GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing Geoprofessional Business Association Member Firm

March 7, 2022

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

Attn: Mr. Jim May

Re: Stormwater Management Infiltration Testing
CSH Old Tappan
Borough of Old Tappan, Bergen County, New Jersey

Dear Jim:

This letter presents the results of test pit excavations observed by Geo-Technology Associates, Inc. (GTA) for the planning and design of stormwater management (SWM) facilities related to a proposed assisted living facility to be constructed in the Borough of Old Tappan, Bergen County, New Jersey. This investigation supplements the results of our previous investigation, which is summarized in our geotechnical report dated May 16, 2021. The site is located at 244 Old Tappan Road as shown in Figure 1 and is identified as Lot 3 in Block 1606 on the Borough of Old Tappan tax map.

GTA was provided with plans prepared by Schwanwede/Hals Engineering, Inc. titled "ALTA/NSPS Land Title Survey" dated March 4, 2021. The plans indicate the site boundaries, existing site features and topography. The site is presently occupied by a 1½-story building along Old Tappan Road, with a small pavement area. We understand the proposed site improvements will include constructing a new two- to three-story assisted living facility with stormwater management facilities. At the time of our exploration, the majority of the site is still undeveloped and wooded.

GTA was requested to perform 3 test pits with in-situ infiltration testing in the proposed areas of stormwater management facilities. The test pit locations were selected by the client's site/civil engineer and located in the field by GTA personnel using the existing site features as reference. The approximate locations of the test pits performed for this study are shown on the attached Infiltration Test Location Plan, Figure 2.

The test pits were excavated by Heritage Contracting Company, Inc. on March 1, 2022 using a CAT 308 mini excavator. Test Pit TP-1 extended to a depth of 2 feet below the ground surface to El. 90+/- while test pits TP-2 and TP-3 were extended to depths of 10 feet and 5 feet below ground surface, respectively, for testing at El. 83+/-. Test Pit TP-1 encountered

about 6 inches of topsoil at the ground surface, before encountering poorly-graded sand with silt and gravel. Test Pit TP-2 encountered an approximately 1-foot thick layer of topsoil at the ground surface followed by silty gravel and sand with cobbles to a depth of about 5 feet, where the soils graded into poorly-graded sand with silt and gravel. Test pit TP-3 encountered a 1-foot thick layer of topsoil at the surface overlying a 6-inch layer of alluvial silt before encountering poorly-graded sand with silt and gravel.

Groundwater seepage was not observed in the test pits and long-term groundwater readings were not obtained because the explorations were backfilled upon completion for safety considerations.

Infiltration tests were performed using double-ring infiltrometers in accordance with the ASTM D 3385 test procedure. The tests were performed at the depths requested by the site/civil engineer in the natural granular soils. The results of the infiltration tests are summarized in the following table:

SUMMARY OF INFILTRATION TEST RESULTS

Test Pit Location	Depth (ft)	Final Water Level Drop (in)	Time Interval (min)	USCS Classification	Measured Infiltration Rate (in/hr)
TP-1	2	5.25	30	Poorly-graded Sand with Silt (SP-SM)	10.5
TP-2	10	6.5	6	Poorly-graded Sand with Silt (SP-SM)	64.9
TP-3	5	3.75	30	Poorly-graded Sand with Silt (SP-SM)	7.5

The primary conditions that affect the capacity of soils to infiltrate water are the soil gradation and density properties and the presence of hydraulically restrictive layers such silt or clay (fines), rock, or groundwater, each of which would restrict the flow into the underlying aquifer.

Based on the results of our field and laboratory testing, it is GTA's professional opinion that the natural soils tested are suitable for infiltration of collected stormwater. The infiltration tests resulted in relatively high infiltration rates of 7.5 inches per hour or higher in the granular soils.

