GEOTECHNICAL ENGINEERING REPORT

Hope Presbyterian Church

Mercer County, New Jersey

April 29, 2026

Prepared for:
Hope Presbyterian Church
140 Denow Road
Lawrenceville, New Jersey 08648

Attn: Noell Greenberger

Prepared by:
Geo-Technology Associates, Inc.
Geotechnical and Environmental Consultants
Construction Observation and Testing

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GTA Project No: 31260060

April 29, 2026

Hope Presbyterian Church
140 Denow Road
Lawrenceville, New Jersey 08648

Attn: Noell Greenberger

Re: Geotechnical Engineering Report
Hope Presbyterian Church
Mercer County, New Jersey

Dear Noel:

In accordance with our agreement December 15, 2025 and executed on December 19, 2025, Geo-Technology Associates, Inc. (GTA) has conducted a geotechnical engineering study in support of a proposed building addition to be constructed at the Hope Presbyterian Church in Lawrence Township, Mercer County, New Jersey. GTA has prepared this report to convey our findings, conclusions, and recommendations about subsurface conditions that could affect foundation support and related geotechnical considerations for the proposed building addition.

Please note that, unless you make other arrangements, GTA will discard all soil samples obtained from the explorations 60 days after the date of this report. If you have any questions or concerns about this report, or if you want additional information, please contact our office at (732) 271-9301.
Sincerely,

GEO-TECHNOLOGY ASSOCIATES, INC.

Kyle T. Plaza, P.E.
Associate

Christopher M. Reith, P.E., BCGE
Principal Consultant

TABLE OF CONTENTS

1.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

We have prepared this summary for the user's convenience only. Do not rely on it exclusively for any decision-making purpose. Please review the full text of the report which addresses each topic in further detail.

TOPIC	DESCRIPTION
Site Attributes	
Existing Conditions	At the time GTA's exploration was performed, the southwestern portion of the site was occupied by the existing church building, a parking lot, and a landscaped lawn area and the northern portion of the site was wooded.
Proposed Construction	A proposed building addition with a footprint area of about 4,600 square feet abutting the northeastern side of the existing church building.
Conditions Encountered	
Surface Materials	An approximately 5- to 18-inch-thick layer of topsoil encountered in all explorations.
Native Soils	Predominantly residual soils consisting of clayey gravel (GC), clayey sand (SC), silty sand (SM), lean clay (CL), and silt (ML) with varying amounts of gravel and rock fragments.
Weathered Rock	Highly-weathered shale bedrock was encountered in 8 of the 10 explorations at depths ranging from about 3½ to 13 feet below the existing surface grades.
Groundwater	Groundwater was encountered in 7 of the 10 explorations at depths ranging from about 9 to 14 feet below the existing surface grades.
Recommendations	
Site Preparation	The site should be stripped of topsoil and existing pavement from within and at least 5 feet beyond the proposed building and pavement areas.
Existing Fill	Undocumented fill materials, if encountered, are not considered suitable for direct support of permanent improvements.
Difficult Excavation	Weathered rock may be encountered in localized basement foundation, underpinning, and utility excavations. Removing these materials will require increased excavation effort.
Groundwater	• Widespread groundwater impacts not anticipated but water may be encountered in deeper footing excavations. • Perched water may be encountered in localized excavations. • Commonly used temporary dewatering techniques (e.g., sumps, gravity flow trenches) should be sufficient to control perched water seepage.
Fill Material Criteria	Excavated soils will be suitable for reuse as fill, with some limitations. Localized excavations into weathered rock may produce oversized (i.e., larger than 3-inch) rock fragments. These fragments should be broken up or removed.
Fill Placement Requirements	• Place fill in maximum 8- to 12-inch (loose-measure) lifts. Break up clay clumps/clods. • Compact to minimum 95% of max. dry density (Modified Proctor) for structural fill.
Foundations	• Net allowable soil-bearing pressure: 4,000 psf. • Minimum widths: 24 inches (wall footings); 30 inches (column footings). • Anticipated post-construction settlements: 1-inch total; ½-inch differential between columns. • Frost Depth Embedment – 36 inches, or deeper if required by local ordinance. • Seismic Site Class – C
Slabs	Place slab on min. 4-inch-thick gravel covered with a min. 6-mil vapor retarder.
Utilities	Localized excavations may encounter weathered rock.

*bgs = below existing ground surface

2.0 INTRODUCTION

This report presents the results of a geotechnical engineering exploration performed by Geo-Technology Associates, Inc. (GTA) for the planning and design of a proposed building addition to the existing Hope Presbyterian Church located in Lawrence Township, Mercer County, New Jersey. GTA has performed a geotechnical engineering study and prepared this report for Hope Presbyterian Church in accordance with our agreement dated December 15, 2025.

2.1 Study Purpose

This study was conducted to develop confirmation-dependent geotechnical engineering recommendations for the proposed building addition. The scope of GTA's study included a field exploration consisting of 3 Standard Penetration Test (SPT) borings within the proposed building addition footprint area, 2 SPT borings within proposed parking areas, and 5 test pit excavations at the requested locations within potential stormwater management (SWM) areas.

2.2 Referenced Documents

A concept plan prepared by Dynamic Engineering (Dynamic) titled "Conceptual Site Plan 'A'" dated March 26, 2026, and a survey plan prepared by Caroll Engineering titled "Boundary & Topographic Survey" dated September 3, 2025 were provided to GTA. Additionally, an undated architectural plan prepared by Farewell Architects, LLC was provided to GTA. The plans indicate the site boundaries, existing site features and topography, mapped wetlands areas, and the layout of the proposed site improvements.

Our understanding of the project is based on review of the provided plans and subsequent conversations with the Client and their project team. If the reference documents are modified after the date of GTA's initial review, Client should provide the updated versions to GTA. Modifications may make it necessary for GTA to revise the geotechnical engineering recommendations presented in this report.

3.0 PROJECT DESCRIPTION

3.1 Site Location

The project site is located at the existing Hope Presbyterian Church at 140 Denow Road in Lawrence Township, Mercer County, New Jersey, and is identified as Lot 5.021 in Block 6 on the Lawrence Township tax map. The Site Location Map, in Appendix A, Figure No. 1, indicates the site location in relation to adjacent properties.

3.2 Existing Site Conditions

At the time GTA's exploration was performed, the southwestern portion of the site was occupied by the existing church building, a parking lot, and a landscaped lawn area and the northern portion of the site was wooded. Access to the site was provided from Denow Road through the southern portion of the site.

Based on the provided plans, existing ground surface elevations at the site generally sloped downward from about Elevation (EL) 152 feet in the northeastern portion of the site to about EL 135 feet in the southern portion of the site. The existing site grades within the footprint area of the proposed building addition generally ranged from about EL 139 feet in the eastern portion to EL 137 feet in the southwestern portion.

3.3 Proposed Construction

3.3.1 Site Grading

Based on our conversations with the project team, we understand that the proposed improvements will be established at or near the existing surface grades throughout the site. Minor cuts and fills of up to about 1-foot can be expected. Retaining walls are not indicated on the plans and are not anticipated to be required to achieve the final site grades.

3.3.2 Proposed Buildings

The proposed development will include a proposed building addition with a footprint area of about 4,600 square feet abutting the northeastern side of the existing church building. Based on the architectural plan provided, the basement floor elevation will be established about 7 feet below the existing surface grades at approximately EL 132 feet.

Based on our experience on projects of similar scope, we estimate that the maximum column and wall loads will be approximately 75 kips and 5 kips per linear foot, respectively. We anticipate maximum floor slab loads of up to 150 pounds per square foot.

3.3.3 Subsurface Utilities

We anticipate that public gravity sewer, public water, and private storm drain systems will be installed to service the proposed building addition and that they will be established approximately 5 to 8 feet below the existing surface grades.

3.3.4 Stormwater Management

Preliminary testing for stormwater management design was performed by GTA and consisted of 5 test pits within the potential SWM basin areas on the western portion of the site. The results of the testing are presented in a letter titled "Preliminary Stormwater Management Testing" dated April 28, 2026. Please refer to our letter for more information related to the testing performed for SWM design purposes.

3.3.5 Pavements

Based on the provided plans, associated parking areas will be constructed in the western portion of the site. Access and egress to the development will be provided from the existing entrance along Denow Road to the west.

4.0 GEOTECHNICAL ENGINEERING STUDY

4.1 Geologic Review

The subject site is situated within the Piedmont physiographic province of New Jersey, which is characterized by a low rolling plain divided by a series of higher ridges and predominantly underlain by sedimentary rocks of Triassic and Jurassic age. Based on the *Surficial Geology of the Lambertville and Pennington Quadrangle, Hunterdon and Mercer Counties, New Jersey (OFM 119, 2018)* prepared by the New Jersey Geological Survey, the site surficial geology consists of Weathered Shale, Sandstone, and Mudstone. The unit is described as reddish-brown, gray, yellowish-brown, clayey silt and silty clay with some to many angular to subangular chips, flagstone, pebbles, and cobbles of shale, mudstone, and hornfels. The unit can be as much as 40 feet thick, but generally less than 10 feet thick.

