATE: Charlestown, Rhode Island
GEI PROJECT NUMBER: 2603682

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2603682 GINT LOG.GPJ GEI DATA TEMPLATE 2013.GDT 8/7/26

BORING INFORMATION

LOCATION: See Plan

GROUND SURFACE EL. (ft): 150 **DATE START/END:** 7/1/2026 - 7/1/2026

VERTICAL DATUM: **DRILLING COMPANY:** Northern Drill Service, Inc.

TOTAL DEPTH (ft): 6.0 **DRILLER NAME:** Jon Beirholm

LOGGED BY: J. Kharel **RIG TYPE:**

BORING

B1A

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 5 inch / 4.5 inch **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): 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 Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
							SAND	Refer to samples from B1 up to 5 ft.
	5	S1	5 to 5.6	7/6	18-13/1"			S1 : NARROWLY GRADED SAND (SP); ~95% fine to medium sand, ~5% nonplastic fines, light brown, dry.
								Auger refusal at 6.0 ft.
140	10							
	15							
130	20							

NOTES:

PROJECT NAME: Charlestown ES Revised Stage II

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2603682

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2603682 GINT LOG.GPJ GEI DATA TEMPLATE 2013.GDT 8/7/26

BORING INFORMATION

LOCATION: See Plan
GROUND SURFACE EL. (ft): 150
VERTICAL DATUM:
TOTAL DEPTH (ft): 15.5
LOGGED BY: J. Kharel
DATE START/END: 7/1/2026 - 7/1/2026
DRILLING COMPANY: Northern Drill Service, Inc.
DRILLER NAME: Jon Beirholm
RIG TYPE:

BORING

B2

DRILLING INFORMATION

HAMMER TYPE: Automatic
AUGER I.D./O.D.: 5 inch / 4.5 inch
DRILLING METHOD: Hollow Stem Auger
WATER LEVEL DEPTHS (ft): Not Encountered
CASING I.D./O.D.: NA/ NA
DRILL ROD O.D.: NM
CORE BARREL TYPE:
CORE BARREL I.D./O.D. NA / NA

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: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
								(Top 0-3") : Asphalt
		S1	0.5 to 0.5	0/0	30/0"			
		S2	2 to 2.9	11/8	20-53/5"			S2 : NARROWLY GRADED SAND (SP); ~90% fine to medium sand, ~10% fine gravel, brown, dry.
	5	S3	4 to 5.4	17/13	15-42-45/5"			S3 : SILTY SAND (SM); ~85% fine to medium sand, ~15% nonplastic fines, brown, dry.
140	10	S4	10 to 10.5	6/6	55/6"	Difficult driling, grinding at 13 ft.	SAND	S4 : SILTY SAND (SM); ~85% fine to coarse sand, ~15% nonplastic fines, gray, dry.
	15	S5	15 to 15.5	6/6	50/6"			S5 : NARROWLY GRADED SAND WITH SILT (SP-SM); ~90% fine to coarse sand, ~10% nonplastic fines, gray, dry.
130	20							Sampler refusal at 15.5 ft.

NOTES:
B2 offset by 3 ft after sampler refusal at 0.5 ft. on first attempt

PROJECT NAME: Charlestown ES Revised Stage II
CITY/STATE: Charlestown, Rhode Island
GEI PROJECT NUMBER: 2603682

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2603682 GINT LOG.GPJ GEI DATA TEMPLATE 2013.GDT 8/7/26

BORING INFORMATION

LOCATION: See Plan

GROUND SURFACE EL. (ft): 143 **DATE START/END:** 7/1/2026 - 7/1/2026

VERTICAL DATUM: **DRILLING COMPANY:** Northern Drill Service, Inc.

