



Engineering
& Design

Geotechnical Evaluation Report

June 28, 2024 (revised July 3, 2024)

Proposed Pole Barn

Landis Sewerage Authority

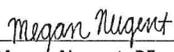
1776 South Mill Road

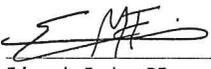
City of Vineland, Cumberland County, New Jersey

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Project No. 24005028A

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Project Description

This report presents the findings of the geotechnical subsurface exploration conducted to provide geotechnical design criteria and foundation support recommendations for the proposed pole barn. The purposes of this exploration are to evaluate the existing subsurface conditions at the project site, located at Landis Sewerage Authority, 1776 South Mill Road, in the City of Vineland, Cumberland County, New Jersey. Our scope of services for this exploration included the completion of two test borings, generally performed within the footprint of the proposed structure, subsequent laboratory testing of representative soil samples, engineering analyses of the subsurface data obtained from this field exploration, and the preparation of this report.

According to the Structural Plan set, prepared by **Bruce D. Turner, AIA - Architect**, dated July 18, 2023 and the Site Plan Concept (v3), provided by the Client, undated, we understand that the proposed development includes a new pole barn approximately 1,800 square feet (sf) with appurtenant site improvements.

The site is currently an undeveloped grass covered area in the southeastern portion of the facility. The facility consists of several single-story buildings, paved roadways, and associated parking lots. The site is directly adjacent to South Mill Road and an open grass area. The existing site grades in the immediate vicinity of the proposed pole barn are relatively level.

Subsurface Exploration and Laboratory Testing

The subsurface conditions at the site were explored on **June 6, 2024**, through the advancement of two test borings, identified herein as TB-1 through TB-2. The test boring locations were located in the field by Colliers Engineering & Design (CED) personnel using offsets from existing site features. The test borings were generally spread across the footprint of the proposed pole barn. The approximate test boring locations are shown on the Exploration Location Plan, Figure 2.

The test borings were advanced to a termination depth of approximately 20 feet below ground surface (bgs) by Soil Borings Drilling, LLC of Haddon Township, New Jersey, using standard hollow-stem auger drilling techniques. Split spoon sampling was performed in accordance with ASTM D1586 (Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils). Upon completion, the test borings were backfilled with soil cuttings. The test borings were performed under the full-time technical observation of CED. Representative soil samples were collected and visually identified in accordance with the Burmister Soil Classification System. Details pertaining to the subsurface conditions encountered are presented on the Test Boring Logs in Appendix A.

The laboratory testing was programmed to determine the physical properties of the subsoils, as well as to augment the field exploration. The stratigraphic continuity and physical characteristics of the subsoils were evaluated by the determinations of grain size distribution by mechanical sieve and organic content. The geotechnical laboratory testing results are presented in Appendix B.

Subsurface Description

Based on the United States Department of Agriculture (USDA) – Natural Resources Conservation Service (NRCS) soil mapping and the Rutgers Engineering Soil Survey of New Jersey (No. 21) for Cumberland County, the surficial soils at the project site are classified as *Lakewood sand, 0 to 5 percent slopes (LasB)* and *AM-23 (ge)* soils, consisting of yellow or orange-brown loose, sand to silty sand with scattered gravel. According to the *Bedrock Geologic Map of Central and Southern New Jersey* (Dalton, R.F., 2014), the surficial soils are underlain at depth by the *Cohansey Formation (Tch)*, consisting of gravelly, fine to coarse quartz sand with discrete lenses of clay and silt, with zones of woody clay. The formation tends to be white to yellow with some local red to orange-brown iron oxide staining in sand layers, while clay beds are dark gray or white to red when weathered.

Based on the results of the test boring explorations, the generalized subsurface conditions at the site may be described below, in order of depth:

- **Surface Cover:** The test borings encountered a surficial layer of topsoil approximately 6 inches thick.
- **Stratum F (Granular Fill with Variable Debris):** Underlying the surface cover, the test borings encountered a granular fill layer extending to a depth of approximately 4 feet bgs. This soil consists of predominantly brown and tan coarse to fine sand with minor amounts of silt and clay (trace to little) and trace medium to fine gravel. This layer also contained occasional asphalt and concrete debris, and organic material. Standard Penetration Test (SPT) N-values within the fill of Stratum F varied between 12 blows per foot (bpf) and 17 bpf, with a relative density of medium dense.
- **Stratum S1 (Medium Dense Granular Soils):** Underlying the surface cover and Stratum F soils is a stratum consisting predominantly of tan, brown, orange, and gray coarse to fine sand, with trace amounts of silt and clay, as well as trace fine gravel. This stratum extends to the maximum test boring exploration depth of approximately 20 feet bgs. The SPT N-values within the Stratum S1 soils varied between 4 bpf and 39 bpf, averaging 16 bpf. The relative density was generally encountered to be very loose to medium dense.

The subsurface material encountered in the test boring explorations is generally consistent with the mapped regional geology. The depth of any in-place fill is difficult to discern without historical grading plans due to similarities in appearance between the near surface soils and the natural soils of the area; however, the top 4 feet of the soil profile appears to be fill.

Groundwater Conditions

Groundwater was encountered in each of the test borings at a depth of approximately 8 feet bgs. It should be noted that fluctuation in groundwater levels can occur due to several factors, including variations in precipitation, seasonal changes, and site development activities, which can alter surface water drainage paths. If precise groundwater levels are required, we recommend that a monitoring well be installed and monitored for several months.

Discussion and Recommendations

Based on our geotechnical exploration, the site is favorable for the use of traditional shallow foundations and slab-on-grade construction to support the proposed pole barn, provided routine site preparation and load bearing fill procedures outlined herein are implemented. The following sections summarize our recommendations with respect to site and subgrade preparation, as well as the construction of foundations, floor slabs, below grade structures and site utilities.

Site Preparation

The purpose of these site preparation procedures is to provide stable and uniform bearing conditions for the proposed structure foundations and slab. The following procedures should be performed under the technical supervision of the Geotechnical Engineer.

- Site preparation and earthwork should be performed during dry and favorable weather conditions. Maintain positive drainage conditions throughout construction, avoiding unnecessary ponding of stormwater in excavations or low areas of the site. Seal-roll exposed soil or subgrade surfaces prior to rain or snow events, and promptly remove any standing water afterwards.
- Remove and dispose of any vegetation at an appropriate off-site facility. Strip topsoil in its entirety and stockpile onsite for later use within landscaped areas.
- Any existing underground utility locations should be verified in the field and relocated or abandoned as necessary, prior to construction. If the option to abandon utilities in-place is chosen, we recommend that a lean cement grout (250 psi) be used to fill the utility lines.
- If any unsuitable (deleterious) fill, buried debris or obstructions are encountered, they should be removed in their entirety and backfilled with compacted load bearing fill.
- Complete a stabilization program within structural areas of the site (foundation footprints, slabs, pavements, etc.), plus a 5-foot perimeter, utilizing high energy (5-ton minimum static weight) vibratory rollers with a minimum of six passes applied in a crisscrossing pattern, where available, prior to the placement of any load bearing fill, or prior to foundation and slab construction. Any remaining unstable zones should be removed as directed by the onsite representative of the Geotechnical Engineer.
- Place and compact load bearing fill, as needed, in thin, controlled, compacted lifts to achieve the final subgrade elevations in accordance with the recommendations presented in the *Load Bearing Fill* section of this report.
- Foundations and slabs should not be constructed on frozen ground. Any frozen subgrade materials should be removed and replaced with compacted load bearing fill or be permitted to thaw and recompacted prior to the placement of reinforcement and concrete. The same recommendations apply to frozen subgrade encountered during placement of load bearing fill.

