ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

REPORT OF GEOTECHNICAL EXPLORATION

Proposed Burger King Restaurant
London Grove Village
Gap Newport Pike
Avondale, PA
ATC Project No. 1011601242

Prepared For:

GPS Hospitality
2100 Riveredge Parkway, Suite 850
Atlanta, GA 30328

Prepared By:

ATC Group Services LLC
7606 Whitehall Executive Center Drive, Suite 800
Charlotte, NC 28273

May 31, 2018

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7606 Whitehall Executive Center Drive, Suite 800 | Charlotte, NC 28273
+1 704 529 3200 www.atcgroupservices.com

May 31, 2018

Mr. Ted Brennen
Director of Construction
GPS Hospitality
2100 Riveredge Parkway, Suite 850
Atlanta, GA 30328

RE: Report of Geotechnical Exploration
London Grove Village
Gap Newport Pike
Avondale, PA
ATC Project No. 1011601242

Dear Mr. Brennen:

ATC is pleased to submit this report providing engineering analysis for the proposed Commercial Development to be constructed at the above-referenced project location. This report, which details the results of our geotechnical exploration for the referenced project, summarizes the project information provided to us, describes the site and subsurface conditions encountered, and details our geotechnical recommendations for the project. The Appendix contains a Boring Location Plan and Soil Test Boring Logs.

We appreciate the opportunity to be of service to you for this phase of the project. If you have any questions concerning this report, please call us.

Respectfully Submitted,
ATC Group Services LLC

Joseph G. Schold, P.E. (NC)
Principal Geotechnical Engineer

David Schmidt, P.E.
Vice President
Registered PA No. 73317

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID A. SCHMIDT
ENGINEER
No. PE073317

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APPENDIX

1.0 INTRODUCTION

1.1 Project Information

The project site is situated at 550 Hepburn Road in Avondale, Pennsylvania. The site is currently an unoccupied asphalt covered parking area in front of the existing Lowes store. The planned construction at the site will include a single story restaurant structure with associated parking and drives. It is our understanding the planned construction for the site can be summarized as follows:

Project Details	
Single Story Commercial Structure	Masonry Block
Estimated Design Column Loads	Less than 20 Kips
Estimated Wall Loads	1 to 3 kips per foot
Design Traffic Loads	Light to Medium Duty
Anticipated Cuts and Fill	Less than 3 feet

1.2 Purpose and Scope of Exploration

The purpose of this exploration was to obtain subsurface data at the project site to provide geotechnical engineering recommendations for the project. Services performed under this agreement included the drilling of the soil test borings, laboratory testing, and preparation of a geotechnical engineering report. The subsurface investigation data obtained for this study and related plans are presented for the proposed structure, associated utilities, and parking facilities and drives.

Scope of Services Summary
Description of the site and presentation of subsurface test boring data, including Boring Location Plan and Soil Test Boring Logs.
Depths, thicknesses, and composition of soil strata that will be impacted by the planned site construction.
Depths to encountered groundwater and soil strata that could affect the proposed construction.
Recommendations for control of groundwater in design and during construction.
Recommendations pertaining to site development including site preparation, earthwork construction, unsuitable soils, groundwater control, and excavation slopes.
Recommended Seismic Site Classification definition based on IBC code requirements.
Recommendations regarding shallow foundation design and construction, including bearing pressures and anticipated settlements.
Recommendation for the design and construction of light and heavy duty pavements.
Recommendations regarding the suitability of the on-site cut soils with regard to use on site for general grading, pavement construction, and utility backfill.

Our scope of services did not include recommendations for unsupported excavation slopes, stormwater management, erosion control, detailed cost or quantity estimates, final plan and specification documents, and construction observations and testing. Any statements in this report regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client.

2.0 EXPLORATION PROCEDURES AND FINDINGS

2.1 Exploration Procedures

ATC performed seven soil test borings, designated B-1, B-2, C-1, and P-1 through P-4, within the general area of the planned site construction. The Standard Penetration Testing (SPT) borings extended to a maximum depth of 15 feet below the existing ground surface elevation. The boring locations were established in the field by ATC by measuring distances and estimating right angles from existing site features.

All soil sampling and standard penetration testing (SPT) were in general accordance with ASTM standard D 1586. The borings were advanced by hollow stem auger drilling techniques. The drilling was performed using an ATV BR-2540 drilling rig with a manual SPT hammer. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-barrel sampler. The sampler was first seated 6 inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler the final foot was recorded and is designated the "standard penetration resistance." Because the sampler may be damaged by driving it a foot into very dense soils, it is driven a few inches into such materials and the penetration resistance is expressed as the number of hammer blows versus the depth of penetration, e.g. 100/3", 50/1", etc. Penetration resistance, when properly evaluated, is an index of the soil's strength, density, and foundation support capability.

Representative portions of the soil samples obtained with an automatic hammer and split-barrel sampler were sealed in glass jars and transported to our laboratory. In the laboratory, they were examined by a geotechnical engineer, classified in general accordance with the Unified Soil Classification System, and assigned laboratory testing. The soil descriptions and classifications are based on visual examination and should be considered approximate. The Soil Test Boring Records that present soil descriptions and graphically depict penetration resistance and observed groundwater levels are included in the report Appendix. The groundwater depths encountered during drilling operations are indicated on the soil test boring logs in the Appendix.