TOTAL DEPTH (ft): 7.5 **DRILLER NAME:** Jon Beirholm

LOGGED BY: J. Kharel **RIG TYPE:**

BORING

B3

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 5 inch / 4.5 inch **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): 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 Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
140	0	S1	0 to 2	24/9	WOH-WOH-WOH-2		SAND	S1 (0"-2") : Top soil. S1 (2"-9") : NARROWLY GRADED SAND (SP); ~95% fine to coarse sand, ~5% nonplastic fines, brown, dry, tree roots present.
		S2	2 to 4	24/9	1-1-1-3			S2 : SILTY SAND (SM); ~75% fine to medium sand, ~25% nonplastic fines, brown, moist, tree roots present.
	5	S3	4 to 6	24/11	2-9-10-16			S3 : NARROWLY GRADED SAND (SP); ~90% fine to medium sand, ~5% nonplastic fines, ~5% fine to coarse gravel, light brown, moist.
								Auger refusal at 7.5 ft.
130	10							
	15							
120	20							

NOTES:

PROJECT NAME: Charlestown ES Revised Stage II

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2603682

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2603682 GINT LOG.GPJ GEI DATA TEMPLATE 2013.GDT 8/7/26

BORING INFORMATION

LOCATION: See Plan

GROUND SURFACE EL. (ft): 143 **DATE START/END:** 7/1/2026 - 7/1/2026

VERTICAL DATUM: **DRILLING COMPANY:** Northern Drill Service, Inc.

TOTAL DEPTH (ft): 7.5 **DRILLER NAME:** Jon Beirholm

LOGGED BY: J. Kharel **RIG TYPE:**

BORING

B4

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 5 inch / 4.5 inch **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): 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 Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
140	0	S1	0 to 2	24/12	WOH-WOH-2-3	Difficult drilling, grinding at 6 ft.	SAND	S1 : SILTY SAND (SM); ~80% fine to medium sand, ~15% nonplastic fines, ~5% fine to coarse gravel, brown, moist, roots present.
		S2	2 to 4	24/12	2-WOR-WOR-1			S2 : Similar as S1.
	5	S2	4 to 6	24/13	2-5-9-23			S3 : NARROWLY GRADED SAND WITH SILT (SP-SM); ~85% fine to medium sand, ~10% nonplastic fines, ~5% fine to coarse gravel, brown, moist.
								Auger refusal at 7.5 ft. Refusal confirmed (7.5 ft.) in offset boring 3 ft. north.
130	10							
	15							
120	20							

NOTES:

PROJECT NAME: Charlestown ES Revised Stage II

CITY/STATE: Charlestown, Rhode Island

GEI PROJECT NUMBER: 2603682

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2603682 GINT LOG.GPJ GEI DATA TEMPLATE 2013.GDT 8/7/26

BORING INFORMATION

LOCATION: See Plan
GROUND SURFACE EL. (ft): 148
VERTICAL DATUM:
TOTAL DEPTH (ft): 4.0
LOGGED BY: J. Kharel
DATE START/END: 7/1/2026 - 7/1/2026
DRILLING COMPANY: Northern Drill Service, Inc.
DRILLER NAME: Jon Beirholm
RIG TYPE:

BORING

B5

DRILLING INFORMATION

HAMMER TYPE: Automatic
AUGER I.D./O.D.: 5 inch / 4.5 inch
DRILLING METHOD: Hollow Stem Auger
WATER LEVEL DEPTHS (ft): Not Encountered
CASING I.D./O.D.: NA/ NA
DRILL ROD O.D.: NM
CORE BARREL TYPE:
CORE BARREL I.D./O.D. NA / NA

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: Sample No.	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	24/12	WOR-WOR-WOH-WOH		SAND	S1 (0"-3") : Top Soil. S1 (3"-312") : SILTY SAND (SM); ~85% fine to medium sand, ~15% nonplastic fines, brown, moist, roots present. S2 : NARROWLY GRADED SAND WITH GRAVEL (SP); ~85% fine sand, ~15% fine to coarse gravel, gray, dry.
		S2	2 to 4	24/7	3-22-40/5"			
	5							Auger refusal at 4.0 ft.
140								
	10							
	15							
130								
	20							

NOTES:

PROJECT NAME: Charlestown ES Revised Stage II
CITY/STATE: Charlestown, Rhode Island
GEI PROJECT NUMBER: 2603682