Stabilization / Over-Excavation

Following stripping/clearing, after the final subgrades have been reached (within cut areas), the exposed subgrade soils should be improved by utilizing high energy (5-ton minimum static weight) vibratory rollers with a minimum of six passes applied in a crisscrossing pattern, where available, prior to the placement of load bearing fill. A smooth drum roller should be utilized on predominantly granular soil. The vibratory or static modes should be used as directed by the onsite representative of the Geotechnical Engineer, depending on possible interference from groundwater conditions. The compactor should be used in static mode within 5 feet of any nearby structures. The use of high energy vibratory proof-rolling should be applied within the footprint areas of the proposed foundations and slabs, including a minimum of 5 feet outboard of the proposed perimeters, where possible.

The near surface subgrade, consisting of apparent fill and loose granular soils, requires stabilization prior to construction of the proposed site development. During subgrade preparations, these strata should be carefully screened and observed during the high-energy vibratory proof-rolling, and evaluated by the onsite representative of the Geotechnical Engineer to confirm suitability for the support of the proposed site development. Areas that do not respond favorably to high energy proof-rolling may require the use of over-excavation and replacement methods.

Any loose, soft, or wet soil and soil containing organic material or significant debris are not considered suitable support for foundations and slabs, and if encountered, should be excavated as directed by the onsite representative of the Geotechnical Engineer. If any buried debris or obstructions are encountered, they should be removed in their entirety and backfilled with compacted load bearing fill.

Construction during extended wet weather periods could create the need to over-excavate exposed soils if they become disturbed and cannot be recompacted due to elevated moisture content and/or weather conditions. The need for over-excavation should be confirmed through continuous observation and testing by the onsite representative of the Geotechnical Engineer. Selective drying and re-compaction of unsuitable subgrades may be accomplished by scarifying or windrowing surficial material during extended periods of dry and warm weather. Otherwise, use of imported material or chemical subgrade stabilization methods, such as cement or fly ash, could become necessary at additional cost. The need for subgrade over excavation and/or stabilization will be dependent, in part, on the subgrade protection effort exercised by the Contractor.

The length of time that the prepared subgrade remains exposed to weather conditions should be kept to a minimum so as to not generate more unsuitable material removal. Onsite soils and fill exposed to weather conditions may soften, requiring removal and replacement prior to fill placement, and foundation and slab installation, due to their sensitivity to moisture. Water that accumulates in the bottom of excavations should be removed promptly.

Load Bearing Fill

Fill/backfill proposed to support site features that will be adversely affected by settlement, as well as fill placed within 5 feet of the structure walls is considered load bearing fill. Materials used as load

bearing fill should consist of visually stable, inorganic, readily compactable materials that are free of trash, debris, organic inclusions and other deleterious material, frozen material, or excess moisture.

The existing on-site materials may be re-used as load bearing fill, provided they meet the requirements above, are sufficiently moisture conditioned, and any organic material, as well as fragments larger than 4 inches, are removed. If additional materials are required to establish the proposed site grades, we recommend using imported fill consisting of granular soils with no more than 10% fines.

Load bearing fill should be placed in essentially horizontal lifts, with a maximum loose thickness of 8 inches. Each lift should be compacted to at least 95 percent of the maximum dry density, as determined by the modified Proctor test (ASTM D 1557). In addition to meeting the compaction criteria, the compacted material should maintain visual stability beneath the compaction equipment and be observed and documented by the onsite representative of the Geotechnical Engineer. Moisture contents should be maintained near the optimum moisture content during compaction procedures to facilitate proper compaction.

Foundation Recommendations

The test borings indicate that the proposed pole barn can be adequately supported using a conventional shallow foundation system, provided that the proper site preparation techniques outlined herein are implemented. Footings may be designed and proportioned assuming a maximum allowable soil bearing pressure of 2,500 pounds per square foot (psf). The allowable bearing capacity may be increased by 30% for transient loadings.

Footings may be supported on compacted in-place soils, or on newly placed compacted load bearing fill. Footing subgrades should be compacted using a "jumping jack" or other trench compaction equipment upon completion of foundation excavation. The foundation bearing surface preparation should be observed by the onsite representative of the Geotechnical Engineer prior to foundation construction (i.e. reinforcing steel installation and concrete placement) for consistency with the recommended design allowable soil bearing pressure.

The minimum width of all wall footings should be 24 inches, and the minimum horizontal dimension of all spread footings should be 36 inches, regardless of the bearing pressure developed. All exterior footings subject to frost action should be based at least 30 inches below the adjacent exterior grade for frost protection and bearing considerations. Interior footings should be based at least 24 inches below the finished floor elevation. In addition, we recommend that the shallow foundations bear below a zone bounded by a plane that extends outward and upward on a 1:1 slope from any underground utility excavation, or other underground features.

Following proper site preparation techniques, our opinion is that the foundations will be capable of supporting the anticipated loads with the potential for post-construction total settlement estimated at less than 1 inch, and 0.5 inches of differential settlement between adjacent columns. These values are generally within tolerable limits for this type of structure.

Floor Slab

The floor slab subgrade should be compacted with a vibratory roller immediately prior to installation of the aggregate base to re-compact any materials disturbed by previous construction activities or adverse weather conditions. Any unstable zones detected that cannot be stabilized by additional compaction efforts should be removed, and the excavated area backfilled with load bearing fill.

Immediately prior to slab construction, we recommend that a minimum 4-inch layer of an aggregate base course of a dense-graded aggregate (DGA) consisting of crushed stone or recycled concrete aggregate (conforming to NJDOT 901.10), be placed and compacted over the prepared subgrade. All structural fill supporting the floor slab, including the aggregate base course, should be compacted to a minimum of 95 percent of the maximum dry density, as determined by the modified Proctor test (ASTM D1557). The aggregate should be dampened just prior to concrete placement to allow for proper curing of the concrete. These procedures are intended to interrupt the rise of capillary moisture through the slab and to provide uniform concrete curing conditions.