2.2 Subsurface Conditions

Underlying the asphalt pavement, the borings encountered subsurface materials that were classified using the Unified Soil Classification System (USCS). The soil test boring logs, which detail the subsurface conditions encountered in the borings, are included in the Appendix. The field portion of ATC's geotechnical exploration consisted of seven soil test borings to a maximum depth of 20 feet below the existing ground surface elevations. The subsurface conditions generally consisted of layer of clayey SAND and sandy CLAY soils with rock fragments. SPT blow counts in the subsurface soils ranged from 4 blows per foot to 40 blows for 5 inches of penetration indicating loose to very dense hard consistency soil conditions.

Groundwater was not encountered during the site investigation. Generally, seasonal and yearly fluctuations of the water table should be expected with variations in precipitation, surface runoff, evaporation, pumping, and other similar factors.

3.0 FOUNDATION SUPPORT AND RECOMMENDATIONS

Soil data obtained during this subsurface exploration have been used to estimate the shearing strength and deformation characteristics for the subsurface soils encountered at the site. These parameters have been used as guidelines for foundation system design and to estimate potential settlement due to the anticipated site construction and foundation loading. The engineering analysis based on these parameters was performed in accordance with generally accepted engineering principles and practices.

3.1 Site Preparation

Based on the site conditions encountered during the site investigation, the subsurface materials appears suitable for the planned building construction planned for the site. All areas that will support floor slabs and pavements should be prepared as described herein. After rough grade has been established in cut areas and prior to placement of fill, the exposed subgrade should be inspected by the project geotechnical engineer or his representative, by probing and testing as needed.

We recommend the asphalt and base materials be excavated prior to the commencement of the site construction operations. If utility features are encountered or noted, we recommend these be removed if within 10 feet of the site finish grade elevation.

Based on the moisture content testing performed, the near surface materials appear to be at moisture contents below the estimated optimum moisture contents of the soils. However, the combination of heavy construction equipment traffic and excess surface moisture can create pumping and general deterioration of the near surface soils. The severity of this potential problem depends largely on the weather during construction. The contractor must exercise discretion when selecting equipment and the conditions under which the equipment is used.

3.2 Shallow Foundation Design Recommendations

Based on the site findings, the proposed structure may be supported on shallow foundations bearing on competent soils and may be proportioned based on an allowable net soil bearing pressure of 2,000 psf. The presented allowable bearing capacity includes a factor of safety of at least 3.0.

Description	Columns	Walls
Net allowable soil bearing pressure	2,000 psf	2,000 psf
Minimum dimensions	24 inches	18 inches
Minimum protective embedment	24 inches	24 inches
Approximate total settlement	<1 inches	<3/4 inches over 50 feet

The recommended net allowable soil bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. This bearing capacity assumes that any fill or soft soils, as noted herein and as encountered, will be undercut and replaced with compacted engineered fill in accordance with the recommendations provided herein. The extent of any required site undercutting should be determined in the field by experienced geotechnical personnel based on site conditions at the time of construction.

Resistance to lateral loads for shallow foundations will likely be provided by frictional resistance between the base of the concrete footings and the underlying structural fill. We recommend that an ultimate friction factor of 0.45 be used for the design. Additional resistance to lateral loads will be provided by passive pressure of the granular backfill adjacent to the perimeter of the footings. All backfill placed against the edge of the footings must be properly compacted as indicted herein and the upper 18 inches of soils be not be included in the passive pressure calculations.

3.3 Placement and Compaction

During fill placement, density tests should be performed by a soils technician to determine the degree of compaction and compliance with the project specifications. All fill should be placed and compacted in loose lifts not to exceed 12-inches. For under-floor areas, at least one field density test should be made per 2,500 square feet of compacted soil. In addition, a minimum of one density test per 50 feet of bearing wall and one density test in each column pad, or more often when requested by the engineer's representative, should be performed in the excavated footing areas to confirm compliance with project specifications.

All areas beneath floor slabs and footings should be compacted, to a depth of at least 24-inches, to a minimum dry density of 98 percent of the Standard Proctor maximum density determined in accordance with ASTM D-698. Fill placement and compaction operations should be monitored by the ATC project geotechnical engineer or his representative.

We anticipate that the site excavated soil will be suitable for use as fill and/or backfill given the subsurface materials encountered in this exploration. The on-site soils will likely require aeration and drying prior to reuse as structural fill based on the moisture contents of samples collected. High plasticity clays (CH), if encountered, are NOT recommended for reuse as structural fill. In general, any non-organic, naturally-occurring soils with a Liquid Limit (LL) less than 45 percent and a Plasticity Index (PI) less than 20 percent can be used for structural fill. The fill should contain no pieces whose greatest dimension is greater than two-thirds of the lift thickness being placed. If fill construction takes place during the winter months, fill should not be placed over frozen soil, nor should froze materials be used within the fill.