GEI Consultants

GEI WOBURN STD 1-LOCATION-LAYER NAME 2603682 GINT LOG.GPJ GEI DATA TEMPLATE 2013.GDT 8/7/26

Appendix B

Test Pit Logs

TEST PIT LOG

TP-1

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	154.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-10'	(0'-10'): NARROWLY GRADED SAND WITH GRAVEL (SP); ~85% fine to medium sand,~15% fine to coarse gravel, brown, moist, cobbles and boulders up to 24 in.
2			
3			
4			
5			
6			
7			
8			
9			
10			Bottom of test pit at 10 feet. Terminated at planned depth Backfilled test pit with excavated material and tamped with excavator bucket.

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	9
Width	3
Depth	10

GEI Consultants

TEST PIT LOG

TP-1

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	154.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026



Photo 1: TP-1 side view.



Photo 2: TP-1 stockpile of excavated material.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	9
Width	3
Depth	10

GEI Consultants

TEST PIT LOG

TP-2

Project	Chariho Charlestown Elementary School Revised Stage II	**Page**	1 **OF** 2
City/Town	Charlestown, RI	**Northing**	
Client	Garofalo & Associates	**Easting**	
Equipment	HITACHI Tracked Excavator	**Ground El.**	166.00
Weather	Sunny, 80s-90s F	**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc. **Operator**: Jon Beirholm	**Vert. Datum**	NAVD 88
Observed By	J. Kharel **Date** 6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani **Date** 8/4/2026	**Start Date**	6/30/2026
		End Date	6/30/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-2.5'	(0'-2.5'): NARROWLY GRADED SAND WITH SILT (SP-SM); ~80% fine to coarse sand,~10% fine to coarse gravel, ~10% nonplastic fines, brown, moist, cobbles and boulders up to 16 in.
2			
3		2.5'-7'	(2.5'-7'): NARROWLY GRADED SAND (SP); ~75% fine to coarse sand,~20% fine to coarse gravel, 5% nonplastic fines, brown to gray, moist, cobbles and boulders up to 24 in.
4			
5			
6			
7			Dig refusal at 7.0 ft. on hardpan or boulders.
8			Backfilled test pit with excavated material and tamped with excavator bucket.
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	2
Depth	7

GEI Consultants

TEST PIT LOG

TP-2

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	166.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026



Photo 1: TP-2 side view.



Photo 2: TP-2 stockpile of excavated material.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	2
Depth	7

GEI Consultants

TEST PIT LOG

TP-3

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	162.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-2'	(0'-2'): NARROWLY GRADED SAND (SP); ~90% fine to medium sand,~5% fine to coarse gravel, ~5% nonplastic fines, yellowish brown, dry, cobbles and boulders up to 24 in.
2			
3			
4		2'-6'	(2'-6'): NARROWLY GRADED SAND WITH GRAVEL (SP); ~80% fine to coarse sand,~20% fine to coarse gravel, gray to brown, dry, cobbles and boulders up to 24 in.
5			
6			Dig refusal at 6.0 ft. on presumed large boulder or bedrock.
7			Backfilled test pit with excavated material and tamped with excavator bucket.
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	9
Width	3
Depth	6

GEI Consultants

TEST PIT LOG

TP-3

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	162.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026





Photo 1: TP-3 side view.





Photo 2: TP-3 stockpile of excavated material and boulders from test pit.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	9
Width	3
Depth	6

GEI Consultants

TEST PIT LOG

TP-4

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	156.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAMPLE	0'-4.5'	(0'-4.5'): NARROWLY GRADED SAND (SP); ~80% fine to coarse sand,~20% fine to coarse gravel, brown to gray, moist, cobbles and boulders up to 24 inch in length, tree roots present.
2			
3			
4			
5			Dig refusal at 4.5 ft. on presumed large boulder or bedrock.
6			Backfilled test pit with excavated material and tamped with excavator bucket.
7			
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	8
Width	3
Depth	4.5

GEI Consultants

TEST PIT LOG

TP-4

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	156.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026



Photo 1: TP-4 side view.



