REPORT OF GEOTECHNICAL EXPLORATION

CSH OLD TAPPAN

Borough of Old Tappan, Bergen County, New Jersey

March 2021

Prepared For:

CSH OLD TAPPAN LLC
275 Pennsylvania Ave, NW, 2nd Floor
Washington, DC 20004

Attn: Mr. Joe McElwee

Prepared By:

Geo-Technology Associates, Inc.
Geotechnical and Environmental Consultants
211-K Gates Road
Little Ferry, New Jersey 07643
(201) 641-1850

GTA Job No: 31210121

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GEO-TECHOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing ASFE Member Firm

March 16, 2021

CSH Old Tappan LLC
1275 Pennsylvania Ave, NW, 2nd Floor
Washington, DC 20004

Attn: Mr. Joe McElwee

Re: Report of Geotechnical Exploration
CSH Old Tappan
Borough of Old Tappan, Bergen County, New Jersey

Dear Joe:

In accordance with our agreement dated January 8, 2021, Geo-Technology Associates, Inc. (GTA) has performed a geotechnical exploration for a proposed 2- to 3-story senior living facility to be constructed at 244 Old Tappan Road in the Borough of Old Tappan, Bergen County, New Jersey. Transmitted herein is a report of our preliminary findings and conclusions regarding subsurface conditions with respect to foundation support and related geotechnical considerations.

GTA appreciates the opportunity to have been of assistance to you on this project. Please contact our office at (201) 641-1850 if you have questions about this report.

Very truly yours,
GEO-TECHNOLOGY ASSOCIATES, INC.

Allison Tether

Allison Tether, P.G.
Senior Project Manager

Robert Dykstra

Robert Dykstra, P.E.
Vice President

AMT/RD:amt
31210121

REPORT OF GEOTECHNICAL EXPLORATION

CSH OLD TAPPAN
BOROUGH OF OLD TAPPAN
BERGEN COUNTY, NEW JERSEY
MARCH 2021

INTRODUCTION

CSH Old Tappan LLC (CSH) is negotiating the purchase of an approximately 8.14-acre site for the construction of a two- to three-story assisted living facility in the Borough of Old Tappan, Bergen County, New Jersey. The subject site is located at 244 Old Tappan Road and is identified as Block 1606, Lots 3 and 4. Please refer to the Site Location Map, which is Figure 1 in Appendix A of this report.

Geo-Technology Associates, Inc. (GTA) performed a geotechnical exploration at the project site in accordance with the agreement dated January 8, 2021. The scope of this study included a field exploration, laboratory testing, and engineering analyses. The field exploration consisted of 5 Standard Penetration Test (SPT) borings and 15 test pits completed over 2 days. Samples obtained from the borings and test pits were visually examined and subjected to index testing in our laboratory to further characterize general subsurface conditions. Conclusions and recommendations were derived from engineering analyses of field and laboratory data.

GTA was provided with a plan prepared Meyer Architecture and Interiors titled *Site Sketch* dated February 5, 2021 and an undated survey plan prepared by Schwanewede/Hals Engineering titled *Block 1606 – Lots 2 & 4*. The plans indicate the site boundaries, existing site features and topography, mapped wetland areas on the western portion of the site, and the layout and dimensions of the proposed assisted living facility and associated pavement areas. Proposed finished floor elevations are indicated on the plans for the front and rear portions of the building. Proposed site grading was not indicated on the plan; however, finished elevations are indicated for the proposed pavement areas. Stormwater management (SWM) facilities were not indicated on the plans provided to us. Retaining walls are not indicated on the plans; and based on the proposed elevations, are not anticipated to be required.

SITE AND PROJECT DESCRIPTION

The subject site is on the northern side of Old Tappan Road between its intersections with Russell Avenue and Leonard Drive. The site is presently occupied by a 1½-story residence and a barn structure is located on the western portion of the site. Lawn areas are present to the north and south of the existing house, and the remainder of the site is predominantly wooded. Old foundation ruins are indicated on the plan in the northwestern portion of the site. Based on the existing topography indicated on the survey plan provided to us, the southeastern portion of the site contains a topographic high at about Elevation (EL) 110 feet. The surface grades slope down to about EL 102 feet in the southcentral portion of the site in the area of the existing residence, and down to about EL 80 feet along the wetland area on the western portion of the site. The ground surface slopes

moderately down to about EL 86 feet in the northeastern corner, and the northwestern corner contains a topographic high at about EL 96 feet in the area of the old foundation ruins that slopes down in all directions.

Based on the preliminary information indicated on the conceptual plan provided, we understand that the front portion of the assisted living facility will be 2 stories in height with a finished floor established at EL 100 feet, and the rear portion of the structure will be 3 stories in height will a finished floor established at EL 86 feet. The building will occupy a base footprint of approximately 32,000 square feet. Structural plans were not available at the time this report was prepared. Based on similar projects, we anticipate the building will have cast-in-place concrete foundations with steel or timber framing. Maximum column and bearing wall loads are estimated to be less than 240 kips and 6 kips per linear foot, respectively. Parking areas will be provided to the west and south of the proposed structure, and an access to the facility will be provided from one location along Old Tappan Road in the southwestern corner of the site.

SITE GEOLOGY

The subject site is situated within the Piedmont physiographic province characterized by a low rolling plain divided by a series of higher ridges and predominantly underlain by sedimentary rocks of Triassic and Jurassic age. According to the *Bedrock Geologic Map of the Yonkers and Nyack Quadrangles, Bergen County, New Jersey (GMS11-1, 2011)* published by the New Jersey Geological Survey, the site is underlain by the Lower Jurassic and Upper Triassic age Passaic Formation. This formation generally consists of reddish-brown to maroon and purple, conglomerate, fine- to coarse-grained arkosic sandstone, and less common siltstone, shaly siltstone, silty mudstone and mudstone. The unit can be as much as 11,000 feet in thickness.

According to the *Surficial Geology of the Yonkers and Nyack Quadrangles, Bergen County, New Jersey (OFM 50, 2002)* prepared by the New Jersey Geological Society, the site overburden soils consist of ice-contact deposits. These deposits are described as pebble-to-cobble gravel and sand, and locally cobble-to-boulder gravel with sand. The total thickness of the unit can be as much as 80 feet. Please refer to the referenced publications for more detailed descriptions of the geologic members.

SUBSURFACE EXPLORATION

The subsurface exploration program initially consisted of performing 5 SPT borings and 15 test pits throughout the site in the general area of the proposed facility. The borings were performed by D.K. Drilling of New York, Inc. using a CME 75 track-mounted drill rig on February 17, 2021. The test pits were performed by Heritage Contracting Company, Inc. on February 15, 2021 using a Caterpillar 308CR track-mounted excavator. The borings were advanced to completion depths ranging from approximately 18 to 27 feet below the existing ground surface using hollow stem augers, and the test pits extended to depths ranging from 8 to 10½ feet below the ground surface. The explorations were backfilled with spoils upon completion for safety purposes.

GTA personnel observed, logged, and located the explorations in the field. The explorations were located by referencing existing site features indicated on the topographic survey and are shown on the Exploration Location Plan, which is included as Figure 2 in Appendix A. The exploration locations should be considered approximate. 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 shown on the logs were interpolated from the topographic survey provided by the client and should be considered approximate.

Standard Penetration Testing (SPT) was performed in the borings in accordance with procedures of ASTM D1586. Soil samples were obtained at two- to five-foot intervals within the boreholes. 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.

Soil samples obtained from the borings were brought to GTA's laboratory for visual classification by a geotechnical engineer and laboratory testing. The descriptions provided on the logs are therefore based on visual observations of the samples and supplemented by laboratory testing as summarized in the Notes for Exploration Logs included in Appendix B.