The site is underlain by the Lockatong Formation of the Upper Triassic era as shown on the *Bedrock Geology of the Lambertville and Pennington Quadrangle, Hunterdon and Mercer Counties, New Jersey (OFM 156, 2023)*. The formation is described as gray to greenish-gray, locally reddish-brown, siltstone to silty argillite and dark gray to black shale and mudstone. The unit can be as much as 2,200 feet thick.

Please refer to the publications for more detailed descriptions of the geological members.

4.2 Subsurface Exploration Scope

The subsurface exploration performed by GTA consisted of 5 Standard Penetration Test (SPT) borings within the proposed building and pavement footprint areas, and 5 test pit excavations at the requested locations within the potential SWM basin areas. The borings were performed by Environmental Technical Drilling, Inc. on February 4, 2026 using a Geoprobe drill rig and extended to depths ranging from about 6 to 20 feet below the existing surface grades. The test pits were excavated by Neighbors Property Management on April 14, 2026, using a Bobcat E60 excavator and extended to depths ranging from approximately 11 to 13 feet below the existing surface grades. The test pit exploration locations were selected by the Client's engineer, Dynamic Engineering, and the SPT boring explorations were selected by GTA. The explorations were located in the field by GTA using a hand-held GPS unit and the existing site features as reference. A representative from GTA observed the advancement of the explorations, collected soils samples, and logged the explorations as the work progressed. The approximate locations of the explorations performed for this study are shown on the Exploration Location Plan, which is included as Figure 2 in Appendix A of this report.

Detailed descriptions of the encountered subsurface conditions are indicated on the Logs of Borings and Logs of Test Pits which are included in Appendix B. The ground surface elevations indicated on the logs were obtained from interpolating between topographic contours on the provided plans and should be considered approximate.

Standard Penetration Testing (SPT) was performed in the borings in general accordance with procedures of ASTM D1586. Soil samples were obtained continuously within the upper 10 feet of the boreholes and at 5-foot increments thereafter, to completion. The SPT involves driving a 2-inch O.D., 1⅜-inch I.D. split-spoon sampler with a 140- pound hammer free-falling from a height of 30 inches. The number of blows required to drive the sampler was recorded in six-inch intervals. The SPT N-value, given as blows per foot, is defined as the total number of blows required to drive the sampler from the 6- to 18-inch interval.

The soil samples obtained from the explorations were delivered to GTA's laboratory for visual classification and laboratory testing. The classifications shown on the logs are based on the Unified Soil Classification System (USCS) visual/manual methods, supplemented by laboratory testing.

4.3 Subsurface Conditions

The results of the subsurface exploration were, for the most part, consistent with the known site history and geologic mapping of the project site. The specific subsurface conditions at each exploration location are shown on the individual exploration logs within Appendix B. GTA has summarized the subsurface conditions encountered in the following sections.

4.3.1 Surficial Materials

An approximately 5- to 18-inch-thick layer of topsoil was encountered in all explorations performed for this study. The reported topsoil thicknesses generally represent the upper layer of dark and organic soil.

4.3.2 Native Soils

The native soils below the surficial materials were generally residual soils consisting of clayey gravel (GC), clayey sand (SC), silty sand (SM), lean clay (CL), and silt (ML) with varying amounts of gravel and rock fragments. The consistency of the fine-grained soils generally ranged from medium stiff to very stiff, and the density of the granular materials was generally medium dense to dense.

4.3.3 Weathered Rock

Highly-weathered shale bedrock was encountered in 8 of the 10 explorations at depths ranging from about 3½ to 13 feet below the existing surface grades. Refusal to further advancement was encountered at depths ranging from about 11 to 20 feet below the existing surface grades within the shale bedrock.

4.3.4 Groundwater

Groundwater was encountered in 7 of the 10 explorations at depths ranging from about 9 to 14 feet below the existing surface grades. Additionally, trapped water seepage was observed in Test Pit TP-5 at a depth of about 7 feet below the existing grade. Note that groundwater levels can fluctuate with seasonal variations in precipitation and as a result of development activity. Also, perched water conditions may develop in localized areas where granular soils are underlain by less permeable, fine-grained soils, or rock.

4.4 Laboratory Testing

GTA performed laboratory testing on selected soil samples obtained from the explorations, including natural moisture content determinations and grain size analyses for classification of the soils in accordance with the Unified Soil Classification System (USCS). Detailed results of the laboratory testing performed for this study are included in Appendix C. The results of the laboratory tests are summarized in the following table:

SUMMARY OF CLASSIFICATION TESTING

Boring No.	Depth (ft.)	USCS Classification	NMC (%)	Fines (%)
B-2	6-8	Silty SAND (SM)	15.6	49.5
B-3	2-4	Lean CLAY with sand (CL)	20.4	84.8
B-4	½-2	Lean CLAY with sand (CL)	18.5	75.4

Note: NMC=Natural Moisture Content, Fines=Material passing the #200 sieve

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our geotechnical engineering study, it is GTA's professional opinion that the subsurface conditions at the project site are generally suitable for construction of the proposed building addition, provided the geotechnical engineering recommendations are followed, and that applicable standard of care is maintained during design and construction. It is GTA's opinion that the proposed building addition can be supported on conventional spread footings and the basement slab can be established on-grade. GTA's recommendation for foundations, subsurface utilities, pavements, and other geotechnical considerations are presented in the following paragraphs.

5.1 Site Preparation

5.1.1 Demolition of Existing Structures

Due to the potential conflicts with new construction, GTA recommends that demolition include the removal of any existing foundation and utilities that may remain within the proposed building addition area. The resulting excavations should be backfilled with structural fill that is placed and compacted in accordance with the recommendations contained in the Fill Placement section. It should be noted that soft/loose existing fill materials and wet soils may be encountered adjacent to and below any existing foundation elements and abandoned utilities. Therefore, GTA recommends that the subgrade be evaluated prior to backfilling. Where soft/loose materials are encountered, localized over-excavation will be required.

Existing utilities beyond the proposed building areas that will not be incorporated into the proposed construction can be abandoned in-place. In-place abandonment of utilities should consist of completely filling the pipelines with grout or flowable fill, or potentially capping the ends. Alternatively, these utilities can be removed and the resulting excavations backfilled in accordance with the recommendations presented in the Fill Placement section.

5.1.2 Stripping

The site should be stripped of topsoil and existing pavements from within and at least 5 feet beyond the proposed building and pavement areas. The removal of topsoil, pavement, and unstable surface soils should be performed before controlled fill placement. The actual stripping thickness will depend on the localized topsoil development, soil moisture, disturbance by construction traffic, and contractor care. The stripped topsoil and asphalt will not be suitable for reuse as controlled compacted fill or backfill within building or pavement areas, or atop utilities. The stripped topsoil can be relocated to proposed landscaped areas to the extent feasible. Milled pavement can be reused in the subbase layer of the proposed pavement section per NJDEP, but GTA recommends that it be thoroughly mixed with equal parts of NJDOT Dense Graded Aggregate (DGA) for stability reasons.

5.2 Earthwork

5.2.1 Excavations

As a minimum, all construction excavations should be sloped and shored in accordance with OSHA excavation regulations or stricter local governing safety codes. It is our opinion that the undisturbed natural soils or controlled compacted fill composed of similarly graded materials would generally be classified as “Type B or C” soils under the OSHA excavation regulations. Significantly flatter excavation side-slopes will be required where groundwater seepage occurs.

5.2.2 Rock & Difficult Excavation

Highly weathered rock may be encountered in utility and foundation excavations. **Removal of highly weathered rock will require increased excavation effort and will result in reduced excavation efficiency.** The excavation effort/rate in highly weathered rock will depend, in substantial part, on the size and type of excavation equipment. **Excavations which extend beyond a few feet into highly weathered rock will likely require the use of large equipment with ripping attachments, rock buckets, or hydraulic/pneumatic hammers.**

5.2.3 Groundwater

Groundwater was encountered in 7 of the 10 explorations at depths ranging from about 9 to 14 feet below the existing surface grades. Based on the provided plans, the presence of groundwater will not likely affect mass grading and construction activities on widespread basis. However, seepage of perched water will likely be encountered where water becomes trapped granular soils underlain by less-permeable soils, particularly after periods of precipitation.

5.2.4 Moisture Sensitivity & Stability

The on-site soils are moisture sensitive and will lose strength and stability if disturbed in the presence of water. Additionally, near surface materials may be soft and unstable under construction equipment. Drying of the fine-grained soils (CL, ML) will only be feasible during the warm, dry season of the year and may require extended drying times and discing effort to adequately dry the soils to a moisture content that is acceptable for compaction. Based on the encountered fine-grained surficial soils, drying of the on-site soils should be anticipated on this project.