The fill should be placed in lifts of uniform thickness. The lift thickness should not exceed that which can be properly compacted throughout its entire depth with the equipment available, typically 6 to 8 inches for clayey soil. We recommend that structural fills supporting footings, floor slabs and pavement be compacted to at least 98 percent of the maximum Standard Proctor dry density (ASTM D-698). For proper and timely construction of the fills, the soils should be placed at or near the optimum moisture content as determined by the specified Proctor test.

Suitable equipment for either aerating or adding water should be available as the soil moisture and weather conditions dictate. In general, it is recommended that fills supporting structures extend a minimum of 10 feet beyond the exterior building lines.

3.4 Site Excavations

It is recommended that all foundation excavations be inspected by the geotechnical engineer of record or his representative to verify that any loose, soft, or otherwise undesirable material is removed and that the foundation will bear on satisfactory material.

If soft or loose pockets are encountered in the footing excavations, the material should be excavated and backfilled in accordance with recommendations in Section 3.3 Placement and Compaction, of this report. Soils exposed in foundation excavations should be protected from disturbance. Surface runoff water should be directed away from the excavation and not allowed to pond. If possible, all footing concrete should be poured the same day the excavation is made. If this is not practical, the footing excavation should be adequately protected. If foundations are not poured the same day the excavation is made, we recommend that an ATC geotechnical engineer re-examine the excavation to determine if disturbance has occurred.

3.5 Seismic Activity

Structural design considerations include those dynamic forces that are generated from seismic events and are not only dependent on the magnitude of the earthquake but also the types and properties of those soils that underlie the site. As such, the International Building Code (IBC) requires that a Seismic Site Class be assigned based upon the soils encountered in the upper one hundred (100) feet of the ground surface. Based on the results of our exploration, we calculate that the Seismic Site Class Definition of "D" for this site under the 2012 International Building Code (IBC). A more favorable Site Class may be achieved for the site based on the completion of shear wave velocity measurements, which requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100 foot soil profile determination. The boring performed for this report extended to a maximum depth of 15 feet.

3.6 Floor Slabs and Other Flatwork

A proofroll should be completed within 24 hours prior to the placement of floor-slab concrete or underlying aggregate base materials. The exposed soil subgrade (including any newly placed engineered fill materials) should be proofrolled as outlined in this report. If areas of instability or significant deflection are noted, the areas will require undercutting and/or stabilization.

Depending on weather conditions and time constraints, soft or loose soils may be aerated by disking or dried by other methods, and then recompacted in-place. However, if it is not possible to improve the subgrade soils because of weather conditions or scheduling, it may be necessary to remove the unsuitable materials and replace them with crushed stone with the possible inclusion of a geogrid material.

It is recommended that slab-on-grade floors be supported on a minimum 4-inch thick layer of compacted granular base material. A vapor barrier can be placed immediately beneath the slab to facilitate the application of moisture sensitive floor coverings if desired. If curling of the slab edges is of greater concern, the vapor barrier can be placed below the granular base material.

The slab should include control joints to preclude random cracking. Particular attention should be paid to the placement of backfill against foundation walls where equipment access is difficult, as inadequate compaction at these locations may cause cracking of the edges and corners of the slab as a result of backfill settlement. The slab should be designed to be structurally independent of any building footings or walls and should be appropriately reinforced to support the loads proposed. Assuming that the slab subgrade is prepared in accordance with the recommendations of this report, a modulus of subgrade reaction (k) of 100 psi/inch may be used for the design of the slabs.

3.7 Slope Stability

Our exploration did not include a detailed analysis of slope stability for any temporary or permanent condition. We recommend temporary slopes no steeper than 2.0(H):1.0(V) and permanent slopes no steeper than 3.0(H):1.0(V) for construction in existing natural soils or new structural fill placed in accordance with our recommendations. In building areas, minimum top of slope setbacks of 10 feet and 5 feet are recommended, respectively. Slopes should be protected from erosion, and surface runoff should be diverted away from slopes. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible.

3.8 Groundwater Conditions and Control

Based on the site conditions, we do anticipate that groundwater may be encountered during the building foundation construction operations if depths exceed approximately 3-4 feet below the existing ground surface elevation. Depending on the seasonal conditions, there may be some seepage into excavations at shallower depths. The contractor is responsible to assure adequate groundwater control is in-place and functioning prior to the start of any work then allowing all work to be performed in a dry (free from flowing or standing water) condition. The contractor is responsible to establish the means and methods of groundwater control and to include all such items in his bid and scope of work.

In order to prevent adverse effects of groundwater to exposed subgrade materials, it has been our experience that groundwater levels when lowered and maintained at a depth of at least 3 feet below the limits of subgrade excavation and undercutting elevation typically provide a stable working platform.

Rainwater and runoff that accumulate in footing excavations can be pumped out of small dug sumps. Groundwater levels are subject to seasonal, climatic and other variations and may be different at other times and locations than those stated in this report. A site drainage scheme should be implemented and maintained at all times by the contractor to redirect all off site drainage away from the limits of construction. Ponding or standing water may result in softening of soils that will require additional remedial work to facilitate construction.