Photo 2: TP-4 stockpile of excavated material.

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	8
Width	3
Depth	4.5

GEI Consultants

TEST PIT LOG

TP-5

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	162.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-6.5'	(0'-6.5'): NARROWLY GRADED SAND WITH SILT (SP-SM); ~70% fine to coarse sand,~10% fine to coarse gravel, ~10% nonplastic fines,~10% cobbles and boulders 12 in to 16 in, brown to gray, dry.
2			
3			
4			
5			
6			
7			Dig refusal at 6.5 ft. on presumed rock Backfilled test pit with excavated material and tamped with excavator bucket.
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	10
Width	3
Depth	6.5

GEI Consultants

TEST PIT LOG

TP-5

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	162.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026



Photo 1: TP-5 side view and stockpile of excavated material.



Photo 2: TP-5 side view.

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	10
Width	3
Depth	6.5

GEI Consultants

TEST PIT LOG

TP-6

Project	Chariho Charlestown Elementary School Revised Stage II	**Page**	1 **OF** 2
City/Town	Charlestown, RI	**Northing**	
Client	Garofalo & Associates	**Easting**	
Equipment	HITACHI Tracked Excavator	**Ground El.**	165.00
Weather	Sunny, 70s-80s F	**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc. **Operator**: Jon Beirholm	**Vert. Datum**	NAVD 88
Observed By	J. Kharel **Date** 6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani **Date** 8/4/2026	**Start Date**	6/30/2026
		End Date	6/30/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-2'	(0'-2'): NARROWLY GRADED SAND WITH GRAVEL (SP); ~85% fine to coarse sand,~15% fine to coarse gravel, brown, dry, cobbles and boulders up to 24 in.
2			
3		2'-7'	(2'-7'): NARROWLY GRADED SAND WITH GRAVEL (SP); ~75% fine to coarse sand,~25% fine to coarse gravel, gray, dry, cobbles and boulders up to 24 in.
4			
5			
6			
7			Dig refusal at 7.0 ft. on presumed rock.
8			Backfilled test pit with excavated material and tamped with excavator bucket.
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	3
Depth	7

GEI Consultants

TEST PIT LOG

TP-6

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	165.00
Weather	Sunny, 70s-80s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026



Photo 1: TP-6 side view.



Photo 2: TP-6 stockpile of excavated material.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	3
Depth	7

GEI Consultants

TEST PIT LOG

TP-7

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	168.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-7'	(0'-3"): Flat rock slab (3"-7'): NARROWLY GRADED SAND WITH GRAVEL (SP); ~85% fine to coarse sand,~15% fine to coarse gravel, brown, dry, cobbles and boulders up to 30 in.
2			
3			
4			
5			
6			
7			Dig refusal at 7.0 ft. on presumed rock. Backfilled test pit with excavated material and tamped with excavator bucket.
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	3
Depth	7

GEI Consultants

TEST PIT LOG

TP-7

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	168.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026



Photo 1: TP-7 side view.



Photo 2: TP-7 stockpile of excavated material.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	3
Depth	7

GEI Consultants

TEST PIT LOG

TP-8A

Project	Chariho Charlestown Elementary School Revised Stage II	**Page**	1 **OF** 2
City/Town	Charlestown, RI	**Northing**	
Client	Garofalo & Associates	**Easting**	
Equipment	HITACHI Tracked Excavator	**Ground El.**	165.00
Weather	Sunny, 80s-90s F	**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc. **Operator**: Jon Beirholm	**Vert. Datum**	NAVD 88
Observed By	J. Kharel **Date** 6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani **Date** 8/4/2026	**Start Date**	6/29/2026
		End Date	6/29/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-3.5'	(0'-3.5'): NARROWLY GRADED SAND (SP); ~90% fine to coarse sand,~10% fine to coarse gravel, brown, dry, cobbles and boulders up to 15 in.
2			
3			
4			Dig refusal at 3.5 ft. on presumed rock.
5			Backfilled test pit with excavated material and tamped with excavator bucket.
6			
7			
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	3
Width	2
Depth	3.5

GEI Consultants

TEST PIT LOG

TP-8A

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	165.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026



Photo 1: TP-8A side view.