SUBSURFACE CONDITIONS

In general, an approximately 6-inch-thick layer of topsoil was encountered at the ground surface in all of the explorations performed for this study. Beneath the topsoil, several of the explorations generally located in the east-central portion of the site encountered soft fine-grained silt soils to depths ranging from about 2 to 6 feet below the ground surface. Below this layer, and below topsoil in the remaining explorations, the subsurface profile generally consisted of medium dense to silty sands, poorly-graded sands, and silty gravels.

Groundwater was not encountered in the explorations performed for this study. Long-term groundwater readings were not obtained because the explorations were backfilled upon completion for safety considerations. Fluctuations in the groundwater level typically occur due to several factors, including variations in precipitation, seasonal changes, and site development activities.

LABORATORY TESTING

Laboratory testing performed for this study included gradation analyses for classification of the soils in accordance with the Unified Soil Classification System (USCS), and natural moisture content determinations. Classification of soils in accordance with the USCS provides information regarding the engineering properties of the on-site soils that will likely support the proposed foundations, slabs, and pavements, or that will potentially be used as controlled compacted fill. The results of the laboratory tests are summarized in the following table. Detailed results of the laboratory testing performed for this study are included in Appendix C.

BORING NO.	DEPTH (ft.)	CLASSIFICATION (USCS)	NMC%
B-1	5	Silty SAND with gravel (SM)	6.7
B-2	1	SILT with sand (ML)	25.7
B-2	2	Silty SAND with gravel (SM)	10.1
B-3	1	Silty SAND (SM)	32.1

BORING NO.	DEPTH (ft.)	CLASSIFICATION (USCS)	NMC%
B-4	2	Silty GRAVEL with sand (GM)	6.4
B-5	10	Poorly-graded SAND with gravel and silt (SP-SM)	4.1

NMC = Natural Moisture Content

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this study, it is GTA's opinion that development of the site with a senior living facility is feasible, given that the geotechnical recommendations are followed, and that the standard level of care is maintained during construction. We believe that the proposed structure may be supported by conventional spread footings, and the ground level floor slabs may be established on-grade. Geotechnical issues that may impact site development include the presence of moisture sensitive fine-grained soils. Further discussions of our geotechnical recommendations for site development are presented in the following sections of this report.

1. Site Preparation

Site preparation should begin by razing existing structures, removing the existing surface obstructions, clearing the trees and stumps, and stripping the topsoil from within and at least five feet beyond proposed building and pavement areas. All subsurface walls, slabs, etc. of the existing buildings, and subsurface utilities that will be abandoned, should be completely removed from within and at least five feet beyond the limits of the proposed building area. The excavations to remove the existing building elements and utilities should be backfilled with controlled compacted fill if they extend below the proposed grades in structural areas. We recommend that the controlled compacted fill be placed by the earthwork contractor (rather than the demolition contractor) under the observation of the geotechnical engineer. Durable elements of existing structures may remain in place below proposed pavement or landscaped areas provided they are cut off at least two feet below the proposed subgrade levels and will not interfere with proposed utilities.

2. Earthwork

Following clearing, stripping, and structure demolition and backfilling, the exposed subgrade soils below the proposed building and pavement areas to remain at grade or receive fill should be evaluated by a geotechnical engineer or his qualified representative. Ideally, the evaluation should consist of proof-rolling and compacting the soils to a dense and unyielding consistency by several passes of a large smooth drum vibratory compactor with a static drum weight of at least ten tons, although proof-rolling using static methods may be deemed more appropriate by the geotechnical engineer depending on the prevailing weather conditions and type of soil exposed. Soils that are observed to be soft or unstable during the evaluation should be selectively excavated, and the resultant excavations should be backfilled with controlled compacted fill.

The natural soils, particularly in the east-central portion of the site, contain relatively high percentages of fines (silt and clay), and undercutting of unstable soils should be expected. The extent of undercutting will depend on the time of the year when the earthwork is performed and the prevailing weather conditions. The need to over-excavate unstable soils from below proposed building slab subgrades and paved areas should be determined by the geotechnical engineer at the time of construction. Excavations to remove wet, soft soils should be backfilled with granular controlled compacted fill or AASHTO No. 57 stone aggregate.

All construction excavations should be sloped and shored in accordance with the OSHA excavation regulations or stricter local governing safety codes. It is our opinion that the in-place, near surface soils, or controlled compacted fill composed of similarly graded materials would generally be classified as "Type C" soils under the OSHA excavation regulations.

Structural fill should be placed on a stable, nearly level subgrade following subgrade evaluation and preparation previously described. Fill placed on slopes steeper than 5H:1V ground surfaces should be benched into the existing slope for stability. Fill slopes steeper than 5H:1V should generally be placed as structural fill and be controlled and compacted to minimum densities as specified herein. Permanent slopes in soil (cut or fill) should generally be designed to be no steeper than 3H:1V.

All structural fill and backfill should be spread in maximum 12-inch-thick loose lifts where large self-propelled rollers are used. Where hand-guided compaction equipment is used, the loose lift thickness should not exceed 6 inches. All structural fill and backfill should be compacted to at least 95 percent of the maximum dry density as determined by the ASTM D1557 test procedure.

The majority of excavated on-site granular soils will likely be suitable for use as controlled compacted fill within proposed structural areas with some limitations. Moisture conditioning of the excavated on-site soils may be required to attain the recommended degree of compaction. The maximum particle size in structural fill should be generally limited to six inches or less. Existing fill materials are suitable for general grading purposes.

Off-site borrow, if required to complete the site grading operations, should meet the Unified Soil Classification System (USCS) designation SM, SP, GP, GM, or GW and be approved by the geotechnical engineer prior to use.

Grading and backfill operations within structural areas, including pavement, and utility trench and wall backfill, should be observed and tested on a full-time basis by a soils technician under the supervision of a geotechnical engineer licensed in the state of New Jersey. All compactive effort should be verified by in-place density testing per the 2018 International Building Code (IBC). We recommend that final subgrades be proof rolled immediately prior to placement of subbase stone, concrete slabs, or asphalt pavement to evaluate stability of the subgrade, which may have been

impacted by exposure to wet weather and disturbance by construction traffic subsequent to mass grading. This procedure will allow for identification and remediation of any soft or otherwise unstable areas prior to placement of base courses, concrete, and/or asphalt pavement.

3. Foundations

Based on the results of the explorations, it is GTA's opinion that the proposed building may be supported on conventional shallow spread foundations established on suitable natural soils or controlled compacted fill. Foundations established on the natural granular soils or controlled compacted fill can be designed assuming a maximum allowable net bearing pressure of 4,000 pounds per square foot (psf).

Based on the assumed loads, settlements on the order of 1-inch total and ½ -inch differential can be anticipated for footings supported by the natural soils or controlled fill. Exterior footings should be founded a minimum of 36 inches below final exterior grade to provide protection from frost action. Interior foundations in permanently heated portions of the structure may be established at convenient depths below the floor slab.

All foundation excavations should be observed by a professional geotechnical engineer or his qualified representative prior to concrete placement to evaluate bearing pressure. Visual observation, probing, and penetration testing, such as a Dynamic Cone Penetrometer test, should be performed on exposed foundation subgrades to confirm the design allowable bearing capacity. Foundation concrete should be poured on the same day the footing excavations are made to reduce the potential for weakening of the subgrades due to exposure to the elements.

4. Floor Design

It is GTA's opinion that the ground floor slabs can be designed as concrete slabs-on-grade bearing on natural undisturbed soils or compacted fill placed in accordance with the recommendations of the *Earthwork* section of this report. Existing fill materials are not suitable for support of floor slabs and should be replaced with compacted fill. The floor slabs can be designed using a modulus of subgrade reaction (k) of 150 pounds per cubic inch (pci). The slabs may bear on wall projections; however, they should be jointed so that the foundation walls can settle slightly without affecting the slabs.

GTA recommends that concrete floor slabs supported on grade be founded on a four-inch (minimum) coarse granular layer meeting the gradation of AASHTO Size No. 57 aggregate. Where moisture sensitive floor finishes are planned, it is generally recommended that a polyethylene vapor retarder be installed in accordance with ACI guidelines to interrupt the rise of capillary moisture through the slabs.