Installation of utilities below the water table will be problematic, requiring dewatering, if it is encountered. The contractor should be required to control this water such that the utilities can be constructed in the “dry”. The utility joints should be covered with a drainage fabric such as Mirafi 180N, or equivalent, which should extend at least 12 inches beyond each side of the joint.

3.9 Pavement Design and Construction Recommendations

Based upon our evaluation and analyses, the on-site soils should be acceptable for construction and support of an asphaltic concrete type pavement section after proper subgrade preparation as recommended in the site preparation section of this report. The subgrade should be compacted to a minimum depth of 12 inches to at least 98 percent of the Standard Proctor maximum dry density (ASTM D-698). The recommended pavement section are provided below.

Pavement	Flexible Pavement Structural Section
Standard Duty	1.5-inches Surface Course Asphaltic Concrete 1.75-inches Intermediate Course Asphaltic Concrete 6-inches Graded Aggregate Base Course
Heavy Duty	1.5-inches Surface Course Asphaltic Concrete 2.5-inches Intermediate Course Asphaltic Concrete 8-inches Graded Aggregate Base Course

4.0 CONSTRUCTION & GRADING CONSIDERATIONS

A review of the final plans should be conducted by ATC, and subsequently some of the comments and recommendations included in this report may require modifications. It is recommended that an ATC representative evaluate all exposed soils which are to support structural elements such as foundations, building pads, etc. Any soils containing organics observed during construction excavation activities should be removed and replaced with compacted engineered fill. Recommendations regarding construction monitoring are found in Section 3 of this report.

4.1 Construction Monitoring

It is strongly recommended that ATC be retained to provide a comprehensive construction-monitoring program when the project proceeds. This program would assist the owner in determining that the work is being carried out in general conformance with the plans and specifications and help avoid the potential of change orders and cost overruns. Construction monitoring includes testing of construction materials such as compacted fill and concrete and engineering observation during the site preparation, and paving construction phases of the project.

Monitoring and testing during the earthwork and paving construction phases is particularly important since assumptions and recommendations have been made based on the soil boring data. Confirmation that actual subsurface conditions are comparable to the assumed conditions is an essential part of the subsurface exploration process.

4.2 Pavement Monitoring

Monitoring of the asphalt pavement operations will be essential to the success of the project. It is recommended that the contractor's performance be evaluated during the paving process to determine if methods being utilized in the field are attaining results that meet the requirements of the project specifications. It is recommended that paving operations be monitored by an ATC representative. The representative can assist the paving contractor by performing nuclear density measurements, assisting in the establishment of a rolling pattern, and sampling in-place asphalt pavements. It is also recommended that a laboratory testing program be established to evaluate the conformity of the asphalt mix with regards to the project specifications and approved mix design. Typical lab testing should include pavement thickness measurements, asphalt bulk specific gravity, Marshall Density, maximum theoretical density, and extraction / gradation testing.

5.0 GENERAL REMARKS/REPORT LIMITATIONS

An inherent limitation of any geotechnical engineering exploration is that conclusions must be drawn on the basis of data collected at a limited number of locations. The recommendations provided in this report were developed from the information obtained from the test borings, which depict subsurface conditions only at the specific locations and at the particular time designated on the logs. Soil conditions at other locations and times may differ from conditions encountered at these boring locations. The nature and extent of variations between the borings may not become evident until construction. If variations then appear evident, the recommendations in this report may need to be re-evaluated.

ATC's professional services have been performed, the findings obtained, and the recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied. ATC is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploration and laboratory test data presented in this report.

The scope of this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater or surface water within or beyond the site studied.

APPENDIX

Important Information about Your Geotechnical Report

Test Boring Location Plan

Soil Test Boring Logs

Reference Notes for Boring Logs

Important Information About Your

Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from alight industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ-sometimes significantly from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of 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 equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