GTA recommends that positive drainage be maintained across the site during construction to prevent ponding of water since the exposed subgrades could destabilize in combination with construction traffic and precipitation. If the subgrade is disturbed by construction traffic and becomes unstable, undercutting and replacement of these surficial materials will be required.

5.2.5 Fill Material Considerations

The soils encountered in the explorations will generally be suitable for reuse as structural fill. Additional considerations regarding the fill materials are presented below.

- Pavement Subgrade Fill: Fine-grained and/or plastic soils (USCS Classifications ML, CL, and the more-plastic SC) will likely be moisture- and disturbance-sensitive. If encountered, MH and CH materials should be undercut and replaced with approved structural fill.
- Utility Backfill: GTA generally recommends against using fine-grained soils (USCS Classifications ML, MH, CL or CH) as utility trench backfill. If fine-grained soils are used for trench backfill, the contractors involved must apply the special construction methods described in the Utility Trench Backfill section.
- Basement Wall Backfill: Clay and silt (CL, ML) are not recommended for use as basement wall backfill.
- Imported Fill: GTA recommends that off-site borrow materials, if required, should meet the USCS designation SM, SP, SW, SC, GP, GM, GC, or GW. These materials should be approved by the geotechnical engineer and be tested for their environmental quality before import. Crushed concrete (a.k.a. Recycled Concrete Aggregate) generated from on-site or off-site sources should not be used as material that is intended to promote drainage (e.g., drainage stone for walls).
- Over-sized Materials: Rock fragments, cobbles, and boulders larger than 3 inches in the largest dimension should be broken up or removed from fill materials. The excavated highly weathered rock may not break down into suitable particle sizes to be used for fill without further processing.

5.2.6 Fill Placement

The areas to receive fill should first be proofrolled with a loaded, tandem-axle dump truck or numerous passes of a large smooth drum vibratory compactor with a static drum weight of at least ten tons under the observation of GTA. A sheep's-foot style roller may be more efficient where clay (CL) soils are exposed at subgrade elevations. Other methods of compaction may be deemed more appropriate for the subgrade evaluation by GTA's on-site representative depending on prevailing weather conditions and space constraints. Any subgrade materials identified as soft/loose, wet, or otherwise unsuitable should be over-excavated to a stable bearing stratum before placement of controlled fill. After a suitable subgrade has been achieved, controlled fill should be placed and compacted in 8- to 12-inch thick lifts (as measured before compaction). The fill should be compacted to the following recommended specifications:

RECOMMENDED COMPACTION SPECIFICATIONS

Fill Location	Compaction Specification
Below foundations,-slabs-on-grade, slopes steeper than 5H:1V, utility and roadway fill within the top 12 inches of pavement subgrade	95% of Maximum Dry Density per the Modified Proctor (ASTM D-1557), Moisture: ± 3% of optimum
Utility and roadway fill greater than 12 inches below pavement subgrade	92% of Maximum Dry Density per the Modified Proctor (ASTM D-1557), Moisture: ± 3% of optimum

The 2021 IBC requires that fill placement must be observed on a full-time basis by a field representative working under the supervision of a licensed geotechnical engineer and be retained by the Owner or their authorized representative (not the contractor). All compactive effort should be verified by in-place density testing.

5.3 Building Addition

5.3.1 Basement Considerations

Based on our conversations with the project team, we understand that the proposed building addition will contain a basement level if the subsurface conditions are favorable. All below grade foundation walls should be water-proofed and sump pumps are recommended for below-grade areas. The final grades should be designed to promote positive drainage, and to divert surface water away from proposed construction. Final grades in the vicinity of the foundations should be graded to at least 4 to 5 percent if feasible, and conform to local code.

Borings B-1, B-2, and B-3 were performed within the proposed building addition footprint area and encountered groundwater at depths of about 9 to 10 feet below the existing grades, corresponding approximately to EL 125 feet to EL 129 feet. Based on our conversations, we understand the proposed basement floor will be established at EL 132 feet. Based on the conditions observed in our explorations and our understanding of the proposed basement elevations, groundwater is not expected to be encountered during basement excavation but could be encountered in deeper footing excavations. Furthermore, seepage of perched or trapped water may occur in construction excavations across the site, especially at the soil/rock interface, in low-lying areas of the site, and after heavy rainfall events. Basement excavations that penetrate this seepage zone or are excavated below the rock surface can create a sump or a "bathtub effect" where water can accumulate but cannot drain naturally into the underlying bedrock. **The installation of gravity underdrains is recommended.** Sump crock discharge water and roof downspouts should be diverted outside of the backfill zone to prevent recirculation. Sump pumps should be designed to run longer for a period of time after rain events and have a redundant power source.

It is generally recommended that new footings for building additions bear at the same elevation as existing foundations where they abut to avoid undermining concerns and load transfer between the foundation elements. **We understand the existing building does not contain a basement, therefore underpinning will be required during excavation for the proposed basement level of the building addition. Where it abuts, the existing building foundations should be extended down to the same bearing elevation as the new building addition's foundations.** Traditional pit underpinning methodology can likely be used.

Barring unanticipated findings, commonly used excavation techniques can likely be used to make basement excavations, but note that **weathered rock may be encountered.** See the Rock & Difficult Excavation section for more information. GTA expects that if perched water seepage is encountered during basement excavation, dewatering devices like sumps or gravity-flow trenches will likely be sufficient to control the water.

5.3.2 Foundation Design

It is GTA's opinion that shallow spread footings will be able to support the proposed building addition, providing the footings are constructed on firm, native materials, controlled compacted fill, or compacted AASHTO No. 57 stone placed directly atop the suitable natural soils. **Footings that are supported on controlled compacted fill and/or natural soils can be proportioned for a net allowable soil-bearing pressure of 4,000 pounds per square foot (psf).** Based on this design, GTA anticipates the foundations will experience post-construction settlements on the order of 1-inch total and ½-inch differential over a 30-foot span. GTA recommends minimum widths of 24 inches for wall footings and 30 inches for column footings, where foundation design based on the recommended allowable soil-bearing pressure would result in a narrower footing. Exterior footings should be founded at least 36 inches below final exterior grades to protect against the effects of frost, or deeper if required by local ordinance.

5.3.3 Foundation Construction Considerations

The proposed footings will likely be supported on a combination of native soils or new compacted fill. The native soils encountered during our subsurface exploration were generally firm enough for foundation support. New fill will be suitable for foundation support only if it is placed and compacted as we recommend in the Fill Placement section.

There is a potential for footing excavations to encounter both weathered rock/bedrock and soil at the subgrade level. Each individual column footing should be founded on similar material to reduce the potential for excessive differential settlement or brittle fracture. To reduce the potential for differential settlement in areas where an individual column footing bears on both rock and soil, it will be necessary to over-excavate the soil to the top of rock and backfill the undercut volume with lean concrete or undercut the rock by 6 inches and backfill with crushed stone. The decision on the method of support of individual footings will be based upon the depth to bedrock encountered at each footing location during excavation. The details of the transition zone should be provided in the field by the geotechnical engineer at the time the footing excavations are made. Footings may be stepped at a 1 vertical to 2 horizontal slope.

Before rebar and concrete placement, a licensed geotechnical engineer or a qualified representative should evaluate the footing subgrade soils and perform penetration testing on the exposed footing subgrades to confirm the design allowable bearing capacity. **Any loose/soft soils should be over-excavated to a stable bearing stratum.** Over-excavations should be replaced with lean concrete, AASHTO No. 57 stone, or controlled compacted fill. If over-excavations are replaced with soil fill, they should be placed and compacted as recommended in the Fill Placement section. Alternatively, the footings could be lowered to a competent bearing stratum. Over-excavation and replacement, if required, should be performed as recommended by a licensed geotechnical engineer or a qualified representative based on conditions observed in the field during construction. Concrete for footings should be placed the day the excavations are made to prevent excessive disturbance and/or moisture increase.

5.3.4 Seismic Site Class Designation

The soil conditions within the upper 100 feet at this site can be categorized as Site Class C per ASCE/SEI 7-16 guidance. This categorization is based on the boring data, general geologic information for the region, and the information contained in the applicable code. Subsurface explorations at this site were extended to a maximum depth of 20 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of the geologic conditions of the general area. A site-specific seismic study could be performed to confirm the conditions below the current maximum boring depth and could potentially result in an upgrade to the Seismic Site Class.

5.3.5 Slab Design

Following the earthwork procedures recommended in this report, lowest-level slabs can be designed as concrete slabs-on-grade. To prevent or retard the rise of capillary moisture through the slab, GTA recommends that the slab be founded on a minimum 4-inch-thick layer of open-graded stone comprised of imported washed gravel or crushed stone materials with less than 5 percent fines. A polyethylene vapor retarder should be placed beneath the slab and should be at least 6-mil thick if it will also serve as a radon gas retarder. An interior perimeter drain should also be provided below the basement slab that is tied into a sump pit.