Floor slab subgrade soils should be evaluated by a representative of the geotechnical engineer immediately prior to stone and concrete placement. This evaluation may include a combination of visual observations, proof rolling, hand-probing, and field density tests to verify that the subgrade soils have been prepared properly. Contractors should anticipate that remedial work could be required to achieve a stable subgrade prior to stone placement, even if the subgrade soils had previously been compacted to the required densities. All interior utility trenches should be backfilled and compacted in accordance with our Earthwork recommendations.

5. Seismic Criteria

Based on the results of this study, it is GTA's opinion that the subsurface conditions at the site may be categorized as Site Class D "Stiff soil profile" as defined in the Building Code of the State of New Jersey. This categorization is based on the subsurface conditions encountered in the test borings performed by GTA, general geologic information for the region, and the information contained in the code.

6. Lateral Earth Pressure and Building Drainage

Below-grade foundation walls will have to be designed to resist the lateral earth pressure. The foundation walls for this project are expected to be braced by the basement floor and first floor slabs and thus restrained from movement at the top, creating an "at-rest" earth pressure condition. Assuming the use of the non-plastic to low plasticity (PI < 10) on-site soils as backfill, we recommend that "at-rest" walls be designed using a triangular distribution having a maximum equivalent fluid pressure (EFP) at the base of the wall of 60H (psf), where H is the height of unbalanced load in feet. Surcharge loads from adjacent floor slabs, pavements, etc. must also be considered. Hydrostatic pressure is not included in the above values because it is assumed that adequate drainage will be provided.

We recommend that a perimeter drain be provided behind all below-grade walls to convey infiltrating surface water to avoid the buildup of hydrostatic pressures. The perimeter drain should consist of a four-inch diameter slotted or perforated pipe encased in a minimum of six inches of crushed stone and be wrapped by a geotextile filter fabric. The crushed stone should meet the gradational requirements of AASHTO Size No. 57 aggregate. The perimeter drain should tie into a sump pit or be gravity feed to an adjacent stormwater system. All below-grade walls should be damp-proofed.

7. Damp-proofing

To reduce dampness within the cellar levels, GTA recommends as a minimum that the below grade foundation walls be damp-proofed with a trowel applied damp-proofing mastic applied to the exterior of the foundation walls in accordance with the manufacturer's recommendations. Alternatively, spray-on waterproofing membranes and self-adhesive bituthene waterproofing membranes could be used to provide improved moisture control for occupied spaces. A manufactured drainage composite

should be placed over the mastic or waterproofing membrane for protection during backfilling.

8. Subsurface Utilities

GTA has not been provided with information regarding proposed subsurface utilities; however, it is our opinion that the natural soils are considered suitable for support of subsurface utilities, which will likely include water, storm, and sanitary sewer lines. GTA recommends that a six-inch thick granular bedding consisting of AASHTO No. 57 stone aggregate be placed where loose or soft soil is encountered to provide uniform support as dictated by site conditions. Utilities installed below pavements, sidewalks, and other structural areas should be backfilled using controlled fill, compacted in accordance with the *Earthwork* section of this report.

Contractors should provide adequate earth support and dewatering systems in utility trench excavations as required. Problems associated with water seepage include partial loss of stability, sloughing of soils, and running sands. These problems can be reduced at the time of construction through the use of "sump and pump" dewatering techniques.

9. Pavements

GTA recommends the upper 18-inches of pavement subgrade be constructed of materials with the following characteristics:

Liquid Limit	35 or less
Plasticity Index	15 or less
Maximum Dry Density	105 pcf or greater
California Bearing Ratio (CBR)	5 or greater

The laboratory testing suggests that the on-site granular soils (SM, GM) will generally meet the above criteria but the fine-grained soils (ML) may not. Predominately fine-grained soils (silt and clay) are highly susceptible to disturbance and softening from excess moisture content and construction equipment traffic. It should be anticipated that remedial work will be required, particularly if the work is being done during the predominantly wet season, to achieve a stable subgrade prior to paving in areas where the sandy silts are present at the subgrade level, even if the soils had previously been compacted to the required densities. For preliminary planning purposes, GTA suggests the pavements be designed based on a CBR value of 7 percent, which assumes that granular soils containing less than 30 percent fines are predominant within the upper 1½ to 2 feet of roadway subgrade. However, the pavements should be designed assuming a CBR value of approximately 5 percent if fine-grained soils are present at the pavement subgrade level. CBR testing should be performed to confirm these estimated values. The permanent and/or temporary pavement design must consider that construction traffic may traverse paved roads that have not yet received the surface course.

Prior to construction of pavement sections, the pavement subgrade should be tested to verify design parameters and proof-rolled with a loaded tandem axle dump truck under the observation of a geotechnical engineer to evaluate stability. Unsuitable soil should be undercut to stable subgrade soils, and the resultant excavations should be backfilled with granular controlled compacted fill or subbase stone aggregate. Undercutting, reworking and drying, or the use of geo-synthetics may be necessary in some areas for subgrade stabilization depending on the weather conditions at the time roadway construction proceeds.

It should be noted that large trucks could impose significant concentrated wheel loads during loading/unloading which can result in rutting and failure of asphalt pavements. Therefore, we recommend a reinforced concrete pavement section be considered in loading/unloading docks and trash dumpster pick-up areas.

The pavement section should be designed using applicable State or Local standards for the anticipated traffic loading. GTA should be provided the opportunity to perform or review the pavement section design.

10. Additional Services

We recommended that GTA be retained to provide geotechnical consultation and construction observation and testing services as outlined below:

- Perform additional field explorations for stormwater management testing, if required.
- Review final site and structural plans to evaluate if they conform to the intent of this report.
- Provide on-site observation and testing of site stripping, subgrade evaluation, and testing of controlled fills.
- Observe compaction of excavated footing subgrades 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 observation and materials testing during concrete and masonry construction.

LIMITATIONS

This report, including the supporting boring logs, field data, field notes, calculations, and other documents prepared by GTA in connection with this project have been prepared for the

exclusive use of CSH Old Tappan LLC pursuant to agreements between Geo-Technology Associates, Inc. and CSH Old Tappan LLC 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 CSH Old Tappan LLC 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 test boring 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 re-evaluated.

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. Geo-Technology Associates, Inc. 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, 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.

31210121 **Geo-Technology Associates, Inc.**

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 not 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 not be adequate to develop geotechnical design recommendations for the project.

Do not 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 not rely on an executive summary. Do not 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 not 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 Not 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