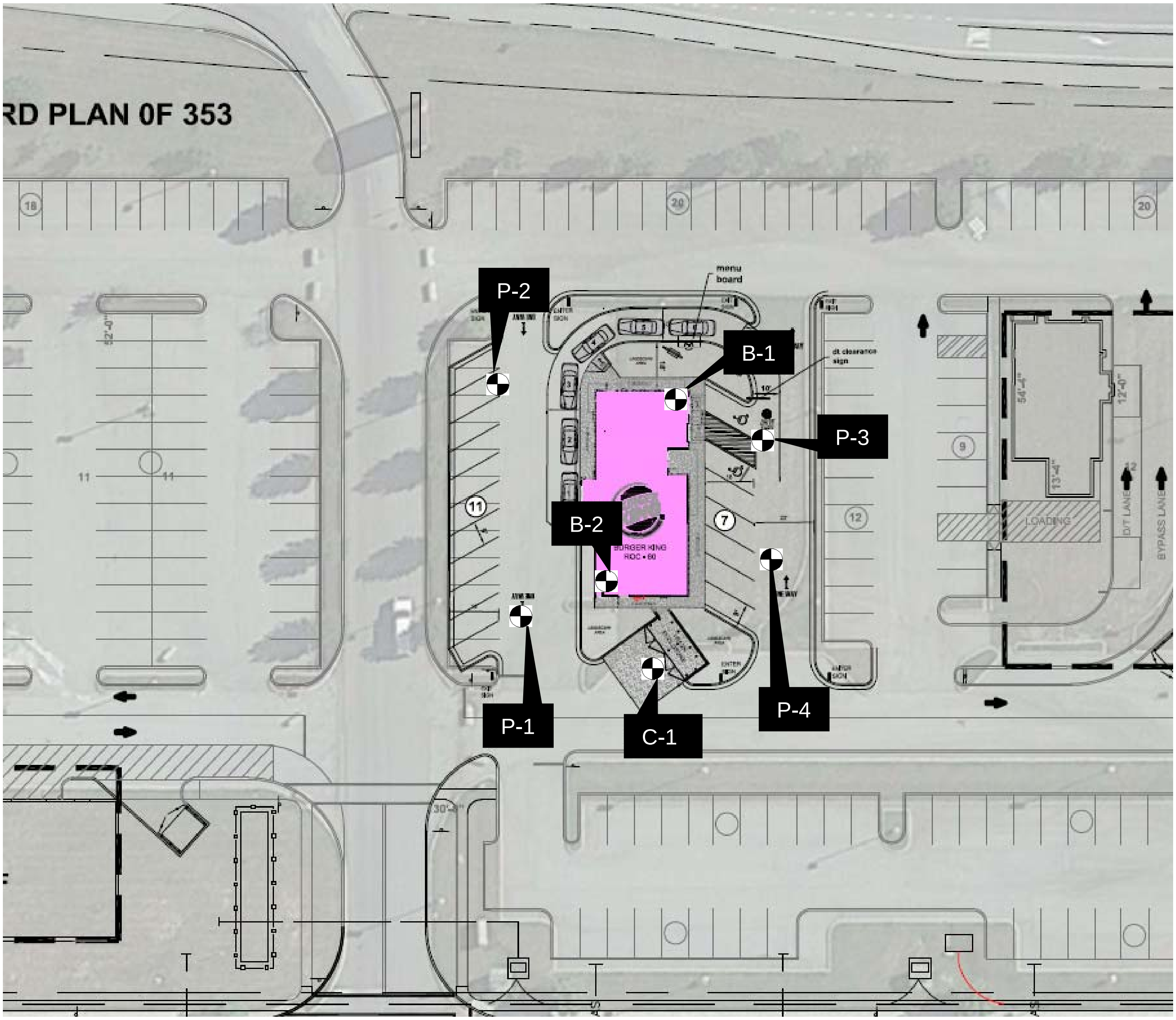
Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in-this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer For Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone:' 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org



= approximate boring location

Figure 1 Field Work Location Plan

Proposed Burger King
Avondale, PA

ATC
ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

7606 Whitehall Executive Center Dr.
Suite 800
Charlotte, North Carolina 28217
www.atcgroupservices.com
Phone: 704-529-3200
Fax: 704-529-3272
N.C. Engineering License No. C-1598

PROJECT No:

SOURCE: Partial Copy Google Earth Photo

Scale: NTS

7606 Whitehall Executive Center Drive
Charlotte, NC 28273
704-529-3200
Fax 704-529-3272

TEST BORING LOG

CLIENT **GPS Hospitality**
PROJECT NAME **Burger King**
PROJECT LOCATION **Gap Newport Pike**
Avondale, Pennsylvania

BORING # **B-1**
JOB # **1011601242**
DRAWN BY **JGS**
APPROVED BY **JGS**

DRILLING and SAMPLING INFORMATION

Date Started	**5/18/18**	Hammer Wt.	**140** lbs.
Date Completed	**5/18/18**	Hammer Drop	**30** in.
Drill Foreman	**ALLIED**	Spoon Sampler OD	**2** in.
Inspector	**ATC**	Rock Core Dia.	**NA** in.
Boring Method	**HSA**	Shelby Tube OD	**NA** in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, N - blows/foot	Qu-psi Unconfined Compressive Strength	Moisture Content %	Liquid Limit (LL)	Plastic Limit (PL)	Pocket Penetrometer, tsf	Remarks
Medium dense brown clayey SAND	1.0		1	SS			13						
Loose to dense SAND with rock fragments			2	SS			10		13.4				
		5	3	SS			42		4.3				
	6.0												
Loose to medium dense clayey SAND with rock fragments			4	SS			9		20.1				
			5	SS			7		20.8				
		10											
			6	SS			10		17.6				
		15											
			7	SS			13		15.0				
	20.0	20											
BORING TERMINATED													

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
Noted on Drilling Tools **NE** ft.
At Completion (in augers) **NE** ft.
At Completion (open hole) **NA** ft.
After **NA** hours **NA** ft.
After **NA** hours **NA** ft.
Cave Depth **NA** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

7606 Whitehall Executive Center Drive
Charlotte, NC 28273
704-529-3200
Fax 704-529-3272

TEST BORING LOG

CLIENT	GPS Hospitality	BORING #	B-2
PROJECT NAME	Burger King	JOB #	1011601242
PROJECT LOCATION	Gap Newport Pike	DRAWN BY	JGS
	Avondale, Pennsylvania	APPROVED BY	JGS