Based on the existing predominantly granular subgrade soil at the site, a coefficient of sliding friction of 0.35 may be used for design of a floor slab without a vapor retarder. However, a minimum 10-mil vapor retarder should be placed over the subgrade, below the aggregate base course, in interior portions of the pole barn to receive floor coverings such as carpeting, floor tile, or epoxy-based finishes. Where vapor retarders are used, a reduced coefficient of sliding friction of 0.20 should be used for design.

We anticipate that, following proper site preparation, the onsite subgrade soils and any newly placed and compacted load bearing fill can achieve a Modulus of Subgrade Reaction on the order of 175 pounds per cubic inch (pci). Reinforced concrete floor slabs should be simply supported at wall and column junctures to allow unrestricted rotation of the slab edges. Control joints should be provided at the slab and wall/column interfaces to reduce the potential for slab cracking, should the structure settle differentially from the floor slab. Alternatively, the slabs should be free to undergo vertical deflections at the edges.

Seismic Considerations

In accordance with the provisions of the International Building Code (New Jersey Edition), the site generally has a Site Class Definition of "D" for the existing subsurface soil and groundwater conditions. This classification was determined by utilizing the Standard Penetration Test (SPT) blow count data through the upper 20 feet of the subsurface profile. Medium compact conditions were assumed throughout the remainder of the soil profile to a depth of 100 feet. The following design parameters are provided utilizing tables in the IBC Code and United States Geological Survey (USGS) design tools:

From the USGS and using ASCE 7-16 information (See Appendix D):

Short Period Spectral Acceleration (S_s)	0.144g
Spectral Acceleration at 1 Second (S_1)	0.043g

Peak Ground Acceleration (PGA)

0.076g

Surface Water and Groundwater Control

Surface grading should be maintained on a continual basis during construction to direct surface water runoff away from open excavations and prevent water from pooling on subgrade soils. The contract documents should require the contractor to provide whatever means and methods are necessary to maintain stable, relatively dry excavations and subgrade conditions at all times during construction.

Based on the anticipated final site grades and below grade excavations, groundwater is not anticipated to be encountered within the shallow excavations. Should groundwater, perched water or seepage be encountered during installation of below grade structures or utilities, pumping using standard sump pit and pump techniques should be sufficient to control such water conditions, provided excavations extend no deeper than 2 feet below the groundwater level. If needed, sump pits should be installed outboard of the tank foundation footprint areas and sump pits should be filled with minimum ¾-inch clean stone and lined with geotextile filter fabric to prevent excessive particle migration, particularly if heavy pumping is required. Pumped water should be discharged away from the proposed construction and open excavations, and filtered as per soil erosion / sediment control requirements and any applicable environmental regulations. Groundwater discharge permits will need to meet local requirements.

The dewatering specifications should be of the performance type requiring that the successful contractor provide an adequate dewatering system capable of maintaining the water table a minimum of 2 feet below the prevailing excavation bottom during each stage of construction to maintain stable excavations, provide appropriate subgrade preparation and allow placement of backfill. Excavations extending deeper than 2 feet below the groundwater level may require an experienced specialized dewatering contractor to design and install a dewatering system utilizing high-capacity pumps and/or well points to maintain stable excavations and allow placement of backfill and/or load bearing fill. A dewatering plan should be submitted for review by the Geotechnical Engineer of Record prior to construction. The dewatering plan should consider the impact of the cone of depression on adjacent features and properties. The contractor should monitor existing nearby structures, as needed during the dewatering period. If applicable, dewatering should continue until adequate structural dead weight is available to resist uplift pressures. The required dewatering operation could be continuous for an extended period of time. Therefore, standby systems should be considered to assure the continuity of the dewatering operation.

Temporary Excavations

Temporary excavation stability is a function of many factors including the presence and abundance of groundwater, the type and density of the various soil strata, the depth of excavation, surcharge loadings adjacent to the excavation, and the length of time and weather conditions while the excavation remains open. The loose sandy soils near the ground surface and any imported load bearing fill are likely to result in excavation bank stability problems for foundation and utility

construction. Temporary bracing or “stay-forms” may be necessary for foundation and/or utility excavations.

For deeper excavations, the use of relatively flat slopes, benching, or temporary bracing and trench shields may be needed. If temporary shoring is utilized, the soil parameters presented herein may be used for design of the excavation shoring. All the lateral load information presented in this report should be used only as a guideline by the contractor and does not in any way obviate the requirement for the contractor to submit proposed sheeting design certified by a licensed Professional Engineer prior to construction.

Our opinion is that the existing site soils and new load bearing fill will generally be classified as “Type C” soils under OSHA excavation regulations. It is the responsibility of the Contractor to maintain safe excavations in conformance with all applicable federal, state, and local regulations such as OSHA. All excavations should conform to applicable sloping or shoring standards for worker access. Temporary sheeting and shoring should be designed and sealed by a Professional Engineer registered in the State of New Jersey. These designs should be submitted for review by CED prior to construction.

Below Grade Utilities

The majority of site soils will be suitable for support of subsurface utilities. We offer the following recommendations specific to utility construction:

- Prior to installation, the bearing surface for utility structures (manholes, vaults, etc.) should be evaluated by the onsite representative of the Geotechnical Engineer. Should debris or unsuitable soils be encountered at the utility invert levels, the subgrade should be over-excavated a minimum depth of 6 inches and backfilled with load bearing fill material to provide uniform support.
- The utility structures should receive a bedding of at least 4 inches of dense-graded aggregate (DGA), as defined by current NJDOT construction standards.
- Any excavated utility trenches beneath the proposed finished floor subgrades should have the subgrade soils compacted and evaluated by the onsite representative of the Geotechnical Engineer, then backfilled with compacted load bearing fill in accordance with the recommendations outlined in the *Load Bearing Fill* section of this report. If loose or otherwise unstable material is present at the subgrade level, this material should be removed and replaced with load bearing fill.

The proposed underground utility installation is not anticipated to be impacted by groundwater concerns, provided they are installed at typical depths of 4 to 6 feet or less below existing site grades. Utility excavations may encounter water conditions if construction starts during or after rainy seasons, or during periods of high tide.

Existing Utilities

Any existing utilities should be located, and those utilities which are not reused should be removed and capped. The utility trenches that are in the influence zone of new construction are recommended to be backfilled with load-bearing fill or grouted, as needed. Underground utilities, which are to be reused, should be evaluated by the Structural Engineer and utility backfill should be evaluated by the Geotechnical Engineer to determine their suitability for support of the planned construction. If any existing utilities are to be preserved, grading operations must be carefully performed to not disturb or damage the existing utility.