Construction oversight by competent engineering personnel during installation of stormwater management facilities is critical to successful functioning of the system. Ideally, construction oversight should be provided by the geotechnical engineer, or qualified representative, retained by the project owner to document construction operations and assure that project specifications and special construction requirements are met. Periodic inspection and maintenance of the system will be required to maximize the efficiency and design life of the system.

This letter, including all supporting test pit logs, field data, field notes, test data, calculations, estimates and other documents prepared by GTA in connection with this Project have been prepared for the exclusive use of CSH Old Tappan LLC. (Client) pursuant to the agreement between GTA and Client dated February 22, 2022, and 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 Client is unauthorized and such use is at the sole risk of the user.

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

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site.

We appreciate the opportunity to provide assistance to you for this project. Please contact us at (732) 271-9301 if you have questions regarding this report.

Very truly yours,
GEO-TECHNOLOGY ASSOCIATES, INC.

Scott Mermelstein
Project Geologist

Robert Dykstra, P.E.
Vice President

SM/RD: sm
31210121

Attachments
Site Vicinity Map (1 page)
Infiltration Test Location Plan (1 page)
Logs of Test Pits (3 pages)

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

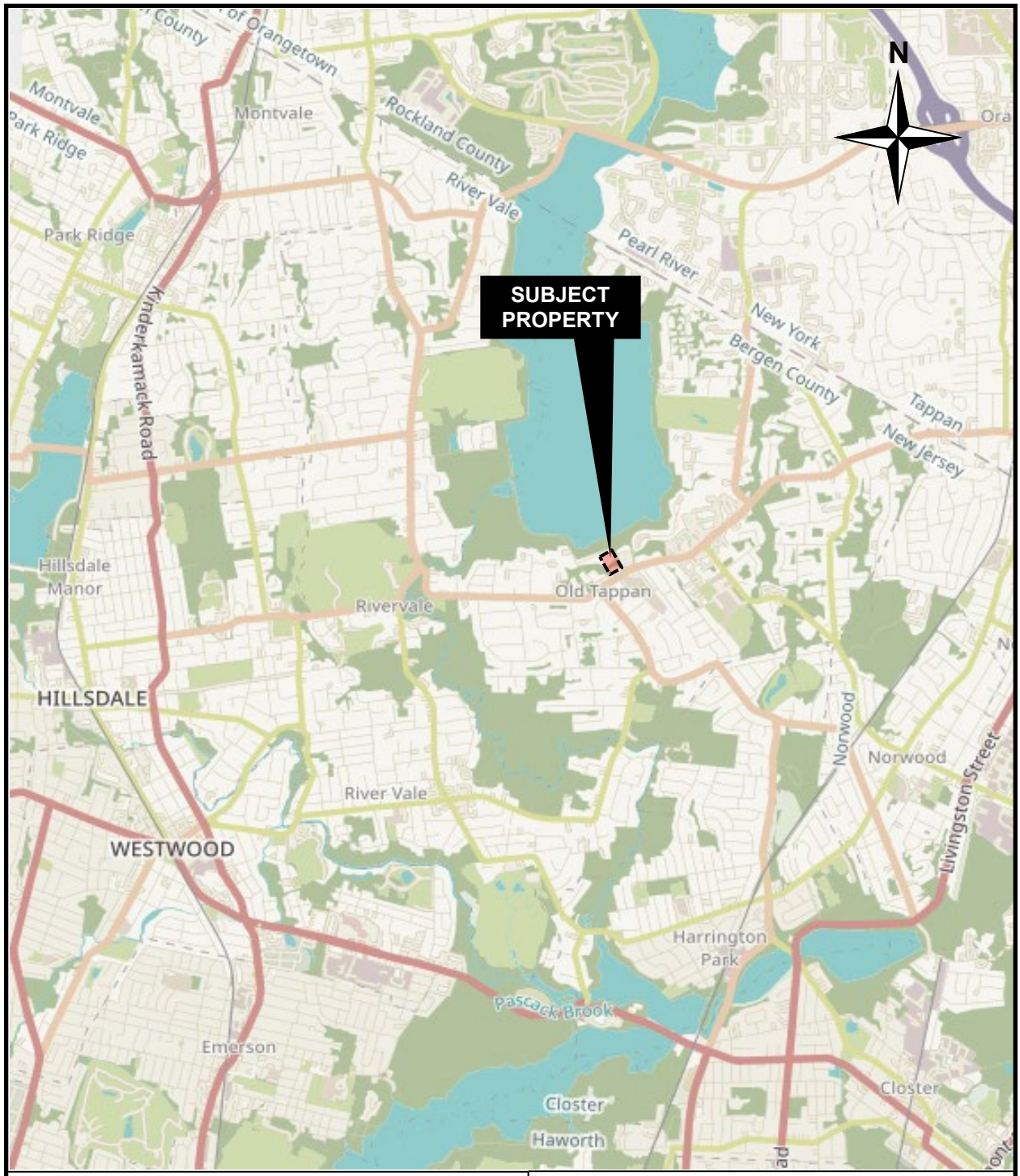
The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide 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