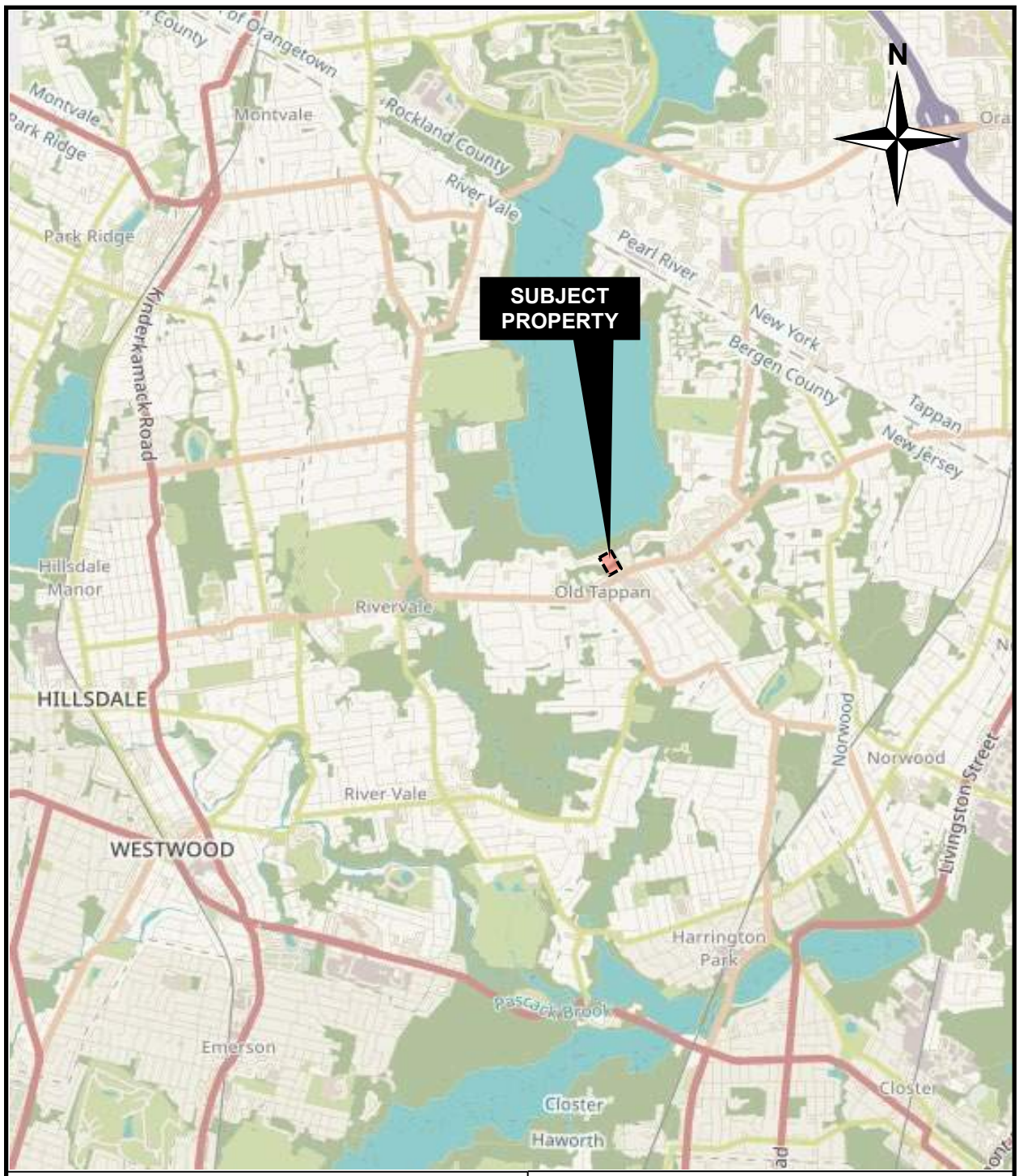
While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not 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 not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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

APPENDIX A

Figures



SITE LOCATION MAP

211-K Gates Road
Little Ferry, New Jersey 07643
(201) 641-1850
fax (201) 641-1655

GTA ENGINEERING SERVICES OF NEW YORK, P.C.

CSH Old Tappan

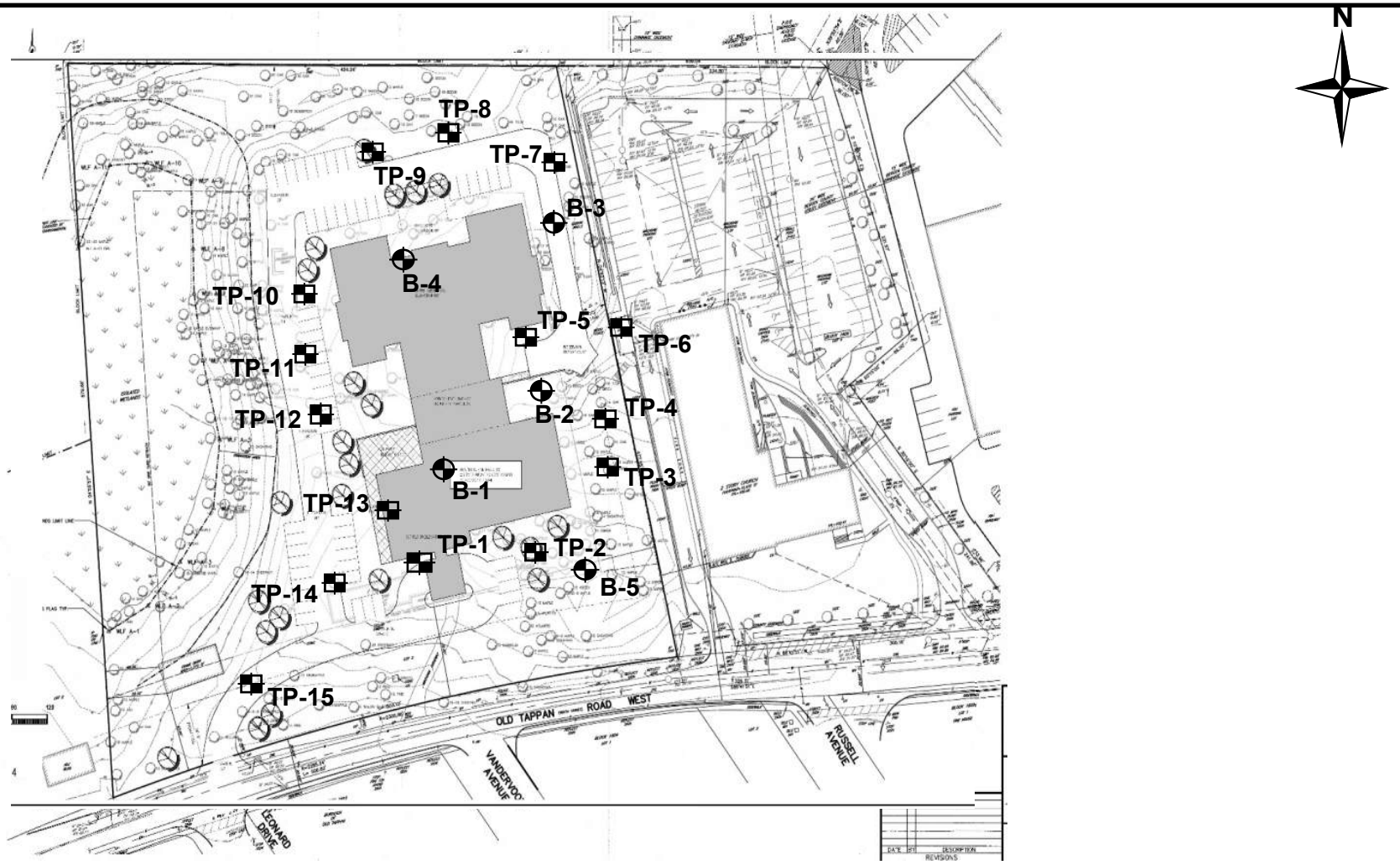
Old Tappan, Jersey

Prepared For: CSH Old Tappan, LLC

SOURCE: Open Street Maps, 2021

SCALE: NTS	DATE: FEB 2021	PROJECT #: 31210121

Figure 1



EXPLORATION LOCATION PLAN

211-K Gates Road
Little Ferry, New Jersey 07643
(201) 641-1850
fax (201) 641-1655

GEO-TECHNOLOGY ASSOCIATES, INC.