Construction Observation

Regardless of the thoroughness of a geotechnical engineering exploration, there is always a possibility that conditions between the test borings and below the depths explored may be different from those encountered in the test borings, that conditions are not as anticipated by the designers, or that the construction process has altered the subsurface conditions. Therefore, geotechnical engineering construction observation should be performed under the supervision of a Geotechnical Engineer from CED who is familiar with the intent of the recommendations presented herein. This observation is recommended to evaluate whether the conditions anticipated in the design actually exist or whether the recommendations presented herein should be modified where necessary. CED should also provide on-site observation and testing on a full-time basis during excavation operations, subgrade remediation and preparation, foundation installation, and all critical earthwork operations. CED recommends that a representative from CED be on-site on a full-time basis during the earthwork construction and subgrade preparation. CED has the capability of providing these services and can provide a proposal to perform the on-site quality assurance observation and materials testing.

Closing

The conclusions and recommendations presented in this report are based, in part, on the explorations accomplished for this evaluation. The number, location, and depth of the explorations were completed within the constraints of budget and site access to yield the information to formulate the recommendations. We recommend that we be provided the opportunity for general review of the project plans and specifications when they become available, to confirm that the recommendations and design considerations presented in this report have been properly interpreted and implemented into the project design package.

We recommend that the test boring logs be a part of the specifications for the project along with a reference to the plan sheets that contain the test boring locations for informational purposes. Should the data not be adequate for the Contractor's purposes, the Contractor may make, prior to bidding, his own explorations, tests, and analyses.

Clarification

This report has not been prepared to serve as the plans and specifications for actual construction without the appropriate interpretation by the project Architect, Structural Engineer, and/or Civil Engineer. This report has been based on assumed conditions and characteristics of the proposed development where specific information was not available. The conclusions, projections, and recommendations presented in this report cannot be applied to other building configurations or loads. The project plans and specifications should be submitted to us for review so that the geotechnical-related conclusions and recommendations provided herein have been correctly interpreted and are incorporated into the design.

We emphasize that this report should be made available to prospective bidders for informational purposes. We would recommend that the project specifications contain the following statement:

"A geotechnical engineering report has been prepared for this project by Colliers Engineering & Design. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed in this report are those of the Geotechnical Engineer and represent their interpretation of the subsurface conditions, field and laboratory testing, and the results of analyses which they have conducted. Should the data contained in this report not be adequate for the Contractor's purposes, the Contractor may make, prior to bidding, his own investigation, tests, and analyses."

Limitations

This geotechnical exploration program has been performed in accordance with generally accepted engineering practice and applicable design standards as referenced herein. This report and its supporting documentation have been prepared exclusively for the use of our Client pursuant to the Agreement between CED, Inc. and the Client. All provisions set forth in the Agreement and the Business Terms and Conditions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein.

The findings, conclusions, and recommendations contained in this report are based on data revealed by limited exploration and testing of the subsurface at the referenced project site. The explorations indicate subsurface conditions at the specific locations and times explored, and only within the depths penetrated. Should deviations from the described subsurface conditions be encountered at any time prior to or during construction, CED should be notified immediately so that modifications to our recommendations can be made, if necessary.

This report is applicable only to the contemplated project design described herein, and any changes in the design should be brought to our attention so that we may evaluate whether our recommendations will be affected. CED is not responsible for any claims, damages, or liability



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associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of CED. As such, the conclusions and recommendations contained in this report are pending our review of final plans and specifications, and verification of subsurface conditions by our direct observation at the time of construction.

This report and supporting documentation are instruments of service. The subject matter of this report is limited to the facts and matters stated herein.

Our recommendations are based upon the assumption that the services of a qualified Geotechnical Engineer will be retained for the observation of excavation operations, foundation installation, and all critical earthwork operations. CED has the capability of providing these services and can provide a proposal to perform the on-site quality assurance observation and materials testing.

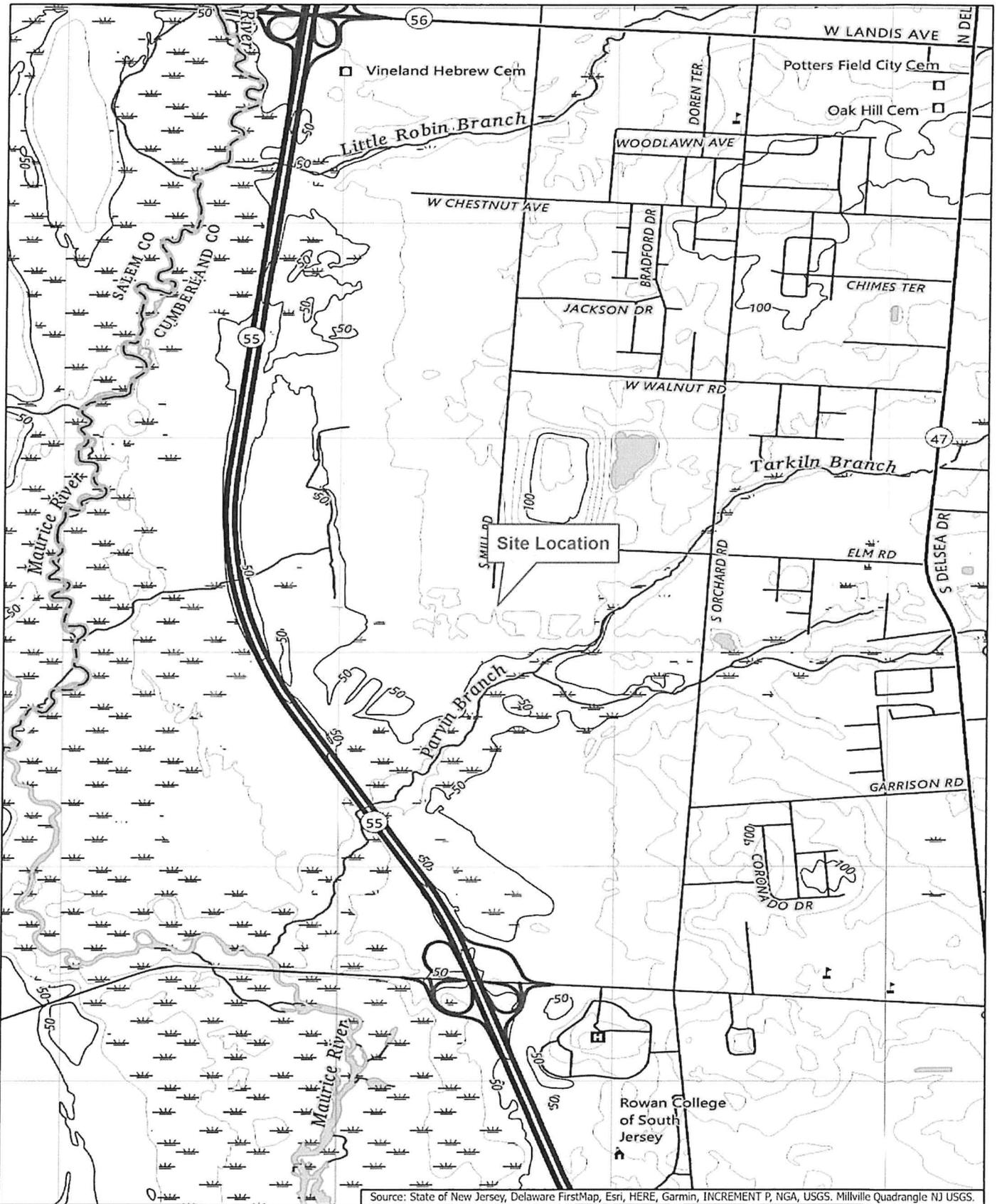
The scope of this geotechnical program did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

\\corp.collierseng.com\corp\Mays Landing, NJ\Projects\2024\24005028A\Reports\Geotechnical\01-Exploration\GeoRpt-FND\Report Docs\240621_RR_GeoRpt-Landis Sewerage.docx



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Figures



Source: State of New Jersey, Delaware FirstMap, Esri, HERE, Garmin, INCREMENT P, NGA, USGS. Millville Quadrangle NJ USGS.