5.3.6 Slab Construction

Before concrete placement, a representative of GTA should evaluate the stability and compaction of natural and compacted fill subgrades for support of the floor slabs. Soft or loose layers should be removed from the slab subgrade and replaced as recommended in the Fill Placement section. Control joints should be provided to control shrinkage cracking of the concrete floor system.

5.4 Lateral Earth Pressures

Below-grade building walls will be subjected to unbalanced lateral-earth pressures and so must be designed to resist such pressures. Surcharge pressures from roadways, buildings, and other site improvement structures will also need to be accounted for in the design.

For design, GTA recommends the following design parameters and considerations:

Soil Property	On-Site Backfill (PI < 15)	AASHTO #57 Clean Stone	Dense-Graded Aggregate backfill
Unit Weight, γ	120 pcf	105 pcf	145 pcf
Angle of Internal Friction, Φ	28°	38°	42°
Coefficient of Active Earth Pressure (Ka)	0.36	0.24	0.20
Coefficient of Passive Earth Pressure (Kp)	2.77	4.20	5.00
Coefficient of Earth Pressure at Rest (Ko)	0.53	0.38	0.33
Base Friction, tan δ	0.34	0.47	0.53
Equivalent Fluid Pressure (Unrestrained Top of Wall)	45 psf/ft	25 psf/ft	30 psf/ft

Soil Property	On-Site Backfill (PI < 15)	AASHTO #57 Clean Stone	Dense-Graded Aggregate backfill
Equivalent Fluid Pressure (Restrained Top of Wall)	65 psf/ft	40 psf/ft	50 psf/ft

Hydrostatic pressure is not included in the above values because it is assumed adequate drainage will be provided. Drainage panels and a perimeter drain should be provided behind below grade walls to carry away any infiltrating surface water so that hydrostatic pressures do not develop. The perimeter drain should consist of a minimum four-inch diameter slotted or perforated pipe encased in a minimum of six inches of crushed stone that is wrapped by a geotextile filter. The crushed stone should meet the gradational requirements of AASHTO Size No. 57 aggregate. The perimeter drain should tie into a sump pit, stormwater management system, or daylight. All below grade foundation walls should be water-proofed.

5.4.1 Basement Wall Backfill

The on-soil residual soils generally consist of clayey gravel (GC), clayey sand (SC), silty sand (SM), lean clay (CL), and silt (ML) with varying amounts of gravel and rock fragments. The granular GC, SC, and SM soils are better suited for use as basement wall backfill. The CL or ML materials are not recommended for use as basement wall backfill as these types of soils can exert excess pressure on the walls. Foundation walls should be designed to resist the lateral soil pressure from the retained backfill. This will be a function of the height of the walls, the differential height of backfill, the type of soil backfill material, the drainage conditions, and the method of placement and compaction.

Basement wall backfill should be free of organic matter, rocks greater than three inches in diameter, and construction debris. Backfill should be placed and compacted in lifts in a manner that does not damage the foundation, water-proofing, and drainage system. Foundation wall backfill should not be placed until the concrete has achieved adequate strength, the basement and first floors have been constructed, or the walls have been adequately braced from the interior of the building.

5.5 Utilities

5.5.1 Utility Excavations

Utility excavations can likely be accomplished using standard excavation techniques, however, **weathered rock may be encountered.** See the Rock & Difficult Excavation section for more information. If perched water seepage is encountered in utility excavations, dewatering devices like sumps or gravity-flow trenches will likely be sufficient to control the water. Utility excavations should be properly shored and supported in accordance with the latest requirements of OSHA and such other regulatory authorities with jurisdiction.

5.5.2 Utility Support

The native soils will likely be suitable for supporting the proposed utilities. Any soft/loose or unstable soils encountered at the utility subgrades should be over-excavated and replaced with controlled compacted fill or AASHTO No. 57 stone. To facilitate compaction, provide additional protection for the pipe, and decrease the risk of excessive trench settlement, GTA recommends placing AASHTO No. 57 stone or DGA to at least 6 inches above utility pipes made of plastic or flexible metal (i.e., CMP) and to the spring line of rigid pipes.

5.5.3 Utility Trench Backfill

Utilities installed below proposed pavement or other structural areas should be backfilled with controlled compacted fill. The backfill should be placed and compacted in accordance with project requirements or the recommended compaction specifications provided in the Fill Placement section. Utility trenches should be backfilled with the most granular material available. The soils encountered during the subsurface exploration of the project site will generally be suitable for use as utility backfill. However, clay (CL) and silt (ML) was encountered in some explorations, and will likely be encountered in utility excavations. **The use of fine-grained, plastic soils for utility backfill should be limited to the extent feasible.** If fine-grained/plastic soils are used as utility backfill, they should be placed in maximum 8-inch (loose measure) lifts and compacted with a sheep's-foot type roller at a moisture content of 2 to 4 percent above optimum. To reduce the risk of trench settlement and associated impacts, moisture conditioning and breaking of clay clumps/clods must be performed for proper placement and compaction of clayey soils as utility backfill. Unless subgrade stabilization is planned, these materials should not be placed within 18 inches of final pavement subgrade.

Hand-operated equipment should be used for compaction around utility structures. Where hand-operated equipment is used for compaction, lift thicknesses should not exceed 6 inches (as measured before compaction). When backfilling around utility structures, each lift should be uniformly compacted with a sufficient number of passes to obtain the required degree of compaction.

It should be noted that excavated boulders, weathered rock, and/or rock materials removed during utility installations may not be suitable for reuse as backfill unless these over-size materials are segregated or processed to a gradation similar of dense graded aggregate.

5.6 Pavement

5.6.1 Pavement Subgrade Preparation

The upper 18 inches of pavement subgrade should be constructed of soils meeting the following characteristics:

- Liquid Limit (AASHTO T-89): 30 percent or less
- Plasticity Index (AASHTO T-89, T-90): 14 percent or less
- California Bearing Ratio (ASTM D1883): 5 percent or higher
- Maximum Dry Density (ASTM D1557): 105 pcf or higher

The more plastic and/or fine-grained soils (USCS classifications CL, ML, and the more-plastic SC), may not meet these suggested pavement subgrade criteria and should not be used as fill in the top 18 inches of pavement subgrade.

If soils not meeting pavement-subgrade criteria are encountered, the top 18 inches of pavement subgrade should be undercut and replaced with controlled compacted fill meeting pavement subgrade criteria.

The pavement subgrades should be well-drained, and if shallow groundwater, springs, or seeps are observed or anticipated, they should be controlled with pavement underdrains.

5.6.2 Pavement Construction

GTA should make observations of soil stability during mass grading. GTA recommends that a testing program, including CBR testing, be implemented to develop a suitable pavement section for the project. A CBR value of 5 can be used for preliminary design purposes. The pavement subgrade should be proofrolled using a loaded, tandem-axle dump truck before pavement sections are constructed. An appropriately experienced representative of GTA should observe the entire proofrolling operation to evaluate stability. Unstable soils or otherwise unsuitable materials, if encountered, should be over-excavated to a stable stratum and replaced with controlled, compacted fill, placed as recommended in the Fill Placement section.

Construction traffic should be controlled in order to limit disturbance of previously approved subgrade, or stone base course, or partially completed asphalt pavements. Too much traffic can result in damage to or premature failure of the pavement. Any damaged pavement areas should be repaired adequately before placing asphalt surface courses. The chemically stabilized subgrade, if used, will provide improved pavement subgrade support and will reduce the potential and extent of pavement damage during construction.

6.0 ADDITIONAL SERVICES

We recommend that GTA be retained during construction of the subject project to provide geotechnical consultation and construction observation and testing services as outlined below:

- Review final site and structural plans to evaluate if they conform to the intent of this report.
- Provide on-site observation of site stripping, subgrade evaluation, and testing of controlled fills.
- Observe underpinning pits and excavated footings for compliance with the project drawings and the intent of this geotechnical report.
- Observe the proofrolling of floor slab and pavement subgrades to evaluate stability.
- Perform Special Inspections during concrete and masonry construction and structural steel erection.
- Perform testing of imported fill for environmental quality.

7.0 LIMITATIONS

This report, including all supporting boring and test pit logs, field data, field notes, laboratory test data, calculations, estimates and other documents prepared by GTA in connection with this project have been prepared for the exclusive use of Hope Presbyterian Church pursuant to agreement between GTA and Hope Presbyterian Church in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreement and the General Provisions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Hope Presbyterian Church is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Borings and test pits indicate soil conditions only at specific locations and times and only at the depths penetrated. They do not necessarily reflect strata or variations that may exist between the exploration locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations of subsurface conditions from those described in this report are noted during construction, recommendations in this report may need to be reevaluated.