DRILLING and SAMPLING INFORMATION

Date Started	5/18/18	Hammer Wt.	140 lbs.
Date Completed	5/18/18	Hammer Drop	30 in.
Drill Foreman	ALLIED	Spoon Sampler OD	2 in.
Inspector	ATC	Rock Core Dia.	NA in.
Boring Method	HSA	Shelby Tube OD	NA in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Standard Penetration Test, N - blows/foot	Qu-psi Unconfined Compressive Strength	Moisture Content %	Liquid Limit (LL)	Plastic Limit (PL)	Pocket Penetrometer, tsf	Remarks
Medium dense brown gravely SAND	2.0		1	SS	13		6.3				
Medium dense to loose clayey SAND with rock fragments			2	SS	9						
		5	3	SS	14		17.3				
			4	SS	7		16.3				
			5	SS	15		17.0				
		10									
			6	SS	13						
		15									
	20.0		7	SS	17		17.5				
BORING TERMINATED		20									

<u>Sample Type</u>
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

<u>Depth to Groundwater</u>
Noted on Drilling Tools NE ft.
At Completion (in augers) NE ft.
At Completion (open hole) NA ft.
After NA hours NA ft.
After NA hours NA ft.
Cave Depth NA ft.

<u>Boring Method</u>
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

7606 Whitehall Executive Center Drive
Charlotte, NC 28273
704-529-3200
Fax 704-529-3272

TEST BORING LOG

CLIENT **GPS Hospitality**
PROJECT NAME **Burger King**
PROJECT LOCATION **Gap Newport Pike**
Avondale, Pennsylvania

BORING # **C-1**
JOB # **1011601242**
DRAWN BY **JGS**
APPROVED BY **JGS**

DRILLING and SAMPLING INFORMATION

Date Started	**5/18/18**	Hammer Wt.	**140** lbs.
Date Completed	**5/18/18**	Hammer Drop	**30** in.
Drill Foreman	**ALLIED**	Spoon Sampler OD	**2** in.
Inspector	**ATC**	Rock Core Dia.	**NA** in.
Boring Method	**HSA**	Shelby Tube OD	**NA** in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, N - blows/foot	Qu-psi Unconfined Compressive Strength	Moisture Content %	Liquid Limit (LL)	Plastic Limit (PL)	Pocket Penetrometer, tsf	Remarks
Medium dense to dense to very loose brown clayey SAND with rock fragments			1	SS			14		10.7				
			2	SS			16		5.5				
		5	3	SS			11		16.5				
			4	SS			31		9.7				
		10	5	SS			29						
			6	SS			4						
	15.0	15											
BORING TERMINATED													

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
Noted on Drilling Tools **NE** ft.
At Completion (in augers) **NE** ft.
At Completion (open hole) **NA** ft.
After **NA** hours **NA** ft.
After **NA** hours **NA** ft.
Cave Depth **NA** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

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Charlotte, NC 28273
704-529-3200
Fax 704-529-3272

TEST BORING LOG

CLIENT: **GPS Hospitality**
PROJECT NAME: **Burger King**
PROJECT LOCATION: **Gap Newport Pike**
Avondale, Pennsylvania

BORING #: **P-1**
JOB #: **1011601242**
DRAWN BY: **JGS**
APPROVED BY: **JGS**

DRILLING and SAMPLING INFORMATION

Date Started	**5/18/18**	Hammer Wt.	**140** lbs.
Date Completed	**5/18/18**	Hammer Drop	**30** in.
Drill Foreman	**ALLIED**	Spoon Sampler OD	**2** in.
Inspector	**ATC**	Rock Core Dia.	**NA** in.
Boring Method	**HSA**	Shelby Tube OD	**NA** in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Groundwater	Standard Penetration Test, N - blows/foot	Qu-psi Unconfined Compressive Strength	Moisture Content %	Liquid Limit (LL)	Plastic Limit (PL)	Pocket Penetrometer, tsf	Remarks
6" ASPHALT 6" AGGREGATE BASE	1.0		1	SS			8						
Loose to medium dense reddish brown clayey SAND with rock fragments			2	SS			15						
			3	SS			12		16.4				
	6.0	5											
Firm to stiff reddish brown sandy CLAY			4	SS			9		20.9				
			5	SS			8		24.0				
	10.0	10											
BORING TERMINATED													

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- Noted on Drilling Tools **NE** ft.
- At Completion (in augers) **NE** ft.
- At Completion (open hole) **NA** ft.
- After **NA** hours **NA** ft.
- After **NA** hours **NA** ft.
- Cave Depth **NA** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

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Charlotte, NC 28273
704-529-3200
Fax 704-529-3272

TEST BORING LOG

CLIENT: GPS Hospitality
PROJECT NAME: Burger King
PROJECT LOCATION: Gap Newport Pike, Avondale, Pennsylvania