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

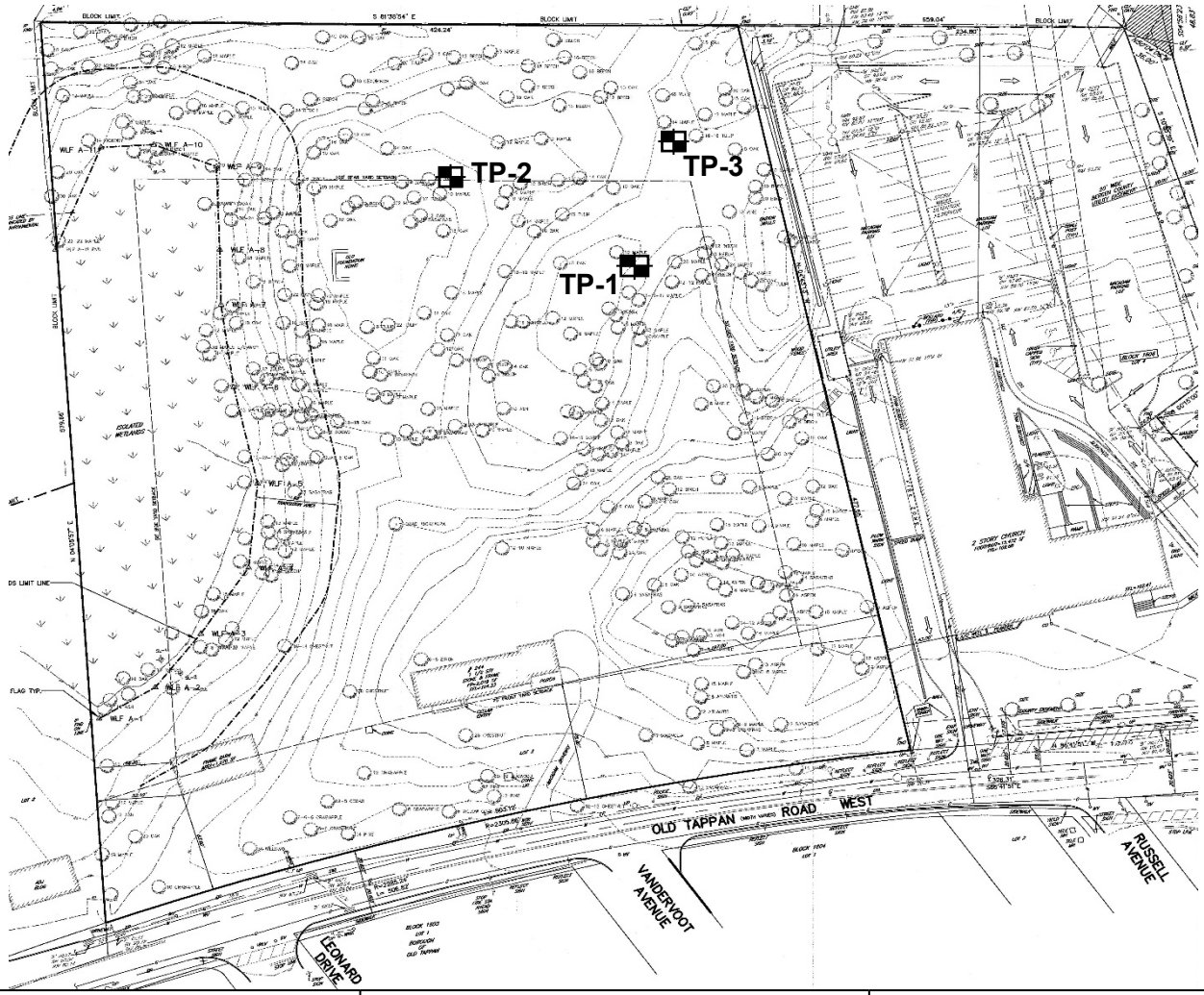
Old Tappan, Jersey

Prepared For: CSH Old Tappan, LLC

SOURCE: Open Street Maps, 2021

SCALE: NTS	DATE: FEB 2021	PROJECT #: 31210121

Figure 1



INFILTRATION TEST LOCATION PLAN

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

GEO-TECHNOLOGY ASSOCIATES, INC.

LEGEND:

TP-X Approximate location of test pit with infiltration testing

CSH Old Tappan

Old Tappan, New Jersey

Prepared For: Capitol Seniors Housing

DESIGN BY: *	DRAWN BY: SM	REVIEWED BY: RD
SCALE: NTS	DATE: MAR 2022	PROJECT #: 31210121

Figure 2

LOG OF TEST PIT NO. TP-1

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

PROJECT NO.: **31210121X1**

DATE STARTED: **3/1/22**
DATE COMPLETED: **3/1/22**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308**

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	1	SP-SM		Brown, moist, Poorly-graded SAND with Silt, Gravel, and Cobbles	
90.0	2			Test pit terminated at 2 ft. for infiltration testing	

NOTES:

GTA Engineering
Service of NY, P.C.

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 Seniors Housing**

PROJECT NO.: **31210121X1**