In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. GTA is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Geo-Technology Associates, Inc.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our client.

This report and the attached logs are instruments of service. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be construed by the reader to imply approval by the writer.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will <u>not</u> likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will <u>not</u> be adequate to develop geotechnical design recommendations for the project.

Do <u>not</u> rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do <u>not</u> rely on an executive summary. Do <u>not</u> read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are <u>Not</u> Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will <u>not</u> of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are <u>not</u> building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX A

Figures

Note: Site boundary is approximate.

SITE LOCATION MAP

14 Worlds Fair Drive, Suite A
Somerset, New Jersey 08873
(732) 271-9301
fax (732) 271-9306

GEO-TECHNOLOGY ASSOCIATES, INC.

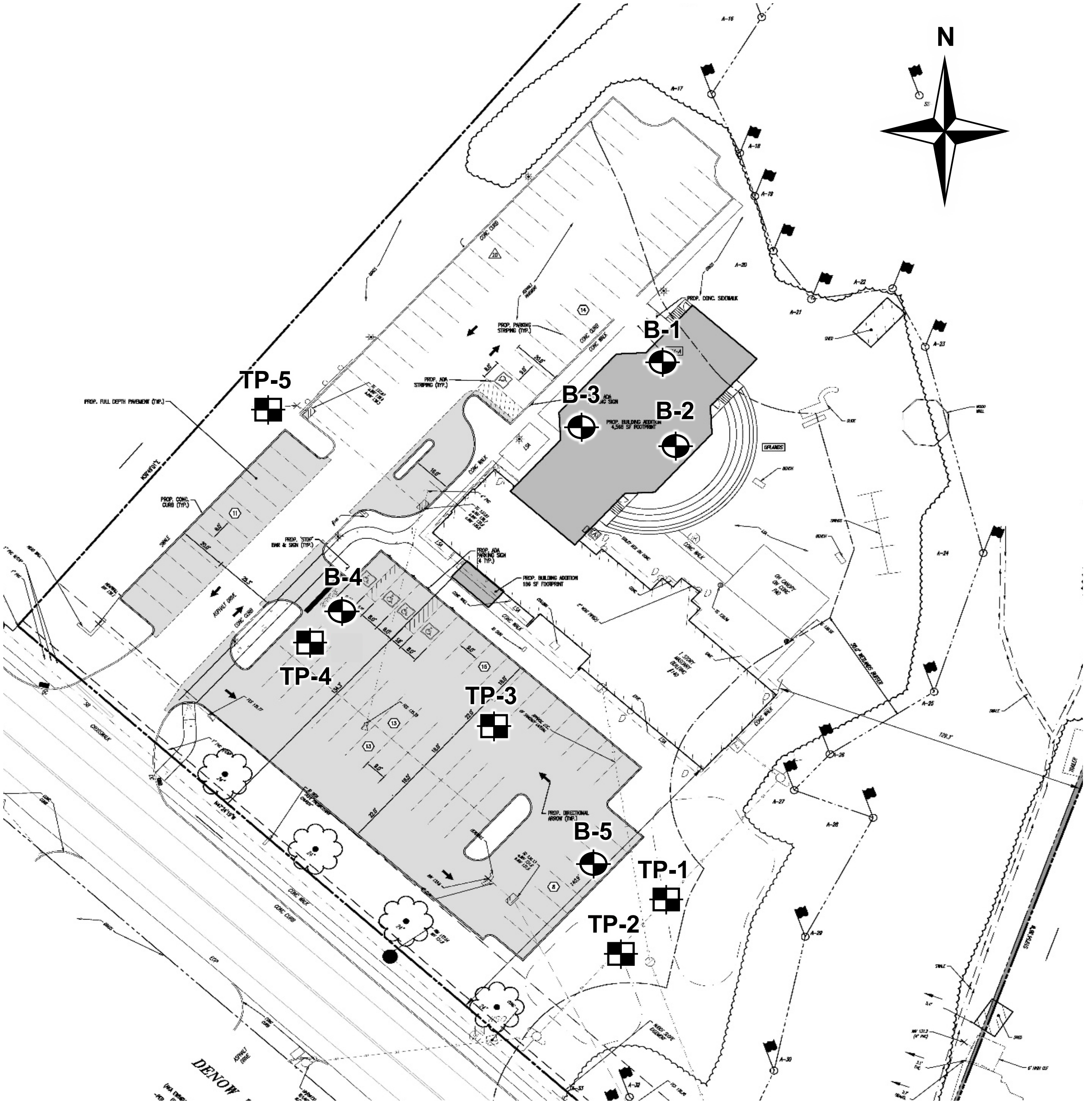
HOPE PRESBYTERIAN CHURCH

Lawrence Township,
Mercer County, New Jersey

Prepared For: Hope Presbyterian Church

SOURCE: Google Earth		
SCALE: NTS	DATE: FEB. 2026	PROJECT#: 31260060

Figure 1



*Base plan prepared by Dynamic Engineering titled "Conceptual Site Plan 'A' " dated March 26, 2026.

LEGEND:

TP-X	Indicates the numbers and approximate locations of test pits performed for this study.
B-X	Indicates the numbers and approximate locations of borings performed for this study.

EXPLORATION LOCATION PLAN

14 Worlds Fair Drive, Suite A
Somerset, New Jersey 08873
(732) 271-9301
fax (732) 271-9306

GEO-TECHNOLOGY ASSOCIATES, INC.

HOPE PRESBYTERIAN CHURCH

Lawrence Township,
Mercer County, New Jersey

Prepared For: Hope Presbyterian Church

DESIGN BY: *	DRAWN BY: AFS	REVIEWED BY: KTP
SCALE: NTS	DATE: APR. 2026	PROJECT#: 31260060

Figure 2

APPENDIX B

Exploration Logs

NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)			SYMBOLS GRAPHIC	SYMBOLS LETTER
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)		GW
				GP
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)		GM
				GC
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)		SW
				SP
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)		SM
				SC
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY (<15% RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE) SANDY OR GRAVELLY SILT OR CLAY (>30% RETAINED ON THE NO. 200 SIEVE)	SILTS AND LEAN CLAYS LIQUID LIMIT LESS THAN 50		ML
				CL
				OL
		ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50		MH
				CH
				OH
HIGHLY ORGANIC SOILS				PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

	DESCRIPTION		GRAPHIC SYMBOLS
ADDITIONAL DESIGNATIONS	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

COARSE-GRAINED SOILS
(GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS
(SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
WOH = WEIGHT OF HAMMER
WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	
UPON COMPLETION OF DRILLING	
24 HOURS AFTER COMPLETION	

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF BORING NO. B-1

PROJECT: **Hope Presbyterian Church**
PROJECT NO.: **31260060**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**

WATER LEVEL (ft):	14 Ft.	-	N/A
DATE:	2/4/2026	2/4/2026	2/4/2026
CAVED (ft):	In Auger	-	BOC

DATE STARTED: **2/4/2026**
DATE COMPLETED: **2/4/2026**
DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
DRILLER: **Brandon S.**
DRILLING METHOD: **3-1/4" HSA**
SAMPLING METHOD: **SPT**

GROUND SURFACE ELEVATION: **139 Ft.**
DATUM: **Topo**
EQUIPMENT: **Geoprobe**
HAMMER TYPE: **Automatic**
LOGGED BY: **JE**
CHECKED BY: **AFS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					139.0	0			6 In. of Topsoil	
1	0.0	14	2-2-4-3	6	138.5		CL		Gray-brown, moist, medium stiff, Lean CLAY with sand	
2	2.0	21	3-4-10-16	14	137.0		ML		Brown, moist, stiff, SILT with sand	
3	4.0	16	9-11-12-15	23	135.0	5	SC		Yellow-brown, moist, medium dense, Clayey SAND with rock fragments	
4	6.0	20	10-18-20-15	38	133.0		GC		Gray-brown, moist, dense, Clayey GRAVEL with rock fragments	
5	8.0	18	8-12-20-28	32						
6	10.0	15	21-16-13-21	29		10			- Dark yellow-brown, medium dense at 10 Ft.	
7	13.0	17	18-41-50/5"	91/ 11"	126.0		HW		Black and dark red-brown, moist, very dense, Highly-weathered ROCK (Shale)	- wet at 14 Ft.
					124.6	15			Boring complete at 14 Ft. 4 In. due to auger and spoon refusal on highly-weathered rock.	
						20				
						25				
						30				

NOTES: **Location and elevation are approximate.**
BOC = Backfilled on completion.