LEGEND:

B-X	Approximate location of test boring performed
TP-X	Approximate location of test pit performed

CSH Old Tappan

Old Tappan, New Jersey

Prepared For: CSH Old Tappan, LLC

DESIGN BY: *	DRAWN BY: SM	REVIEWED BY: RD
SCALE: NTS	DATE: FEB 2021	PROJECT #: 31210121

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: **CSH Old Tappan**
PROJECT NO.: **31210121**
PROJECT LOCATION: **Old Tappan, NJ**

WATER LEVEL (ft): NE **----** | ---- **----** | BOC **2-17-21**
DATE: **2-17-21** | **----** | **2-17-21**
NORTHING: **----** EASTING: **----**

DATE STARTED: **2-17-2021**
DATE COMPLETED: **2-17-2021**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **HSA**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **94+/-**
DATUM: **NAVD88**
EQUIPMENT: **CME 75**
LOGGED BY: **SM**
CHECKED BY: **JS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					94.0	0	TS		6 in. Topsoil	
S-1	0.0	7	2-1-2-1	3	93.5		ML		Brown, moist, soft, SILT with Sand	
S-2	2.0	3	2-10-20-28	30	91.0	2	SM		Brown, moist, dense, Silty SAND with Gravel and Cobbles	NMC: 6.7%
						4			-same, medium dense	
S-3	5.0	16	7-13-13-13	26		6				
						8				
S-4	10.0	20	9-16-18-22	34		10			-same, dense	
						12				
						14				
S-5	15.0	18	8-9-23-12	32		16				
						18				
S-6	20.0	17	18-20-16-19	36	74.0	20	SP		Brown, moist, dense, Poorly-graded SAND with Gravel and Cobbles	
						22			Boring complete at 22ft.	
						24				
						26				
						28				
						30				

NOTES: **BOC = Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF BORING NO. B-1

LOG OF BORING NO. B-2

PROJECT: **CSH Old Tappan**
PROJECT NO.: **31210121**
PROJECT LOCATION: **Old Tappan, NJ**

WATER LEVEL (ft):	NE	----	BOC
DATE:	2-17-21	----	2-17-21
NORTHING:	----	EASTING:	----

DATE STARTED: **2-17-2021**
DATE COMPLETED: **2-17-2021**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **HSA**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **92+/-**
DATUM: **NAVD88**
EQUIPMENT: **CME 75**
LOGGED BY: **SM**
CHECKED BY: **JS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	13	2-1-3-2	4	92.0 91.5	0 2	TS ML		6 in. Topsoil Brown, moist, soft, SILT with Sand and trace Gravel	NMC 25.3%
S-2	2.0	8	2-4-4-12	8	89.0	4	GM		Brown, moist, medium dense, Silty SAND with Gravel and Cobbles	
S-3	5.0	14	26-22-23-23	45		6			-same, dense	NMC: 10.2%
S-4	10.0	16	18-15-17-16	32		10			-same	
S-5	15.0	9	18-29-39-20	68		14 16			-same, very dense	
					74.0	18			Boring terminated at 18 ft. due to auger refusal	
						20 22 24 26 28 30				

NOTES: **BOC = Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF BORING NO. B-2

LOG OF BORING NO. B-3

PROJECT: **CSH Old Tappan**
PROJECT NO.: **31210121**
PROJECT LOCATION: **Old Tappan, NJ**

WATER LEVEL (ft):	NE	----	BOC
DATE:	2-17-21	----	2-17-21
NORTHING:	----	EASTING:	----

DATE STARTED: **2-17-2021**
DATE COMPLETED: **2-17-2021**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **HSA**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **86+/-**
DATUM: **NAVD88**
EQUIPMENT: **CME 75**
LOGGED BY: **SM**
CHECKED BY: **JS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	6	1-1-2-5	3	86.0	0	TS		6 in. Topsoil	
					85.5		SM		Brown, moist, medium dense, Silty SAND	
S-2	2.0	5	8-9-7-7	16	84.0	2	GM		Brown, moist, medium dense, Silty GRAVEL with Cobbles and Sand	
						4			-same	
S-3	5.0	16	8-7-6-5	13		6				
						8				
S-4	10.0	8	10-9-8-8	17		10			-same	
						12				
						14				
S-5	15.0	16	6-9-10-11	19	70.0	16	SP-SM		Brown, moist, medium dense, Poorly-graded SAND with Silt, Gravel, and Cobbles	
						18				
S-6	20.0	19	10-11-12-12	23		20			-same	
					64.0	22			Boring complete at 22 ft.	
						24				
						26				
						28				
						30				

NOTES: **BOC = Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF BORING NO. B-3

LOG OF BORING NO. B-4

PROJECT: **CSH Old Tappan**
PROJECT NO.: **31210121**
PROJECT LOCATION: **Old Tappan, NJ**

WATER LEVEL (ft): NE **----** | ---- **----** | BOC **----**
DATE: **2-17-21** | **----** | **2-17-21**
NORTHING: **----** EASTING: **----**

DATE STARTED: **2-17-2021**
DATE COMPLETED: **2-17-2021**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **HSA**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **93+/-**
DATUM: **NAVD88**
EQUIPMENT: **CME 75**
LOGGED BY: **SM**
CHECKED BY: **JS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					93.0	0	TS		6 in. Topsoil	
S-1	0.0	8	1-1-2-4	3	92.5		ML		Brown, dry, soft, SILT with Sand	NMC: 6.9%
S-2	2.0	10	7-10-13-15	23	91.0	2	GM		Brown, moist, medium dense, Silty GRAVEL with Cobbles and Sand	
						4				
S-3	5.0	12	15-17-20-23	37		6			-same	
						8				
S-4	10.0	6	14-19-25-21	44		10			-same	
						12				
						14				
S-5	15.0	14	7-7-8-7	15	78.0	16	SP-SM		Brown, moist, medium dense, Poorly-graded SAND with Silt, Cobbles, and Gravel	
						18				
S-6	20.0	17	7-8-9-10	17	74.0	20	SM		Brown, moist, medium dense, Silty SAND with Gravel and Cobbles	
					71.0	22			Boring complete at 22 ft.	
						24				
						26				
						28				
						30				

NOTES: **BOC = Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF BORING NO. B-4

LOG OF BORING NO. B-5

PROJECT: **CSH Old Tappan**
PROJECT NO.: **31210121**
PROJECT LOCATION: **Old Tappan, NJ**

WATER LEVEL (ft):	NE	----	BOC
DATE:	2-17-21	----	2-17-21
NORTHING:	----	EASTING:	----

DATE STARTED: **2-17-2021**
DATE COMPLETED: **2-17-2021**
DRILLING CONTRACTOR: **D.K. Drilling of New York, Inc.**
DRILLER: **Kostas**
DRILLING METHOD: **HSA**
SAMPLING METHOD: **SPT**

HAMMER TYPE: **Automatic**
GROUND SURFACE ELEVATION: **110+/-**
DATUM: **NAVD88**
EQUIPMENT: **CME 75**
LOGGED BY: **SM**
CHECKED BY: **JS**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	SPT-N VALUE	ELEVATION (ft.)	DEPTH (ft.)	STRATA	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					110.0	0	TS		6" Topsoil	
S-1	0.0	12	5-4-6-4	10	109.5		SM		Brown, moist, medium dense, Silty SAND with Cobbles and Gravel	
S-2	2.0	5	5-12-9-6	21		2			-same	
						4				
S-3	5.0	4	12-13-14-12	27		6			-same	
						8				
S-4	10.0	17	11-13-11-11	24	100.0	10	SP-SM		Brown, moist, medium dense, Poorly-graded SAND with Silt and Gravel	NMC: 4.1%
						12				
S-5	15.0	9	6-9-10-5	19		14			-same	
						16				
S-6	20.0	13	3-5-7-9	12		18			-same	
						20				
S-7	25.0	16	5-5-6-6	11		22			-same	
						24				
					83.0	26			Boring complete at 27 ft.	
						28				
						30				

NOTES: **BOC = Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF BORING NO. B-5

LOG OF TEST PIT NO. TP-1

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **102+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
101.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
93.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-1

LOG OF TEST PIT NO. TP-2

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **104+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
103.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
93.5				Test pit complete at 10.5 ft.	
	11				
	12				

NOTES: **Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-2

LOG OF TEST PIT NO. TP-3

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **101+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
100.5		ML		Brown, moist, SILT with Sand and Gravel	
	1				
	2				
	3				
	4				
	5				
95.0	6	GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	7				
	8				
92.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-3

LOG OF TEST PIT NO. TP-4

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **100+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
99.5	0	TS		6 in. Topsoil	
	1	ML		Brown, moist, SILT with Sand and Gravel	
	2				
97.0	3	GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	4				
	5				
	6				
	7				
92.0	8			Test pit complete at 8 ft.	
	9				
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-4