DATE STARTED: **3/1/22**
DATE COMPLETED: **3/1/22**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **95+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		1 ft. Topsoil	
94.0	1	GM		Brown, moist, Silty GRAVEL with Sand and Cobbles	
	2				
	3				
	4				
90.0	5	SP-SM		Brown, moist, Poorly-graded SAND with Silt, Gravel, and Cobbles	
	6				
	7				
	8				
	9				
85.0	10			Test pit terminated at 10 ft. for infiltration testing	

NOTES:

GTA Engineering
Service of NY, P.C.

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 Seniors Housing**

PROJECT NO.: **31210121X1**

DATE STARTED: **3/1/22**
DATE COMPLETED: **3/1/22**
CONTRACTOR: **Heritage**
EQUIPMENT: **CAT 308**

GROUNDWATER ENCOUNTERED: **NE**
GROUND SURFACE ELEVATION: **87+/-**
DATUM: **NAVD88**
LOGGED BY: **SM**
CHECKED BY: **RD**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0	TS		1 ft. Topsoil	
86.0	1	ML		Olive-gray, moist, SILT with Sand	
85.5	2	SP-SM		Brown, moist, Poorly-graded SAND with Silt, Gravel, and Cobbles	
	3				
	4				
82.0	5			Test pit terminated at 5 ft. for infiltration testing	

NOTES:

GTA Engineering
Service of NY, P.C.

211-K Gates Road
Little Ferry, NJ 07643

LOG OF TEST PIT NO. TP-3