Photo 2: TP-8A stockpile of excavated material.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	3
Width	2
Depth	3.5

GEI Consultants

TEST PIT LOG

TP-8B

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	165.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-3'	(0'-3'): NARROWLY GRADED SAND (SP); ~90% fine to coarse sand,~10% fine to coarse gravel, brown, dry, cobbles and boulders up to 15 in.
2			
3			Dig refusal at 3.0 ft. on presumed rock.
4			Backfilled test pit with excavated material and tamped with excavator bucket.
5			
6			
7			
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	5
Width	2
Depth	3

GEI Consultants

TEST PIT LOG

TP-8B

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	165.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/29/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/29/2026
				End Date	6/29/2026



Photo 1: TP-8B side view.



Photo 2: TP-8B front view.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	5
Width	2
Depth	3

GEI Consultants

TEST PIT LOG

TP-9

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	148.00
Weather	Sunny, 70s-80s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-3.5'	(0'-3.5'): NARROWLY GRADED SAND WITH GRAVEL (SP); ~80% fine to coarse sand,~20% fine to coarse gravel, brown, moist, cobbles and boulders up to 24 in.
2			
3			
4			Dig refusal at 3.5 ft. on presumed large boulder or rock.
5			Backfilled test pit with excavated material and tamped with excavator bucket.
6			
7			
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	5
Width	3
Depth	3.5

GEI Consultants

TEST PIT LOG

TP-9

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	148.00
Weather	Sunny, 70s-80s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026



Photo 1: TP-9 side view.



Photo 2: TP-9 stockpile of excavated material.

Notes:

1. Groundwater not encountered.

Pit Dimensions (ft)

Length	5
Width	3
Depth	3.5

GEI Consultants

TEST PIT LOG

TP-10

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	144.00
Weather	Sunny, 70s-80s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-3.5'	(0'-3.5'): NARROWLY GRADED SAND (SP); ~90% fine to medium sand,~10% fine to coarse gravel, brown, moist, with cobbles and boulders up to 24 in.
2			
3			
4			Dig refusal at 3.5 ft. on presumed large boulder or rock.
5			Backfilled test pit with excavated material and tamped with excavator bucket.
6			
7			
8			
9			
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	6
Width	3
Depth	3.5

GEI Consultants

TEST PIT LOG

TP-10

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	144.00
Weather	Sunny, 70s-80s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026



Photo 1: TP-10 side view.



Photo 2: TP-10 stockpile of excavated material.

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	6
Width	3
Depth	3.5

GEI Consultants

TEST PIT LOG

TP-11

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	1 **OF** 2
City/Town	Charlestown, RI			**Northing**	
Client	Garofalo & Associates			**Easting**	
Equipment	HITACHI Tracked Excavator			**Ground El.**	152.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	**Operator**: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026

Depth (ft)	Sample No. and Type	Sample Depth (ft)	Soil Description
0			
1	SAND	0'-8'	(0'-8'): NARROWLY GRADED SAND WITH SILT (SP-SM); ~80% fine to coarse sand,~10% fine to coarse gravel, ~10% nonplastic fines, brown, dry, cobbles and boulders up to 24 in.
2			
3			
4			
5			
6			
7			
8			Dig refusal at 8.0 ft. on presumed rock.
9			Backfilled test pit with excavated material and tamped with excavator bucket.
10			

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	3
Depth	8

GEI Consultants

TEST PIT LOG

TP-11

Project	Chariho Charlestown Elementary School Revised Stage II			**Page**	2 **OF** 2
City/Town	Charlestown, RI			**Northing**	0
Client	Garofalo & Associates			**Easting**	0
Equipment	HITACHI Tracked Excavator			**Ground El.**	152.00
Weather	Sunny, 80s-90s F			**Horiz. Datum**	NAD 83
Contractor	Northern Drill Service, Inc.	Operator: Jon Beirholm		**Vert. Datum**	NAVD 88
Observed By	J. Kharel	**Date**	6/30/2026	**Project No.**	2603682
Checked By	T. Rezzani	**Date**	8/4/2026	**Start Date**	6/30/2026
				End Date	6/30/2026



Photo 1: TP-11 side view.