BORING #: P-2
JOB #: 1011601242
DRAWN BY: JGS
APPROVED BY: JGS

DRILLING and SAMPLING INFORMATION

Date Started	5/18/18	Hammer Wt.	140 lbs.
Date Completed	5/18/18	Hammer Drop	30 in.
Drill Foreman	ALLIED	Spoon Sampler OD	2 in.
Inspector	ATC	Rock Core Dia.	NA in.
Boring Method	HSA	Shelby Tube OD	NA in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, N - blows/foot	Qu-psi Unconfined Compressive Strength	Moisture Content %	Liquid Limit (LL)	Plastic Limit (PL)	Pocket Penetrometer, tsf	Remarks
6" ASPHALT	1.0		1	SS			10		12.3				
6" AGGREGATE BASE	2.0												
Loose brown clayey SAND			2	SS			13		20.5				
Medium dense to loose clayey SAND with rock fragments			3	SS			10		21.9				
		5	4	SS			9		17.6				
			5	SS			13						
	10.0	10											
BORING TERMINATED													

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Depth to Groundwater
- Noted on Drilling Tools NE ft.
- At Completion (in augers) NE ft.
- At Completion (open hole) NA ft.
- After NA hours NA ft.
- After NA hours NA ft.
- Cave Depth NA ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

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Charlotte, NC 28273
704-529-3200
Fax 704-529-3272

TEST BORING LOG

CLIENT **GPS Hospitality**
PROJECT NAME **Burger King**
PROJECT LOCATION **Gap Newport Pike**
Avondale, Pennsylvania

BORING # **P-3**
JOB # **1011601242**
DRAWN BY **JGS**
APPROVED BY **JGS**

DRILLING and SAMPLING INFORMATION

Date Started	**5/18/18**	Hammer Wt.	**140** lbs.
Date Completed	**5/18/18**	Hammer Drop	**30** in.
Drill Foreman	**ALLIED**	Spoon Sampler OD	**2** in.
Inspector	**ATC**	Rock Core Dia.	**NA** in.
Boring Method	**HSA**	Shelby Tube OD	**NA** in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, N - blows/foot	Qu-psi Unconfined Compressive Strength	Moisture Content %	Liquid Limit (LL)	Plastic Limit (PL)	Pocket Penetrometer, tsf	Remarks
6" ASPHALT 6" AGGREGATE BASE	1.0		1	SS			16		7.6				
Loose to dense brown clayey SAND with rock fragments			2	SS			22		12.2				
		5	3	SS			8		9.8				
			4	SS			13		24.4				
	10.0	10	5	SS			40/5"		17.8				
BORING TERMINATED													

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Depth to Groundwater
Noted on Drilling Tools **NE** ft.
At Completion (in augers) **NE** ft.
At Completion (open hole) **NA** ft.
After **NA** hours **NA** ft.
After **NA** hours **NA** ft.
Cave Depth **NA** ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

TEST BORING LOG

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Charlotte, NC 28273
704-529-3200
Fax 704-529-3272

CLIENT	**GPS Hospitality**	BORING #	**P-4**
PROJECT NAME	**Burger King**	JOB #	**1011601242**
PROJECT LOCATION	**Gap Newport Pike**	DRAWN BY	**JGS**
	Avondale, Pennsylvania	APPROVED BY	**JGS**

DRILLING and SAMPLING INFORMATION

Date Started	**5/18/18**	Hammer Wt.	**140** lbs.
Date Completed	**5/18/18**	Hammer Drop	**30** in.
Drill Foreman	**ALLIED**	Spoon Sampler OD	**2** in.
Inspector	**ATC**	Rock Core Dia.	**NA** in.
Boring Method	**HSA**	Shelby Tube OD	**NA** in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Groundwater	Standard Penetration Test, N - blows/foot	Qu-psi Unconfined Compressive Strength	Moisture Content %	Liquid Limit (LL)	Plastic Limit (PL)	Pocket Penetrometer, tsf	Remarks
6" ASPHALT 6" AGGREGATE BASE	1.0		1	SS			47		14.4				
Dense to medium dense brown clayey SAND with rock fragments			2	SS			29		13.9				
	6.0	5	3	SS			32						
Firm to stiff reddish brown sandy CLAY			4	SS			7						
	10.0	10	5	SS			14						
BORING TERMINATED													