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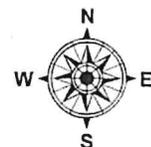
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SITE LOCATION MAP

Proposed Pole Barn
Landis Sewerage Authority

CITY OF VINELAND
CUMBERLAND COUNTY, NJ 08360

Drawn By: RR	Checked By: EF	Proj. No.: 24005028A
Scale: 1 IN = 2,000 FT	Date: 06/21/2024	Figure No.: 1





Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community. Google Earth Imagery dated 4/4/23, retrieved 6/8/24. Site Concept Plan, provided by The Authority (undated)

LEGEND

INDICATES THE NUMBERS AND APPROXIMATE LOCATIONS OF TEST BORINGS PERFORMED FOR THIS EXPLORATION PROGRAM.



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Engineering & Design

TITLE:

EXPLORATION LOCATION PLAN

PROJECT:

**Proposed Pole Barn
 Landis Sewerage Authority**

CITY OF VINELAND
 CUMBERLAND COUNTY, NJ 08360

Drawn By:

RR

Checked By:

EF

Project No.:

24005028A

Scale:

1 IN = 100 FT

Date:

06/21/2024

Figure No.:

2



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Appendix A

Test Boring Logs



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5439 Harding Highway, Mays Landing, NJ 08330

PROJECT: Proposed Pole Barn - Landis Sewerage Authority - Vineland, NJ
 LOCATION: (See plan).
 PROJECT NO. 24005028A

TEST BORING: TB-2
 PAGE 1 OF 1

GROUND ELEVATION (ft): -
 ELEV. FROM: Exist. Grade

CONTRACTOR: Soil Borings Drilling, LLC
 DRILLER: C. Blemings
 DRILLING EQUIPMENT: Mobile Drill B-29
 METHOD: HSA Mud Rotary Other
 HAMMER: CH Safety Automatic
 RODS: AW NW Other

GROUNDWATER: DEPTH (ft) DATE
 FIRST ENCOUNTERED ∇ 8 6/6/24
 END OF DRILLING (0 hrs.) ∇ _____

DATE STARTED 6/6/24
 DATE FINISHED 6/6/24
 FIELD OBSERVER: R. Macchia
 CHECKED BY: E. Freire

ASTM D-1586

DEPTH BELOW SURFACE (ft.)	SAMPLE NUMBER	BLOWS PER 6 INCHES				RECOVERY (in)	POCKET PENETROM. (tsf)	MOISTURE (%)	WATER SYMBOL	PROFILE DEPTH ELEV.	IDENTIFICATION OF SOILS / REMARKS
		0-6"	6-12"	12-18"	18-24"						
5	S-1	6	6	6	6	18			4.0	Stratum F	S-1: ±6" Topsoil Brown cmf SAND, some mf Gravel, little Silt & Clay. (FILL; Moist). Occasional Asphalt and Concrete debris.
	0.0'-2.0'										S-2: Tan cmf SAND, trace cm Gravel, trace Silt. (FILL; Moist).
10	S-2	4	5	7	13	24			20.0	Stratum S	S-3: Tan, Orange mf SAND, trace Silt. (Moist).
	2.0'-4.0'										S-4: Tan cmf SAND, trace Silt. (Very Moist).
	S-3	10	10	11	9	12					S-5: No recovery. (Spoon Wet).
15	4.0'-6.0'								20.0	Stratum S	S-6: Tan, Brown cmf SAND, little f Gravel, trace Silt. (Wet).
	S-4	5	5	6	5	14					S-7: Tan, Gray cmf SAND, little mf Gravel, trace Silt. (Wet).
	6.0'-8.0'										S-8: Tan, Brown cmf SAND, trace mf Gravel, trace Silt. (Wet).
20	S-5	3	4	5	4	0			20.0	Stratum S	S-6: Tan, Brown cmf SAND, little f Gravel, trace Silt. (Wet).
	8.0'-10.0'										S-7: Tan, Gray cmf SAND, little mf Gravel, trace Silt. (Wet).
25	S-6	4	3	1	3	18			20.0	Stratum S	S-8: Tan, Brown cmf SAND, trace mf Gravel, trace Silt. (Wet).
	10.0'-12.0'										
30	S-7	7	11	14	15	16			20.0	Stratum S	
	13.0'-15.0'										
35									20.0	Stratum S	
40	S-8	11	17	22	30	24			20.0	Stratum S	
	18.0'-20.0'										
									-20.0		END OF TEST BORING AT 20.0 FEET

NOTES: Bentonite Slurry added through auger at 13 feet.

TEST BORING: TB-2
 PAGE 1 OF 1



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Appendix B

Laboratory Test Results



5439 Harding Highway
 Mays Landing, New Jersey 08330
 Main: 877 627 3772
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US Army Corps of Engineers
 VALIDATED LABORATORY

GEOTECHNICAL LABORATORY TESTING RESULTS

CLIENT: The Authority
 745 Lebanon Road
 Millville, NJ 08332

PROJECT: Proposed Pole Barn
 Landis Sewerage Authority
 1776 South Mill Road
 Vineland, NJ