Photo 2: TP-11 stockpile of excavated material.

Notes:
1. Groundwater not encountered.

Pit Dimensions (ft)

Length	7
Width	3
Depth	8

GEI Consultants

Appendix C

Laboratory Results

GeoTesting EXPRESS

Client:	GEI Consultants, Inc.				
Project:	Chariho ES				
Location:	RI			Project No:	GTX-318584
Boring ID:	---	Sample Type:	---	Tested By:	ckg
Sample ID:	---	Test Date:	02/08/24	Checked By:	ank
Depth :	---	Test Id:	758084		

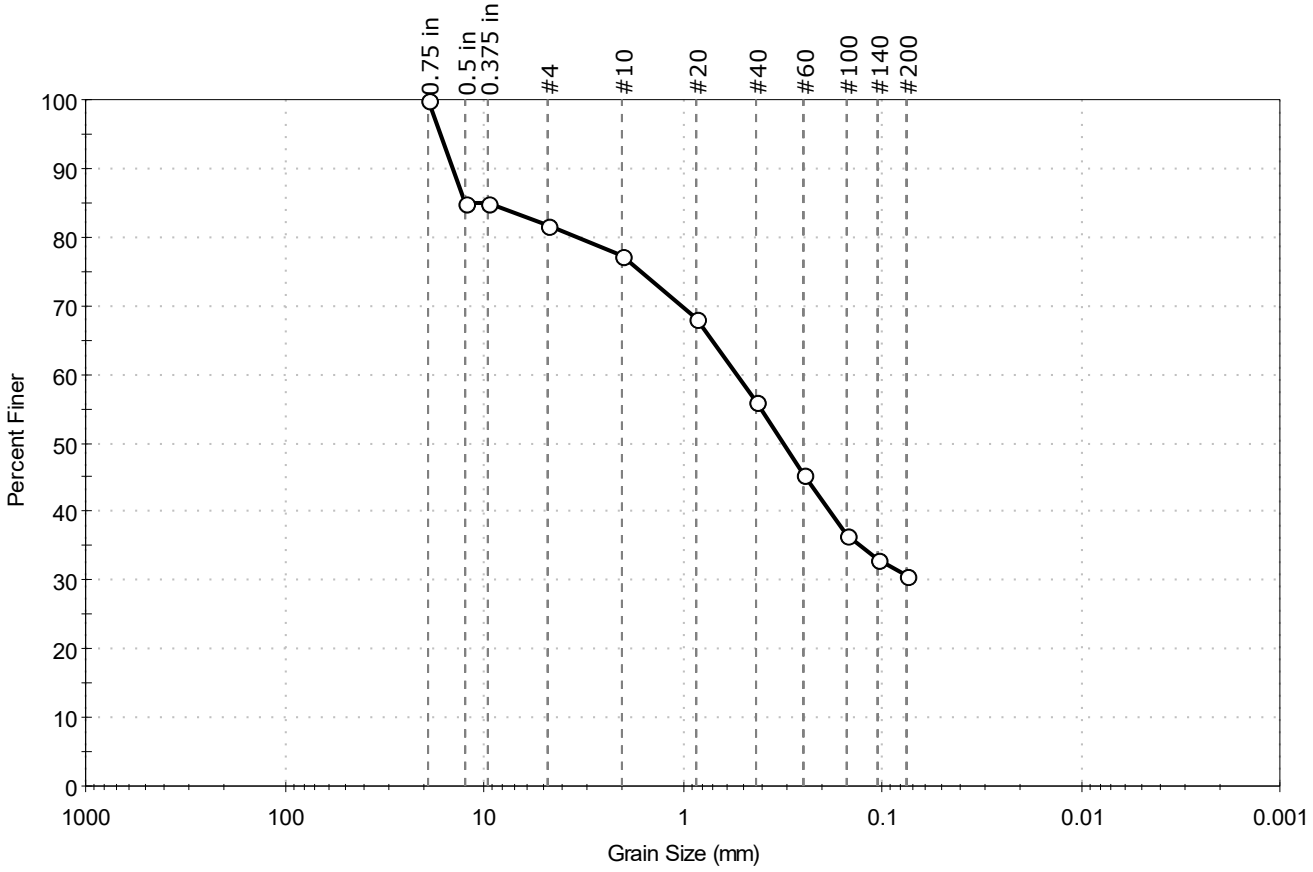
Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
A-2	S3	4.5-6.5	Moist, yellowish brown sand	2.8
A-3	S4	6.5-8.5	Moist, yellowish brown sand with silt and gravel	2.3
C-1	S3	4.5-6.5	Moist, yellowish brown silty sand with gravel	13.5
C-3	S4	8-10	Moist, yellowish brown silty sand	4.0
R-2	S2	2-4	Moist, yellowish brown sandy gravel with silt	2.3
R-3	S3	5-7	Moist, yellowish brown sand with silt and gravel	3.1