GEO-TECHNOLOGY ASSOCIATES, INC.
14 Worlds Fair Drive, Suite A
Somerset, NJ 08873

LOG OF BORING NO. B-2

PROJECT: **Hope Presbyterian Church**
PROJECT NO.: **31260060**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**

WATER LEVEL (ft):	10 Ft.	-	N/A
DATE:	2/4/2026	2/4/2026	2/4/2026
CAVED (ft):	In Auger	-	BOC

DATE STARTED: **2/4/2026**
DATE COMPLETED: **2/4/2026**
DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
DRILLER: **Brandon S.**
DRILLING METHOD: **3-1/4" HSA**
SAMPLING METHOD: **SPT**

GROUND SURFACE ELEVATION: **138 Ft.**
DATUM: **Topo**
EQUIPMENT: **Geoprobe**
HAMMER TYPE: **Automatic**
LOGGED BY: **JE**
CHECKED BY: **AFS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					138.0	0			6 In. of Topsoil	
1	0.0	14	2-4-4-6	8	137.5		CL		Gray-brown, moist, medium stiff, Lean CLAY with sand	
2	2.0	16	4-7-9-14	16	135.0		ML		Yellow-brown, moist, very stiff, Sandy SILT	
					134.0		SM		Yellow-brown, moist, medium dense, Silty SAND	
3	4.0	23	8-12-13-18	25		5				
4	6.0	16	13-23-24-31	47					- dense at 6 Ft.	- NMC = 15.6%
5	8.0	21	13-18-14-18	32					- Yellow-brown, with rock fragments at 8 Ft.	
					128.0	10	HW		Black and dark red-brown, moist, very dense, Highly-weathered ROCK (Shale)	- wet at 10 Ft.
6	10.0	15	12-23-28-50/2"	51						- sampler refusal at 11 Ft. 8 In., augered to 12 Ft.
7	12.0	14	25-36-50/4"	86/ 10"						
					124.7				Boring complete at 13 Ft. 4 In. due to auger and spoon refusal on highly-weathered rock.	
						15				
						20				
						25				
						30				

NOTES: **Location and elevation are approximate.**
BOC = Backfilled on completion.

LOG OF BORING NO. B-3

PROJECT: **Hope Presbyterian Church**
PROJECT NO.: **31260060**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**

WATER LEVEL (ft):	**10 Ft.**	**-**	**N/A**
DATE:	**2/4/2026**	**2/4/2026**	**2/4/2026**
CAVED (ft):	**In Auger**	**-**	**BOC**

DATE STARTED: **2/4/2026**
DATE COMPLETED: **2/4/2026**
DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
DRILLER: **Brandon S.**
DRILLING METHOD: **3-1/4" HSA**
SAMPLING METHOD: **SPT**

GROUND SURFACE ELEVATION: **139 Ft.**
DATUM: **Topo**
EQUIPMENT: **Geoprobe**
HAMMER TYPE: **Automatic**
LOGGED BY: **JE**
CHECKED BY: **AFS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	DESCRIPTION	REMARKS
					139.0	0		5 In. of Topsoil	
1	0.0	16	1-3-3-6	6	138.6		CL	Gray-brown, moist, medium stiff, Lean CLAY with sand	
2	2.0	20	4-4-9-13	13				- stiff at 2 Ft.	- NMC = 20.4%
3	4.0	24	5-8-9-14	17		5		- Dark yellow-brown, moist, very stiff, with rock fragments at 4 Ft.	
4	6.0	21	12-13-15-17	28	133.0		GC	Dark yellow-brown, moist, medium dense, Clayey GRAVEL with rock fragments	
5	8.0	15	12-18-14-12	32				- dense at 8 Ft.	
6	10.0	22	12-22-29-32	51	129.0	10	HW	Black and dark red-brown, moist, very dense, Highly-weathered ROCK (Shale)	- difficult drilling at 10 Ft.
7	13.0	22	19-14-26-37	40				- Dark yellow-brown, dense, wet at 13 Ft.	
						15		- Yellow-brown at 15 Ft.	
8	18.0	16	17-20-20-25	40				- Gray-brown at 18 Ft.	
					119.0	20		Boring complete at 20 Ft. due to auger refusal on highly-weathered rock.	
						25			
						30			

NOTES: **Location and elevation are approximate.**
BOC = Backfilled on completion.

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Somerset, NJ 08873

LOG OF BORING NO. B-3

LOG OF BORING NO. B-4

PROJECT: **Hope Presbyterian Church**
PROJECT NO.: **31260060**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**

WATER LEVEL (ft):	N/E	-	N/A
DATE:	2/4/2026	2/4/2026	2/4/2026
CAVED (ft):	In Auger	-	BOC

DATE STARTED: **2/4/2026**
DATE COMPLETED: **2/4/2026**
DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
DRILLER: **Brandon S.**
DRILLING METHOD: **3-1/4" HSA**
SAMPLING METHOD: **SPT**

GROUND SURFACE ELEVATION: **139.5 Ft.**
DATUM: **Topo**
EQUIPMENT: **Geoprobe**
HAMMER TYPE: **Automatic**
LOGGED BY: **JE**
CHECKED BY: **AFS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					139.5	0			6 In. of Topsoil	
1	0.0	11	1-2-5-4	7	139.0		CL		Yellow-brown, moist, medium stiff, Lean CLAY with sand	- NMC = 18.5%
2	2.0	20	5-9-11-13	20	137.5		ML		Yellow-brown, moist, very stiff, Sandy SILT	
3	4.0	21	12-14-11-12	25	135.5	5	SC		Dark yellow-brown, moist, medium dense, Clayey SAND with rock fragments	
					133.5				Boring complete at 6 Ft.	
						10				
						15				
						20				
						25				
						30				

NOTES: **Location and elevation are approximate.**
BOC = Backfilled on completion.

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14 Worlds Fair Drive, Suite A
Somerset, NJ 08873

LOG OF BORING NO. B-4

LOG OF BORING NO. B-5

PROJECT:	**Hope Presbyterian Church**	WATER LEVEL (ft):	**N/E** / **-** / **N/A**
PROJECT NO.:	**31260060**	DATE:	**2/4/2026** / **2/4/2026** / **2/4/2026**
PROJECT LOCATION:	**Lawrence Township, Mercer County, New Jersey**	CAVED (ft):	**In Auger** / **-** / **BOC**

DATE STARTED:	**2/4/2026**	GROUND SURFACE ELEVATION:	**138 Ft.**
DATE COMPLETED:	**2/4/2026**	DATUM:	**Topo**
DRILLING CONTRACTOR:	**Environmental Technical Drilling, Inc.**	EQUIPMENT:	**Geoprobe**
DRILLER:	**Brandon S.**	HAMMER TYPE:	**Automatic**
DRILLING METHOD:	**3-1/4" HSA**	LOGGED BY:	**JE**
SAMPLING METHOD:	**SPT**	CHECKED BY:	**AFS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					138.0	0			8 In. of Topsoil	
1	0.0	15	2-2-6-4	8	137.3		ML		Yellow-brown, moist, medium stiff, Sandy SILT	
2	2.0	24	3-3-5-14	8						
3	4.0	19	9-15-17-16	32	134.0	5	SM		Yellow-brown, moist, dense, Silty SAND	
					132.0				Boring complete at 6 Ft.	
						10				
						15				
						20				
						25				
						30				

NOTES: **Location and elevation are approximate.**
BOC = Backfilled on completion.

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LOG OF TEST PIT NO. TP-1

PROJECT: **Hope Presbyterian Church**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**
CLIENT: **Hope Presbyterian Church**

PROJECT NO.: **31260060**

GROUNDWATER ENCOUNTERED: **10 Ft.**
GROUND SURFACE ELEVATION: **137 Ft.**
DATUM: **Topo**
LOGGED BY: **AFS**
CHECKED BY: **KTP**

DATE STARTED: **4/14/2026**
DATE COMPLETED: **4/14/2026**
CONTRACTOR: **Neighbors Property Management**
EQUIPMENT: **Bobcat E60**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0			10 In. of Topsoil	
136.2		SM		Dark yellow-brown (10YR 4/4), moist, single grain, loose, Sandy Loam	
133.0	4	ML		Gray-brown (10YR 5/2), moist, subangular blocky, friable, Silt Loam	- Infiltration rate = 0.0 in/hr at 6 Ft.
129.0	8	HW		Dark red-brown (5YR 3/3), moist to wet, Highly-weathered ROCK (Shale)	- Water seepage at 10 Ft.
125.0	12			Test pit complete at 12 Ft. due to refusal on highly-weathered rock.	

NOTES: **Location and elevation are approximate.**
Backfilled on completion.