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

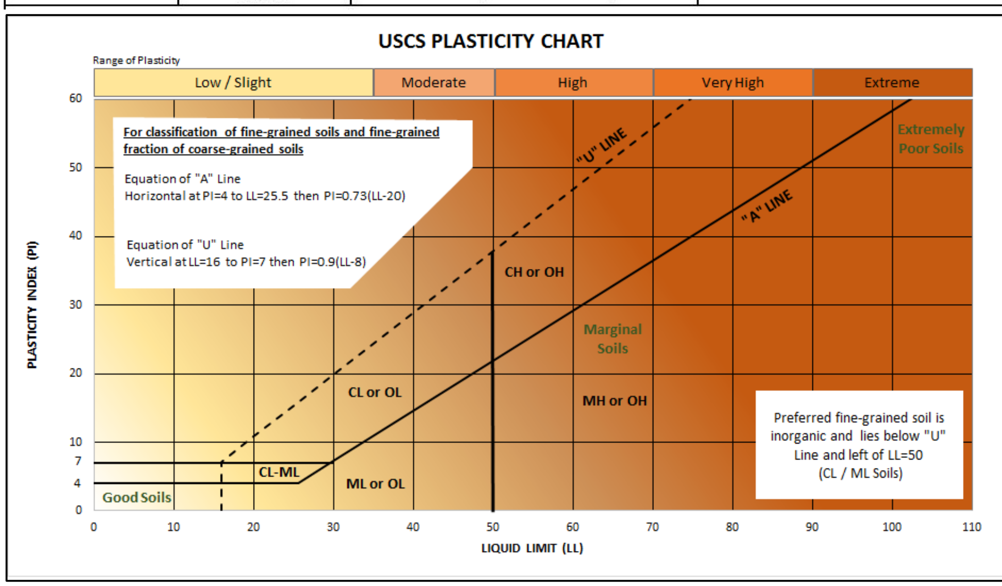
Depth to Groundwater
- Noted on Drilling Tools **NE** ft.
- At Completion (in augers) **NE** ft.
- At Completion (open hole) **NA** ft.
- After **NA** hours **NA** ft.
- After **NA** hours **NA** ft.
- Cave Depth **NA** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

SOIL DESCRIPTIONS BASED ON THE UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

ASTM D 2487 and D 2488

Major Division			Group Symbol	Letter Symbol	Group Name*
Coarse Grained Soils Less Than 50 Percent Passing the # 200 Sieve	GRAVEL - Percent GRAVEL > percent SAND	Gravel with < 5% Fines		GW	Well Graded GRAVEL
				GP	Poorly Graded GRAVEL
		Gravel with Between 5 and 15% Fines		GW-GM	Well Graded GRAVEL with silt
				GW-GC	Well Graded Gravel with clay
				GP-GM	Poorly Graded GRAVEL with silt
				GP-GC	Poorly Graded GRAVEL with clay
		Gravel with ≥ 15% Fines		GM	Silty GRAVEL
				GC	Clayey GRAVEL
				GC-GM	Silty, Clayey GRAVEL
	SAND - Percent SAND ≥ percent GRAVEL	Sand with < 5% Fines		SW	Well Graded SAND
				SP	Poorly Graded SAND
		Sand with Between 5 and 15% Fines		SW-SM	Well Graded SAND with silt
				SW-SC	Well Graded SAND with clay
				SP-SM	Poorly Graded SAND with silt
				SP-SC	Poorly Graded SAND with clay
		Sand with ≥ 15% Fines		SM	Silty SAND
				SC	Clayey SAND
				SC-SM	Silty, Clayey SAND
Fine Grained Soils 50 percent or more Passing the # 200 Sieve	SILT and CLAY	Liquid Limit Less Than 50		ML	SILT
				CL	Lean CLAY
				CL-ML	SILTY CLAY
				OL	Organic SILT, CLAY, or SILTY CLAY
		Liquid Limit 50 or Greater		CH	Fat CLAY
				MH	Elastic SILT
				OH	Organic SILT or CLAY
Highly Organic Soils				PT	Peat
* Additional Modifiers	Coarse Grained Soils	with silt or clay		5 to 12 % Silt or Clay by weight	
		Silty or Clayey		more than 12 % Silt or Clay by weight	
	Fine Grained Soils	with sand or gravel		15 to 29 % Sand or Gravel by weight	
		Sandy or Gravelly		30 % or more Sand or Gravel by weight	



Sample Type Indicator

= Split Spoon

= Shelby Tube

= Rock Core

= Bag Sample

KEY TO SYMBOLS AND CLASSIFICATIONS

|	Undisturbed sample recovered
●	Standard Penetration Resistance (ASTM D 1587)
100/2"	Number of blows (100) to drive the spoon a number of inches (2)
AX,BX,NX	Core barrel sizes thet obtain cores 1-1/8, 1-5/8, and 2-1/8 inches in diameter respectively
65%	Percentage of rock core recovered
RQD	Rock quality designation
U	Unit weight test performed
A	Atterberg limits test performed
C	Consolidation test performed
GS	Grain size test performed
T	Triaxial shear test performed
P	Permeability test performed
V	Field shear test performed
▼ (solid, truncated)	Caved Level
▼	Water table at least 24-hours after drilling
▽	Water table one hour or less after drilling

CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

	No. of Blows, N	Approximate Relative Density
SANDS	0-4	Very Loose
	5-10	Loose
	11 – 30	Medium Dense
	31 – 50	Dense
	50+	Very Dense
SILTS AND CLAYS	0 – 2	Very Soft
	2 – 4	Soft
	5 – 8	Firm
	9 – 15	Stiff
	16 – 30	Very Stiff
	30+	Hard

Soil sampling and standard penetration testing performed in accordance with ASTM D 1586. The standard penetration resistance is the number of blows of a 140 pound hammer falling 30 inches to drive 2-inch o.d., 1.4-inch i.d., split barrel sampler one foot. Core drilling in accordance with ASTM D 2113. The undisturbed sampling procedure is described by ASTM D 1587. Soil and rock samples will be discarded 30 days after the date of the final report unless otherwise directed.