Notes: Temperature of Drying : 110º Celsius

Client:	GEI Consultants, Inc.				
Project:	Chariho ES				
Location:	RI			Project No:	GTX-318584
Boring ID:	C-1	Sample Type:	Jar	Tested By:	ckg
Sample ID:	S3	Test Date:	02/08/24	Checked By:	ank
Depth :	4.5-6.5	Test Id:	758075		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	18.3	50.9	30.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	85		
0.375 in	9.50	85		
#4	4.75	82		
#10	2.00	77		
#20	0.85	68		
#40	0.42	56		
#60	0.25	45		
#100	0.15	37		
#140	0.11	33		
#200	0.075	31		

Coefficients

D_{85} = 9.4656 mm D_{30} = N/A

D_{60} = 0.5300 mm D_{15} = N/A

D_{50} = 0.3141 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))

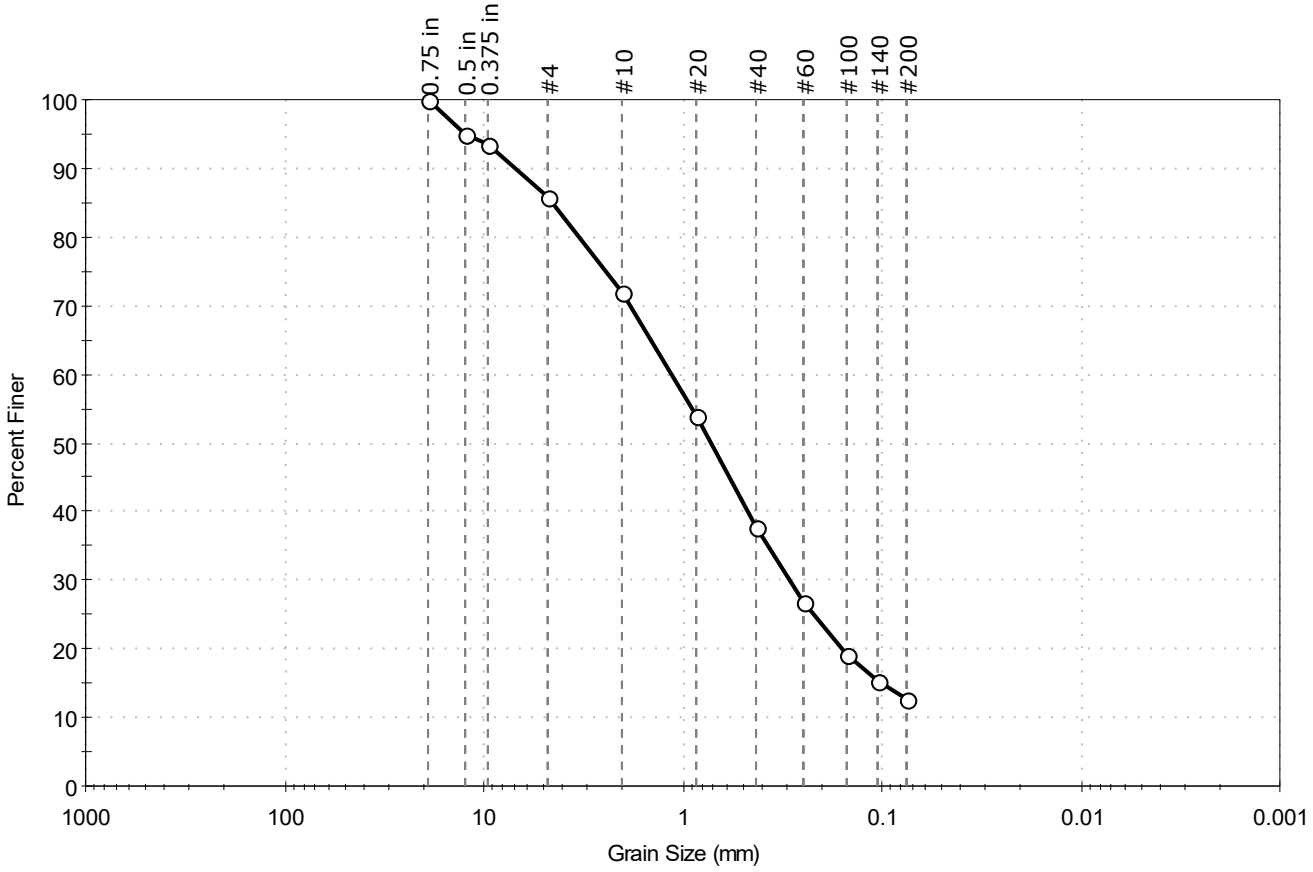
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	GEI Consultants, Inc.				
Project:	Chariho ES				
Location:	RI			Project No:	GTX-318584
Boring ID:	C-3	Sample Type:	Jar	Tested By:	ckg
Sample ID:	S4	Test Date:	02/08/24	Checked By:	ank
Depth :	8-10	Test Id:	758076		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	14.1	73.3	12.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	95		
0.375 in	9.50	94		
#4	4.75	86		
#10	2.00	72		
#20	0.85	54		
#40	0.42	38		
#60	0.25	27		
#100	0.15	19		
#140	0.11	15		
#200	0.075	13		

Coefficients

D_{85} = 4.4950 mm
D_{30} = 0.2899 mm
D_{60} = 1.1326 mm
D_{15} = 0.1012 mm
D_{50} = 0.7174 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 : ANGULAR

Sand/Gravel Hardness : HARD

Appendix D

Recommended Material Specifications

Recommended Material Specifications
Charlestown Elementary School
Charlestown , RI

Per the Geotechnical Report, the native soils 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 6-inches in diameter should be screened out of the native soils or crushed to an acceptable size. Rock removed as part of mechanical excavation can likely be crushed and screened to meet requirements for project re-use, if so desired. Mixing processed rock with site soils may also be considered to improve workability.

Fill imported from off site should meet the below gradation requirements. Fill placed within the building limits, within a 3-foot-wide zone outside foundation walls, under pavements, and behind retaining walls should meet the compaction requirements for Structural Fill. Backfill placed in non-structural areas 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.

If existing asphalt pavements are milled, these materials (recycled asphalt pavements/RAP) may be suitable for use, subject to review by the geotechnical engineer, as recycled base beneath new pavements or mixed into general grade-raise fills at a proportion of no more than 50 percent by weight.

Structural Fill

Imported 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 non-plastic. 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 Section M.01.09, Table I, Column II of the RI DOT Standard Specifications for Road and Bridge Construction. 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 equal product.