LOG OF TEST PIT NO. TP-5

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **90+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
89.5		ML		Brown, moist, SILT with Sand and Gravel	
	1				
	2				
87.0	3	GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	4				
	5				
	6				
	7				
82.0	8			Test pit complete at 8 ft.	
	9				
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

GEO-TECHNOLOGY ASSOCIATES, INC.
211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-5

LOG OF TEST PIT NO. TP-6

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **88+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
87.5		ML		Brown, moist, SILT with Sand and Gravel	
	1				
	2				
	3				
84.0	4	GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	5				
	6				
	7				
	8				
79.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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LOG OF TEST PIT NO. TP-6

LOG OF TEST PIT NO. TP-7

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **86+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
85.5	1	ML		Brown, moist, SILT with Sand and Gravel	
84.0	2	GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	3				
	4				
	5				
	6				
	7				
	8				
77.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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LOG OF TEST PIT NO. TP-7

LOG OF TEST PIT NO. TP-8

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **84+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
83.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
75.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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LOG OF TEST PIT NO. TP-8

LOG OF TEST PIT NO. TP-9

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **86+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
85.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
76.0	10			Test pit complete at 10 ft.	
	11				
	12				

NOTES: **Backfilled On Completion**

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LOG OF TEST PIT NO. TP-9

LOG OF TEST PIT NO. TP-10

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **94+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
93.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
85.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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LOG OF TEST PIT NO. TP-10

LOG OF TEST PIT NO. TP-11

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **92+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
91.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
82.5				Test pit complete at 9.5 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-11

LOG OF TEST PIT NO. TP-12

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **91+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
90.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
82.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-12

LOG OF TEST PIT NO. TP-13

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **100+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
99.5		ML		Brown, moist, SILT with Sand and Gravel	
	1				
	2				
	3				
96.0	4	GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	5				
	6				
	7				
92.0	8			Test pit complete at 8 ft.	Boulder at 8 ft.
	9				
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-13

Sheet 1 of 1

LOG OF TEST PIT NO. TP-14

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **102+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
101.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
93.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-14

LOG OF TEST PIT NO. TP-15

PROJECT: **CSH Old Tappan**
PROJECT LOCATION: **Old Tappan, NJ**
CLIENT: **Capitol Senior Housing**

PROJECT NO.: **31210121**

DATE STARTED: **2/15/21**
DATE COMPLETED: **2/15/21**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308CR Excavator**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **94+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		6 in. Topsoil	
93.5		GM		Brown, moist, Silty GRAVEL and Cobbles with Sand	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
85.0	9			Test pit complete at 9 ft.	
	10				
	11				
	12				

NOTES: **Backfilled On Completion**

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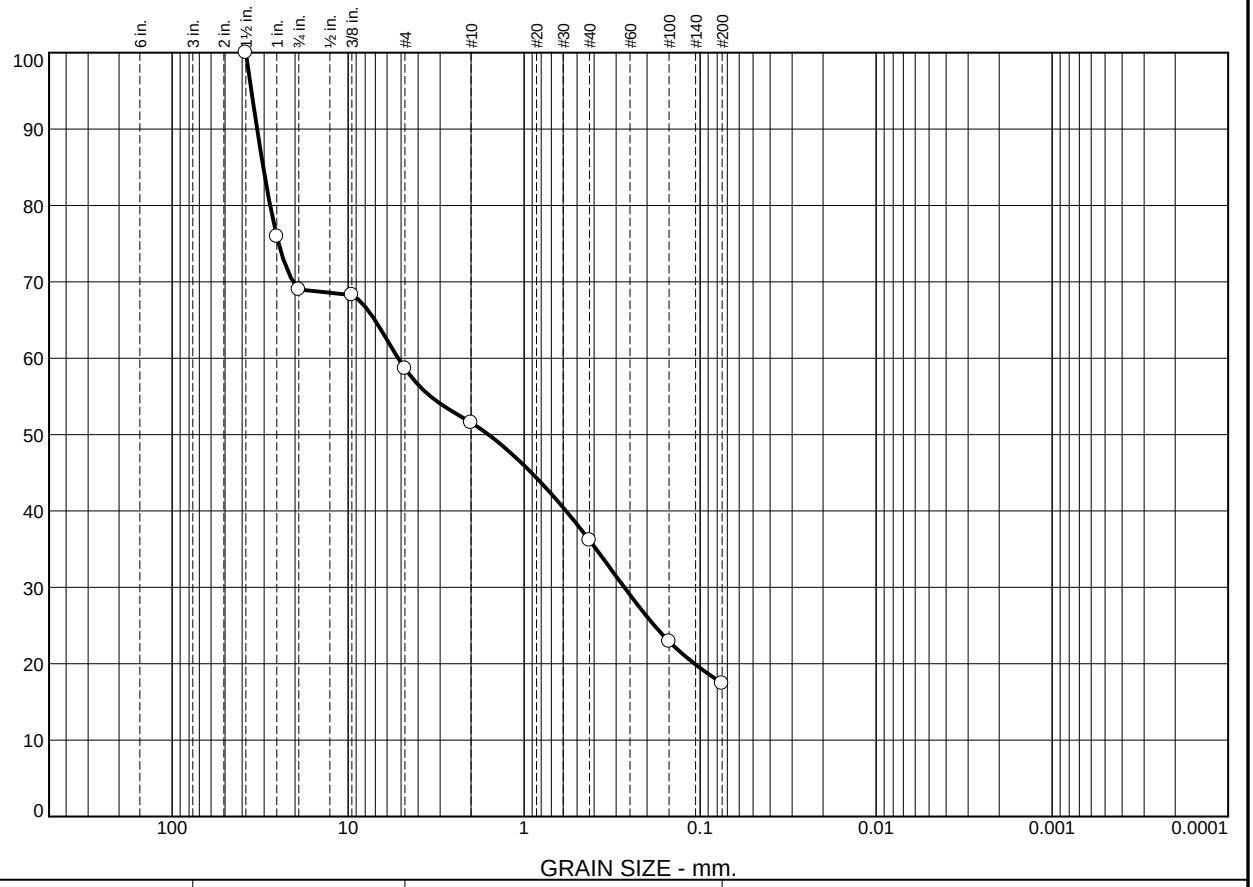
211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-15

APPENDIX C

Laboratory Data

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	31.0	10.3	7.1	15.4	18.8	17.4	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		0	0	30.3271	5.1910	1.5952	0.2692				