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14 Worlds Fair Drive, Suite A
Somerset, NJ 08873

LOG OF TEST PIT NO. TP-1

LOG OF TEST PIT NO. TP-2

PROJECT: **Hope Presbyterian Church**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**
CLIENT: **Hope Presbyterian Church**

PROJECT NO.: **31260060**

DATE STARTED: **4/14/2026**
DATE COMPLETED: **4/14/2026**
CONTRACTOR: **Neighbors Property Management**
EQUIPMENT: **Bobcat E60**

GROUNDWATER ENCOUNTERED: **9 Ft.**
GROUND SURFACE ELEVATION: **137 Ft.**
DATUM: **Topo**
LOGGED BY: **AFS**
CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0			10 In. of Topsoil	
136.2		SM		Dark yellow-brown (10YR 4/4), moist, single grain, loose, Sandy Loam	
133.0	4	ML		Gray (10YR 6/1) and yellow-brown (10YR 5/6), moist, subangular blocky, friable, Silt Loam	- Infiltration rate = 0.2 in/hr at 6 Ft.
129.0	8	HW		Dark red-brown (5YR 3/3), moist to wet, Highly-weathered ROCK (Shale)	- Water seepage at 9 Ft.
125.0	12			Test pit complete at 12 Ft. due to refusal on highly-weathered rock.	

NOTES: **Location and elevation are approximate.**
Backfilled on completion.

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LOG OF TEST PIT NO. TP-3

PROJECT: **Hope Presbyterian Church**
PROJECT NO.: **31260060**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**
CLIENT: **Hope Presbyterian Church**

GROUNDWATER ENCOUNTERED: **11.5 Ft.**
DATE STARTED: **4/14/2026**
GROUND SURFACE ELEVATION: **138.5 Ft.**
DATE COMPLETED: **4/14/2026**
DATUM: **Topo**
CONTRACTOR: **Neighbors Property Management**
LOGGED BY: **AFS**
EQUIPMENT: **Bobcat E60**
CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0			10 In. of Topsoil	
137.7		SM		Dark yellow-brown (10YR 4/4), moist, single grain, loose, Sandy Loam	
135.5		CL		Yellow-brown (10YR 5/6) and gray (10YR 6/1), moist, subangular blocky, friable, Clay	
134.5	4	SC		Dark yellow-brown (10YR 4/4), moist, single grain, loose, Sandy Clay Loam	
132.5	6	CL		Dark yellow-brown (10YR 4/4), moist, subanuglar blocky, friable, Sandy Clay	- Infiltration rate = 0.2 in/hr at 6 Ft.
130.0		HW		Black (10YR 2/1) and dark red-brown (5YR 3/3), moist, Highly-weathered ROCK (Shale)	- Water seepage 11-1/2 Ft.
126.5	12			Test pit complete at 12 Ft. due to refusal on highly-weathered rock.	

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18

NOTES: **Location and elevation are approximate.**
Backfilled on completion.

LOG OF TEST PIT NO. TP-4

PROJECT: **Hope Presbyterian Church**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**
CLIENT: **Hope Presbyterian Church**

PROJECT NO.: **31260060**

DATE STARTED: **4/14/2026**
DATE COMPLETED: **4/14/2026**
CONTRACTOR: **Neighbors Property Management**
EQUIPMENT: **Bobcat E60**

GROUNDWATER ENCOUNTERED: **10 Ft.**
GROUND SURFACE ELEVATION: **139.5 Ft.**
DATUM: **Topo**
LOGGED BY: **AFS**
CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0			18 In. of Topsoil	
138.0	2	ML		Yellow-brown (10YR 5/6) and gray (10YR 6/1), moist, subangular blocky, friable, Silt Loam	
	4			- Dark yellow-brown (10YR 3/3) at 4-1/2 Ft. - with shale fragments at 5-1/2 Ft.	- Infiltration rate = 0.0 in/hr at 4 Ft.
133.5	6	HW		Black (10YR 2/1) and dark red-brown (5YR 3/3), moist, Highly-weathered ROCK (Shale)	
	8				
	10				- Water seepage at 10 Ft.
	12				
126.5				Test pit complete at 13 Ft. due to refusal on highly-weathered rock.	
	14				
	16				
	18				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.

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LOG OF TEST PIT NO. TP-5

PROJECT: **Hope Presbyterian Church**
PROJECT LOCATION: **Lawrence Township, Mercer County, New Jersey**
CLIENT: **Hope Presbyterian Church**
PROJECT NO.: **31260060**

DATE STARTED: **4/14/2026**
DATE COMPLETED: **4/14/2026**
CONTRACTOR: **Neighbors Property Management**
EQUIPMENT: **Bobcat E60**

GROUNDWATER ENCOUNTERED: **N/E**
GROUND SURFACE ELEVATION: **140 Ft.**
DATUM: **Topo**
LOGGED BY: **AFS**
CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0			12 In. of Topsoil	
139.0		ML		Yellow-brown (10YR 5/6) and gray (10YR 6/1), moist, subangular blocky, friable, Silt Loam	- Infiltration rate = 0.0 in/hr at 1-1/2 Ft.
136.5		HW		Dark red-brown (5YR 3/3), moist, Highly-weathered ROCK (Shale)	- Trapped water seepage at 7 Ft., dissipated as excavation advanced.
129.0				Test pit complete at 11 Ft. due to refusal on highly-weathered rock.	

Depth scale (ft.): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18

NOTES: **Location and elevation are approximate.**
Backfilled on completion.

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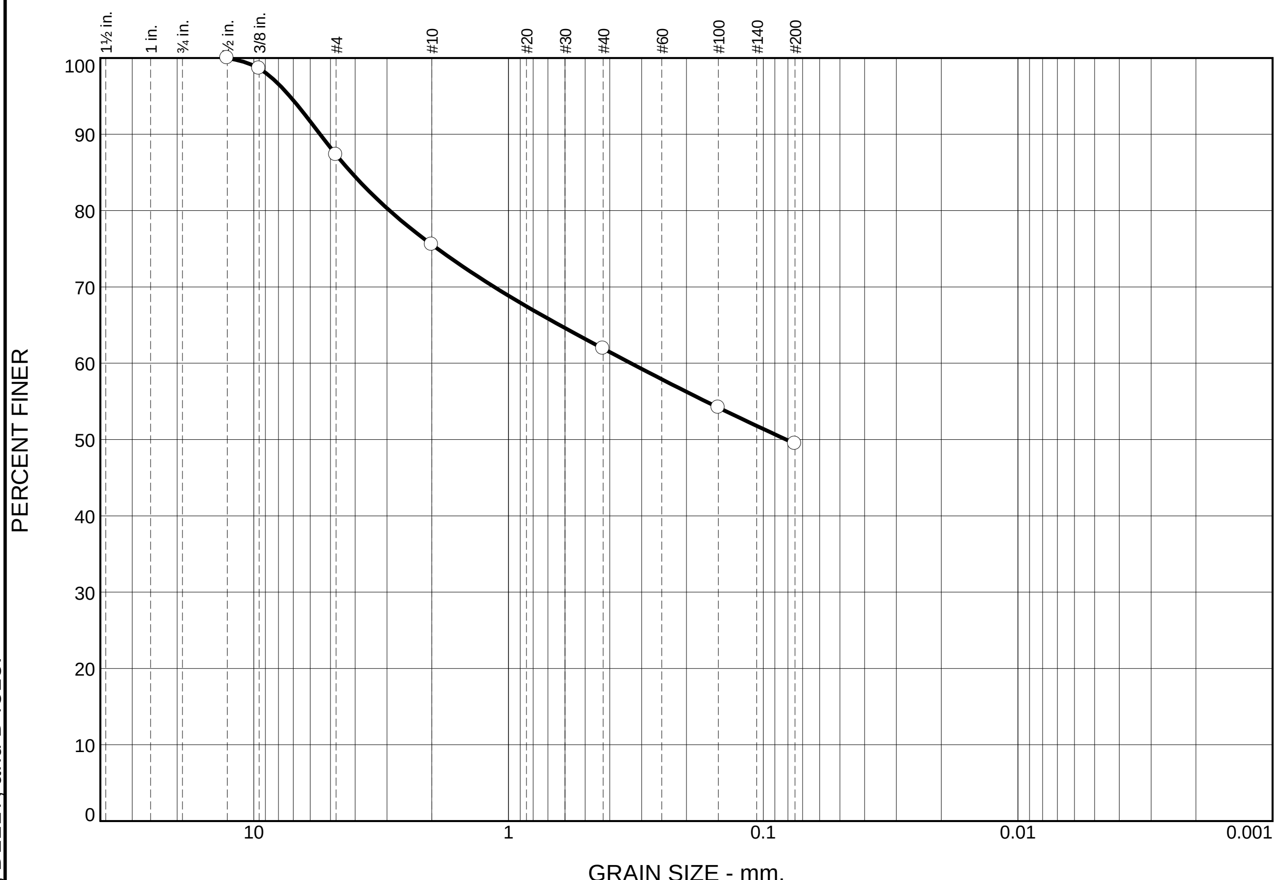
APPENDIX C

Laboratory Data

Particle Size Distribution Report



	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	12.7	11.8	13.6	12.4	49.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	4.1412	0.3306	0.0813					

Material Description	USCS	AASHTO
○ Silty SAND	SM	A-4(0)