Project # 24005028A DATE: June 17, 2024
 PAGE: 1 of 1

ATTN: Mr. Bruce D. Turner

CHECKED BY: Eduardo M. Freire, P.E.
 TITLE: Laboratory Manager

SAMPLES RECEIVED: June 6th, 2024

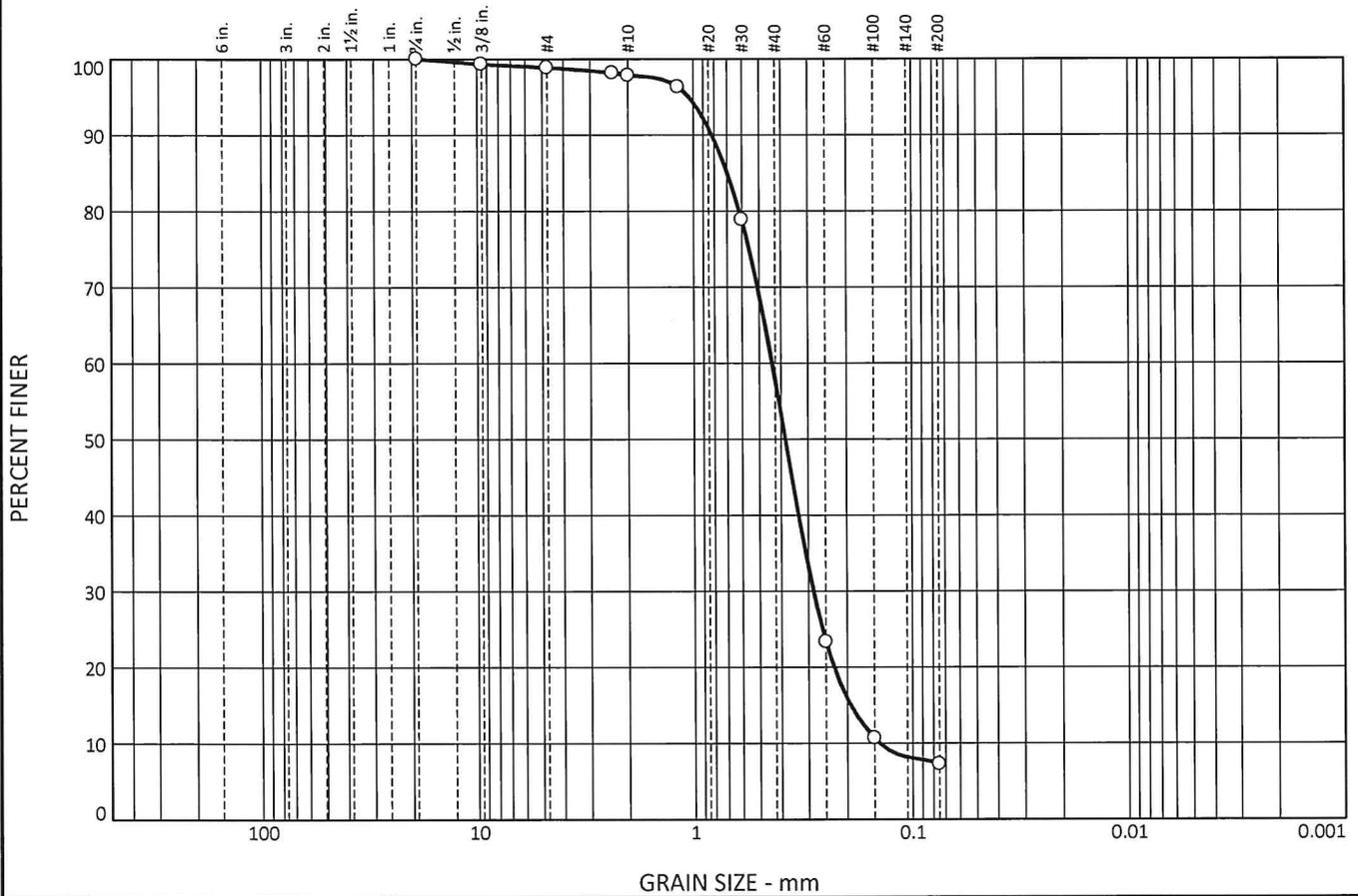
SAMPLES TESTED: June 7, 2024 - June 17, 2024

LAB TECHNICIAN(S): K. Perry

Test Boring No.	Sample No.	Depth (ft)	Water Content (%) (ASTM D2216)	Atterberg Limits (ASTM D4318)			Particle Size Analysis (Sieve Only) (ASTM D6913)	%Passing #200 Sieve (ASTM D1140)	Organic Content (%) (ASTM D2974)												
				Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)															
TB-1	S-2	2-4					PSA-1														
	S-3	4-6					PSA-2														
TB-2	S-1	0-2					PSA-3	0.8													
	S-4	6-8					PSA-4														
Testing Total:							4	1													

Comments/Remarks: * See attached Plate(s)

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	0.7	1.5	18.9	55.6	16.0	7.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	99.3		
#4	98.8		
#8	98.2		
#10	97.8		
#16	96.3		
#30	78.9		
#60	23.3		
#100	10.7		
#200	7.3		

Material Description

Brown coarse to fine SAND, trace [Fines: (Silt/Clay)], trace fine Gravel

Atterberg Limits

LL= PL= PI=

Coefficients

D₈₅= 0.6992 D₆₀= 0.4384 D₅₀= 0.3818
D₃₀= 0.2844 D₁₅= 0.1931 D₁₀= 0.1424
C_u= 3.08 C_c= 1.30

Classification

USCS= SP-SM\SC

Remarks

* (no specification provided)

Source of Sample: TB-1
Sample Number: S-2

Depth: 2'-4'