Material Description	USCS	AASHTO
○ Brown Silty Sand with Gravel	SM	A-1-b

Project No. 31210121 **Client:** CSH Old Tappan, LLC

Project: CSH Old Tappan

○ **Source of Sample:** B-1 **Depth:** 5 **Sample Number:** S-3

Date: ○ 2/22/21

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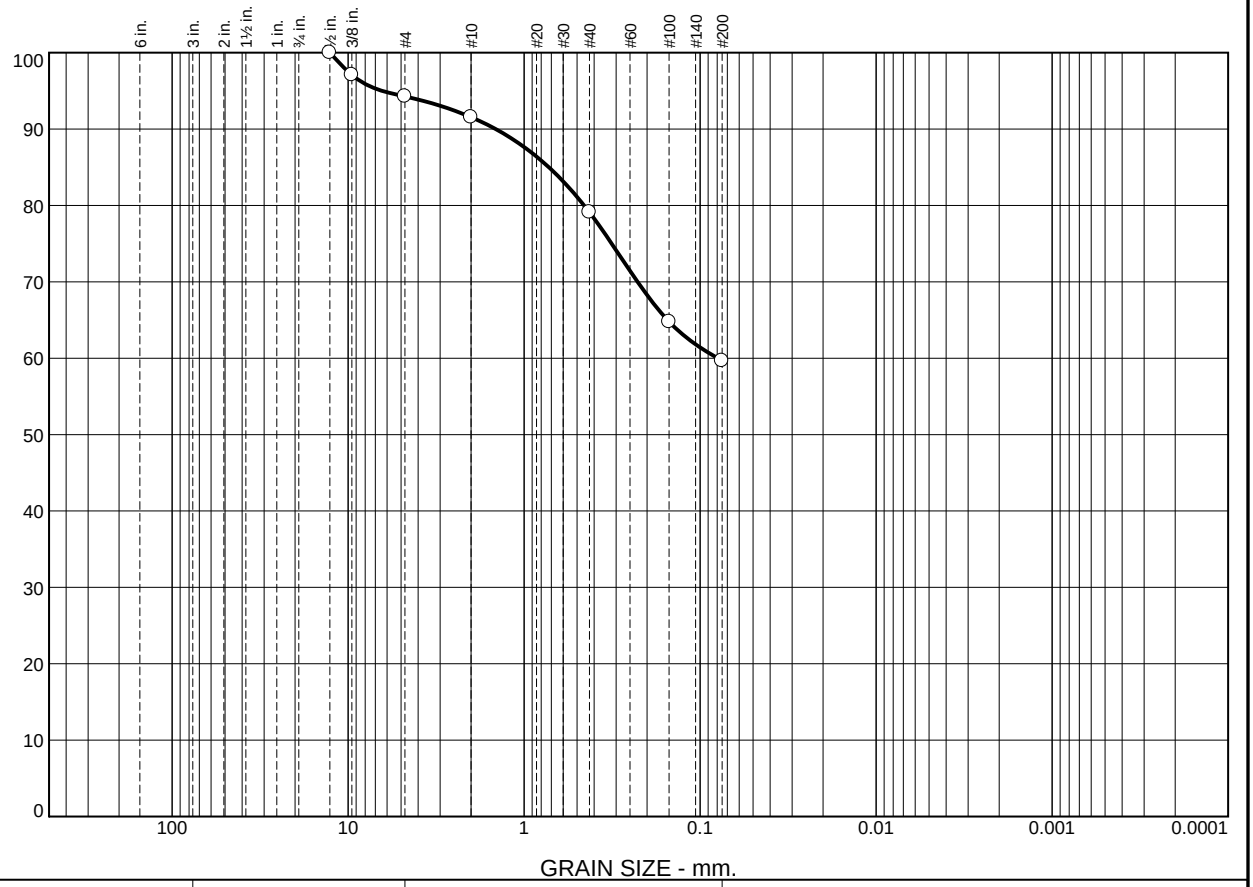
Remarks:
○NMC: 6.7%

Figure

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

Tested By: SM/RR **Checked By:** RD

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	5.7	2.7	12.5	19.4	59.7	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		0	0	0.7233	0.0794						

Material Description	USCS	AASHTO
○ Brown, Silt with Sand	ML	A-4(0)

Project No. 31210121 **Client:** CSH Old Tappan, LLC

Project: CSH Old Tappan

○ **Source of Sample:** B-2 **Depth:** 0 **Sample Number:** S-1

Date: ○ 2/23/21

Remarks:

○NMC: 25.7%

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Figure

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

Tested By: SM **Checked By:** RD

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	4.5	14.1	8.9	23.4	30.7	18.4	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		0	0	7.1482	0.7486	0.4419	0.1960				

Material Description	USCS	AASHTO
○ Brown Silty Sand with Gravel	SM	A-1-b

Project No. 31210121 **Client:** CSH Old Tappan, LLC

Project: CSH Old Tappan

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

Date: ○ 2/22/21

Remarks:

○NMC: 10.1%

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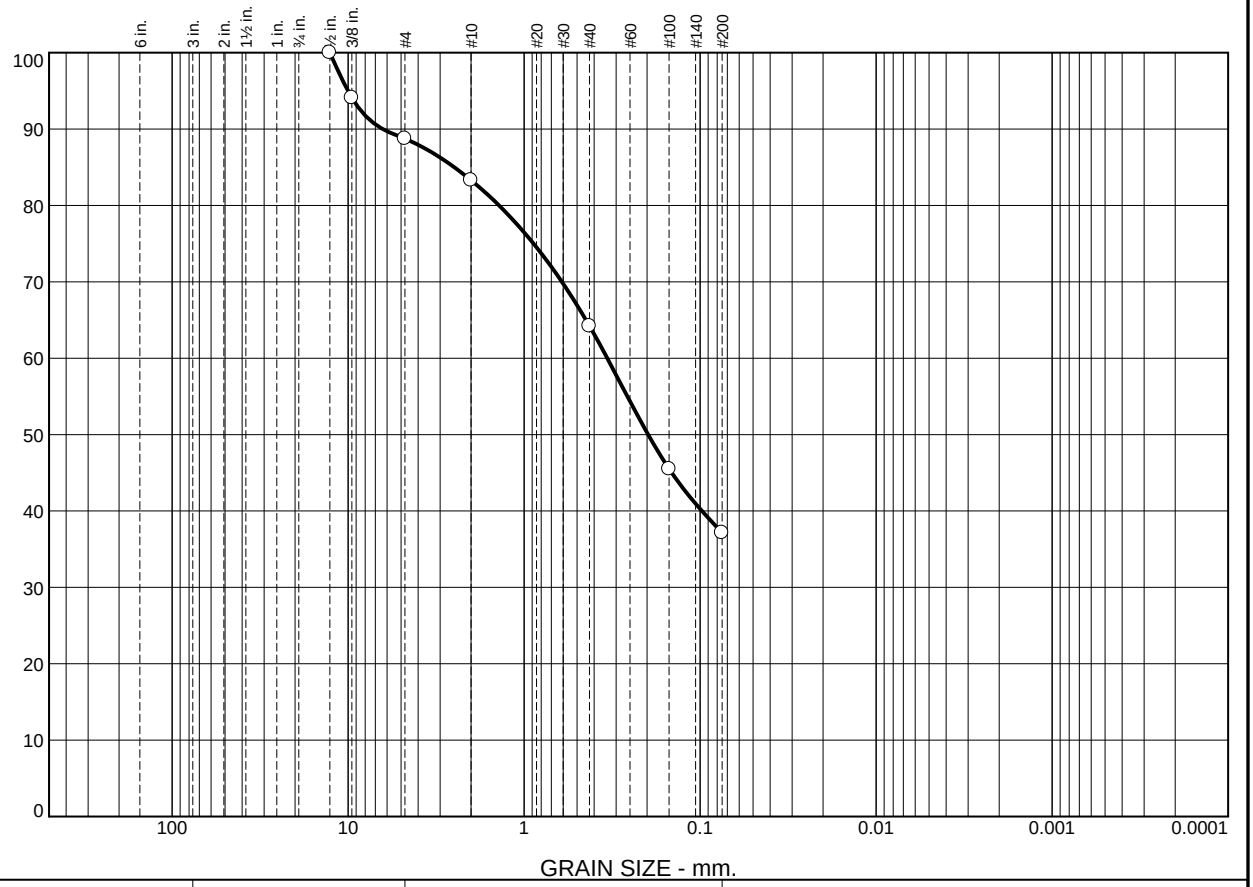
Figure

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

Tested By: SM/RR **Checked By:** RD

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	11.3	5.4	19.1	27.1	37.1	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		0	0	2.4932	0.3369	0.1972					

Material Description	USCS	AASHTO
○ Brown Silty Sand with Topsoil	SM	A-4(0)

Project No. 31210121 **Client:** CSH Old Tappan, LLC

Project: CSH Old Tappan

○ **Source of Sample:** B-3 **Depth:** 0 **Sample Number:** S-1

Date: ○ 2/22/21

Remarks:

○NMC: 32.1%

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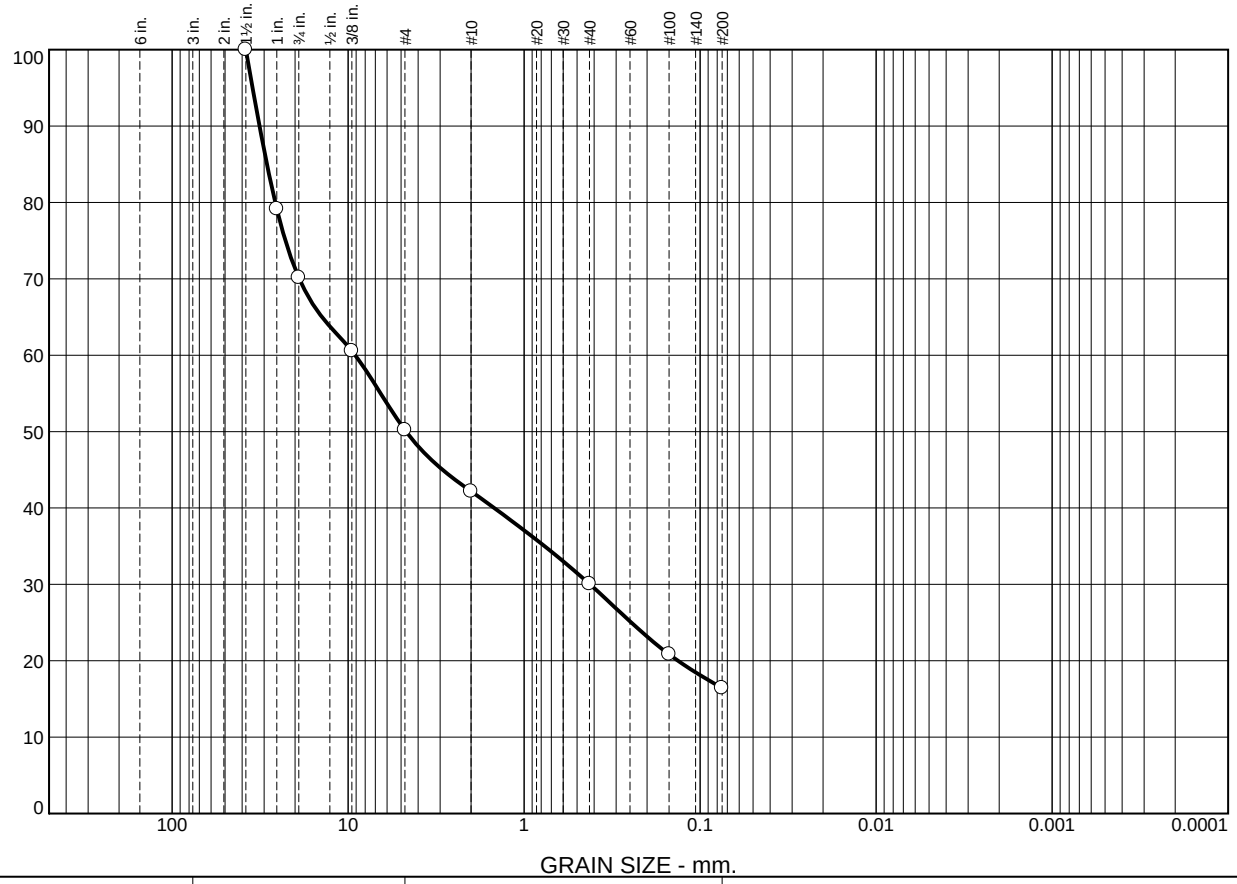
Figure

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

Tested By: SM/RR **Checked By:** RD

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	29.8	20.0	8.0	12.1	13.7	16.4	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		0	0	28.9000	9.1222	4.6780	0.4224				

Material Description	USCS	AASHTO
○ Brown Silty Gravel with Sand	GM	A-1-b

Project No. 31210121 **Client:** CSH Old Tappan, LLC

Project: CSH Old Tappan

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

Date: ○ 2/22/21

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Little Ferry, NJ 07643

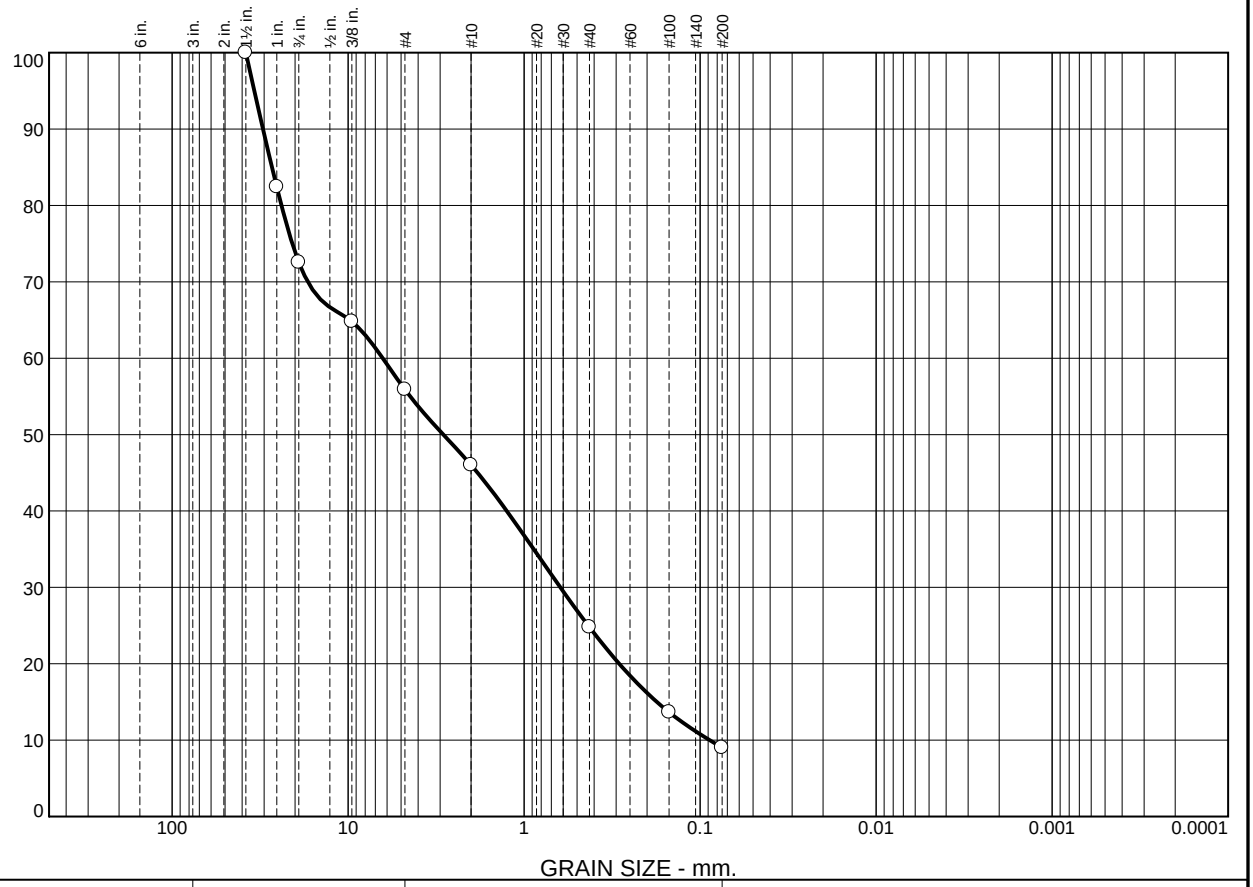
Remarks:
○NMC: 6.4%

Figure

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

Tested By: SM/RR **Checked By:** RD

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	27.5	16.6	9.9	21.2	15.8	9.0	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		0	0	27.0575	6.3539	2.8732	0.6220	0.1759	0.0883	0.69	71.96

Material Description	USCS	AASHTO
○ Brown Poorly-graded Sand with Gravel and Silt	SP-SM	A-1-a

Project No. 31210121 **Client:** CSH Old Tappan, LLC

Project: CSH Old Tappan

○ **Source of Sample:** B-5 **Depth:** 10 **Sample Number:** S-4

Date: ○ 2/22/21

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Remarks:
○NMC: 4.1 %

Figure

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

Tested By: SM/RR **Checked By:** RD