Project No. 31260060 **Client:** Hope Presbyterian Church

Project: Hope Presbyterian Church

○ **Source of Sample:** B-2 **Depth:** 6 **Sample Number:** 4

Remarks:

○NMC = 15.6%

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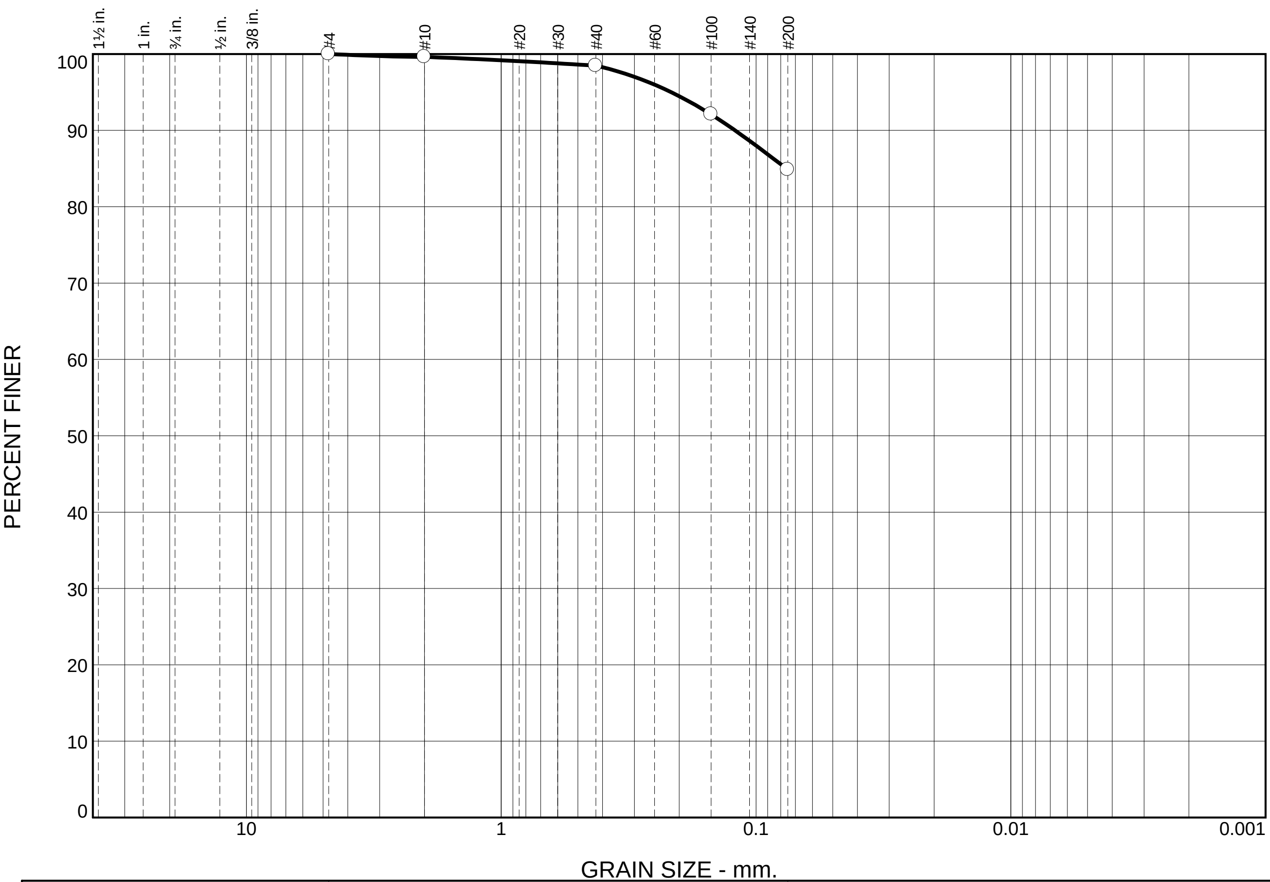
Figure

ASTM Specifications performed my include: D421, D422, D2216, D2217, and D4318.

Tested By: RR/EM **Checked By:** AFS

Particle Size Distribution Report



	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.4	1.1	13.7	84.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NV	0.0760							

Material Description	USCS	AASHTO
○ Lean CLAY with sand	CL	A-4(0)

Project No. 31260060 **Client:** Hope Presbyterian Church

Project: Hope Presbyterian Church

○ **Source of Sample:** B-3 **Depth:** 2 **Sample Number:** 2

Remarks:

○NMC = 20.4%

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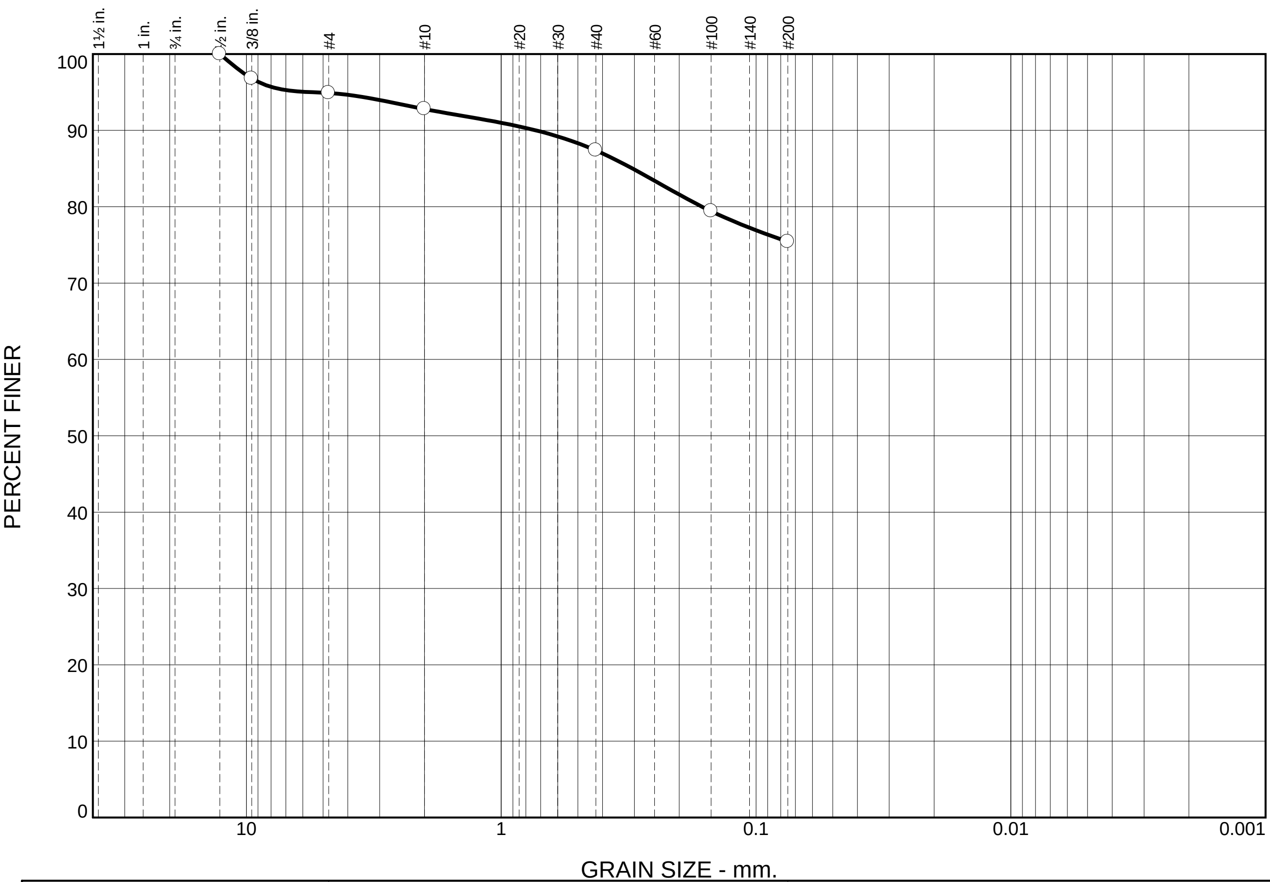
Figure

ASTM Specifications performed my include: D421, D422, D2216, D2217, and D4318.

Tested By: RR/EM **Checked By:** AFS

Particle Size Distribution Report



	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	5.1	2.1	5.4	12.0	75.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NV	0.3052							

Material Description	USCS	AASHTO
○ Lean CLAY with sand	CL	A-4(0)

Project No. 31260060 **Client:** Hope Presbyterian Church

Project: Hope Presbyterian Church

○ **Source of Sample:** B-4 **Depth:** 0.5

Remarks:

○NMC = 18.5%

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Figure

ASTM Specifications performed my include: D421, D422, D2216, D2217, and D4318.

Tested By: RR/EM **Checked By:** AFS