Date: 6/17/24

5439 Harding Highway
Mays Landing New Jersey 08330
Main: 877 627 3772

**Geotechnical
Laboratory**

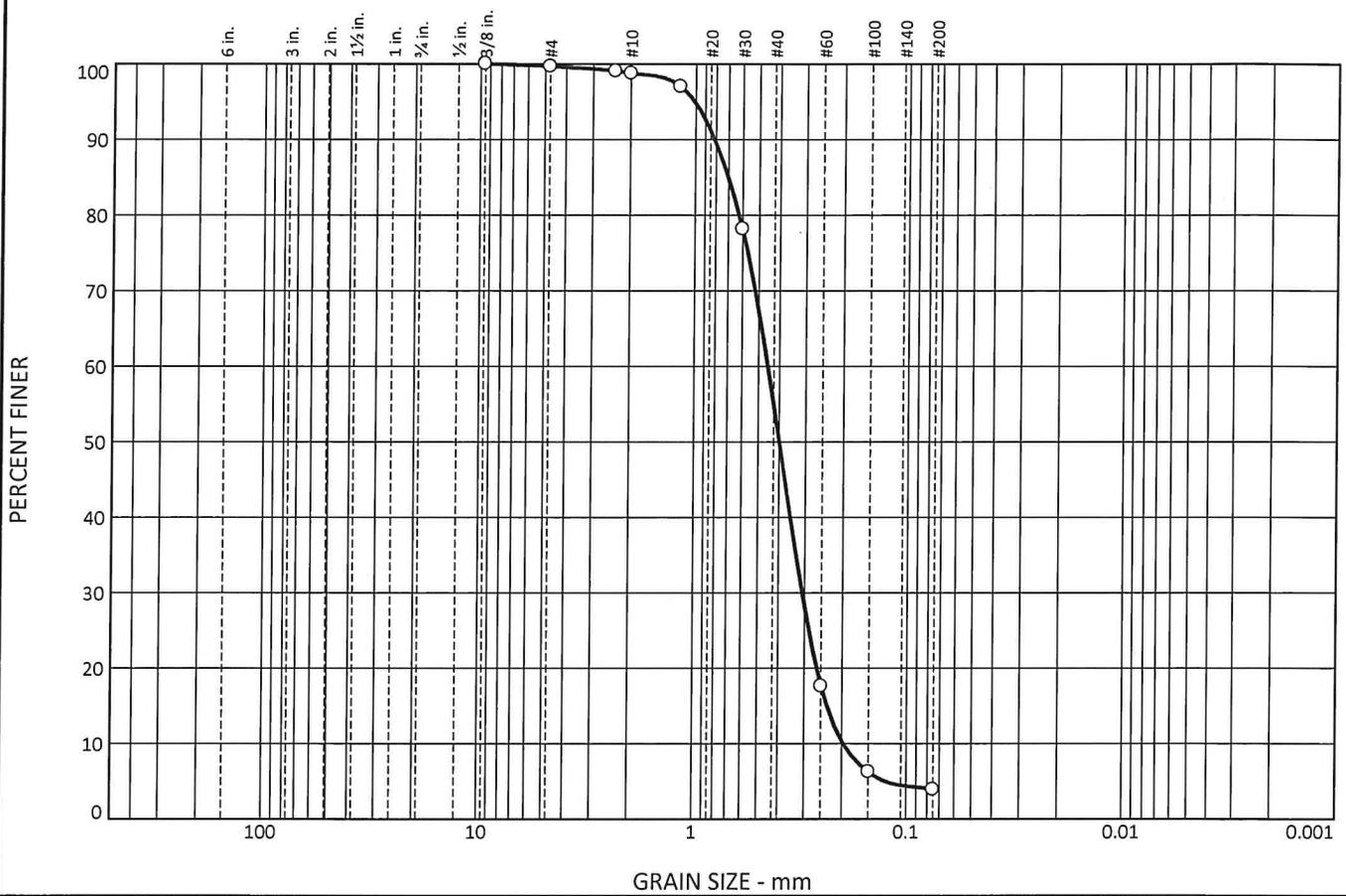


Client: The Authority
Project: Proposed Pole Barn - Landis Sewerage Authority
1776 South Mill Road - Vineland, NJ

Project No: 24005028A

Plate PSA-1

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	0.0	1.3	20.5	60.6	13.7	3.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.7		
#8	99.1		
#10	98.7		
#16	97.0		
#30	78.2		
#60	17.6		
#100	6.2		
#200	3.9		

Material Description

Brown coarse to fine SAND, trace [Fines: (Silt/Clay), trace fine Gravel]

Atterberg Limits

LL= PL= PI=

Coefficients

D₈₅= 0.7026 D₆₀= 0.4531 D₅₀= 0.3991
D₃₀= 0.3080 D₁₅= 0.2348 D₁₀= 0.1972
C_u= 2.30 C_c= 1.06

Classification

USCS= SP

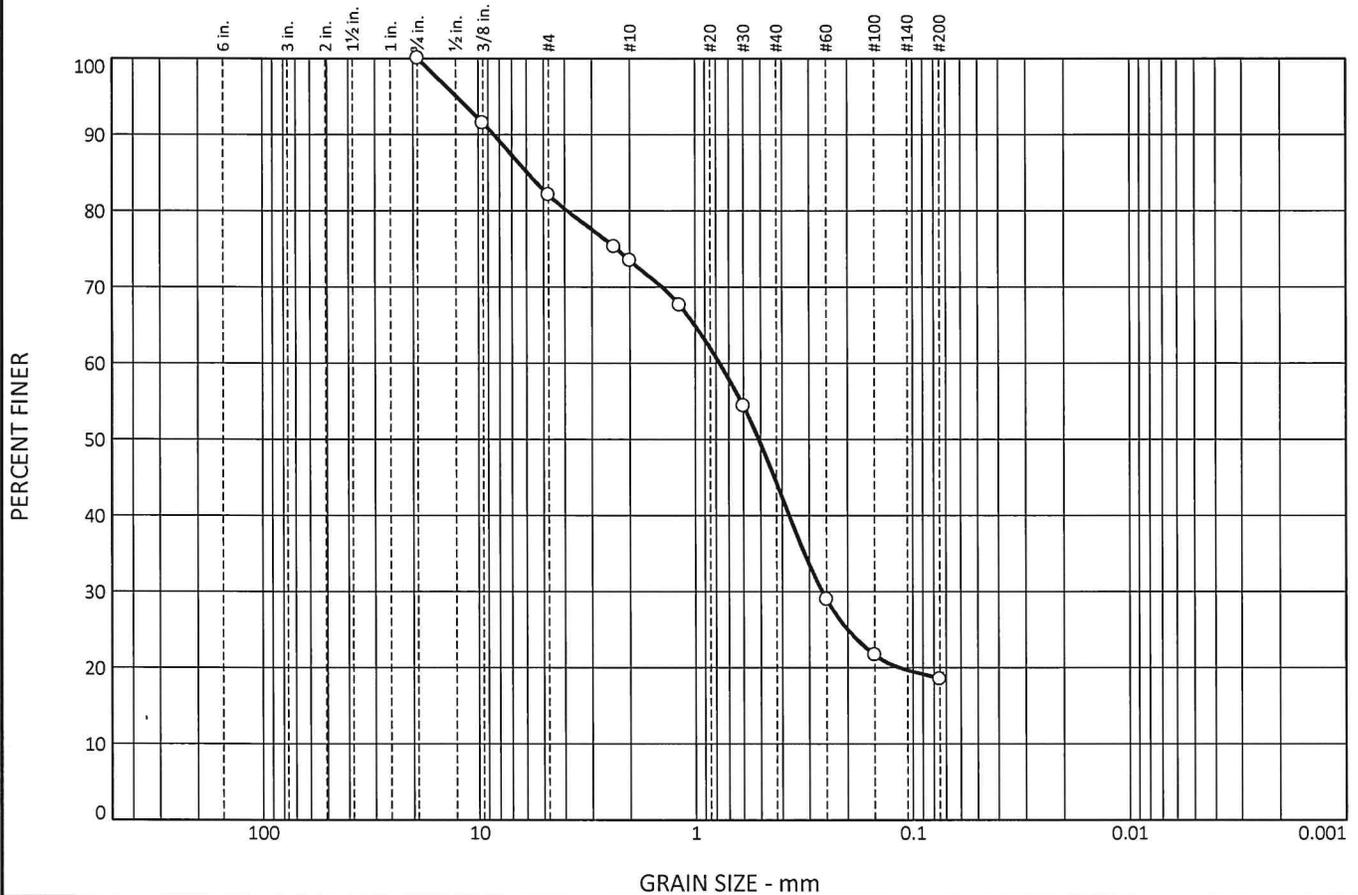
Remarks

* (no specification provided)

Source of Sample: TB-1 Depth: 4'-6'
Sample Number: S-3

Date: 6/17/24

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	8.5	18.1	19.0	25.4	10.5	18.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	91.5		
#4	82.1		
#8	75.3		
#10	73.4		
#16	67.6		
#30	54.4		
#60	29.0		
#100	21.7		
#200	18.5		

Material Description

Brown coarse to fine SAND, some medium to fine Gravel, little [Fines: (Silt/Clay)]

Atterberg Limits
 LL= PL= PI=

Coefficients
 D₈₅= 5.9560 D₆₀= 0.7711 D₅₀= 0.5103
 D₃₀= 0.2618 D₁₅= D₁₀=
 C_u= C_c=

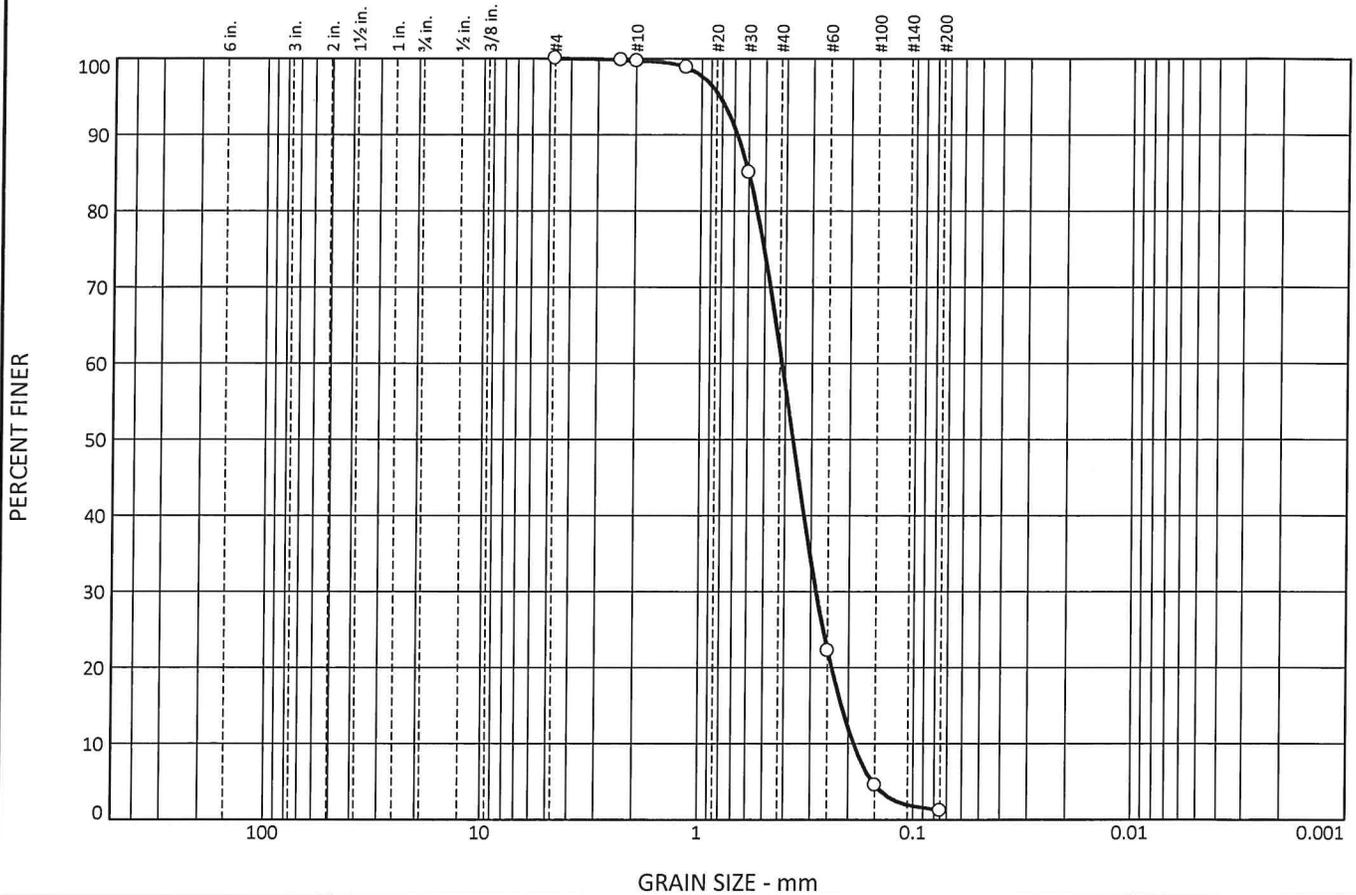
Classification
 USCS= SM\SC

Remarks
 Organic Content (OC): 0.8%

* (no specification provided)

Source of Sample: TB-2 Depth: 0'-2' Date: 6/17/24
 Sample Number: S-1

Particle Size Distribution Report



% Cobbles	% Gravel			% Sand			% Fines
	Coarse	Medium	Fine	Coarse	Medium	Fine	
0.0	0.0	0.0	0.3	14.6	62.9	21.1	1.1

SIEVE SIZE	PERCENT FINER	SPEC. * PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.8		
#10	99.7		
#16	98.8		
#30	85.1		
#60	22.2		
#100	4.5		
#200	1.1		

Material Description

Tan coarse to fine SAND, trace [Fines: (Silt/Clay)]

Atterberg Limits

LL= PL= PI=

Coefficients

D₈₅= 0.5993 D₆₀= 0.4146 D₅₀= 0.3673
D₃₀= 0.2839 D₁₅= 0.2153 D₁₀= 0.1889
C_u= 2.20 C_c= 1.03

Classification

USCS= SP

Remarks

* (no specification provided)

Source of Sample: TB-2
Sample Number: S-4

Depth: 6'-8'

Date: 6/17/24



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Appendix C

Seismic Information

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
 USGS web services are now operational so this tool should work as expected.



OSHDPD

Proposed Pole Barn - Landis Sewerage Authority

1776 S Mill Rd, Vineland, NJ 08360, USA

Latitude, Longitude: 39.45803, -75.061244



Date	6/21/2024, 2:12:20 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_s	0.144	MCE_R ground motion. (for 0.2 second period)
S_1	0.043	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.23	Site-modified spectral acceleration value
S_{M1}	0.102	Site-modified spectral acceleration value
S_{Ds}	0.154	Numeric seismic design value at 0.2 second SA
S_{D1}	0.068	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.076	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.122	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
$SsRT$	0.144	Probabilistic risk-targeted ground motion. (0.2 second)
$SsUH$	0.153	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
$S1RT$	0.043	Probabilistic risk-targeted ground motion. (1.0 second)
$S1UH$	0.046	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S1D$	0.6	Factored deterministic acceleration value. (1.0 second)
PGA_d	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.076	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.943	Mapped value of the risk coefficient at short periods
C_{R1}	0.931	Mapped value of the risk coefficient at a period of 1 s
C_v	0.7	Vertical coefficient



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