



REPORT OF PRELIMINARY GEOTECHNICAL EXPLORATION

PATUXENT GREENS
PRINCE GEORGE'S COUNTY, MARYLAND

December 20, 2017

Prepared For:

ADC Builders, Inc.
6290 Montrose Road
Rockville, MD 20852

Attn: Mr. Alan Cohen
cc: Mr. Alex Villegas, Rodgers
Mr. Milt McCarthy

Prepared By:

GEO-TECHNOLOGY ASSOCIATES, INC.
Geotechnical and Environmental Consultants
14280 Park Center Drive, Suite A
Laurel, MD 20707
(410) 792-9446 or (301) 470-4470
Facsimile (410) 792-7395

GTA Job No: 171358

GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND
ENVIRONMENTAL CONSULTANTS

A Practicing GBA Member Firm



December 20, 2017

ADC Builders, Inc.
6290 Montrose Road
Rockville, MD 20852

Attn: Mr. Alan Cohen

Re: Report of Preliminary Geotechnical Exploration
Patuxent Greens Golf Club
Prince George's County, Maryland

Dear Alan:

In accordance with our proposal, dated November 8, 2017, Geo-Technology Associates, Inc. (GTA) has performed a preliminary geotechnical exploration for the mixed-use development planned at the existing Patuxent Greens Golf Club in Laurel, Prince George's County, Maryland. This study included 23 Standard Penetration Test (SPT) borings, visual classifications of the soils, and limited laboratory testing. The results of field and laboratory testing and a summary of the implications of the subsurface conditions with respect to the proposed development are included in this report. GTA has performed a Phase II Environmental Site Assessment (ESA) for the project site. The results of the Phase II ESA are presented in GTA's *Phase II Environmental Site Assessment*, dated August 24, 2017.

GTA's understanding of the site is based on our review of the following plans:

- The draft *Concept Land Plan*, prepared by Rodgers Consulting (Rodgers), the project civil engineer, dated November 9, 2017. This plan depicted a conceptual, proposed site layout.
- The *Soil Boring Exhibit*, prepared by Rodgers, dated November 2017. This plan depicted the existing site grades, proposed roadway and lot layout, the proposed boring locations, and the proposed site grading in portions of the site where compensatory floodplain basins are planned.

Detailed site plans with proposed grades in the remainder of the site or details regarding other site improvements, such as stormwater management (SWM) facilities or subsurface utilities, were not available at the time of this report.

14280 Park Center Drive, Suite A, Laurel, MD 20707 (410) 792-9446 (301) 470-4470 Fax (410) 792-7395

◆ Abingdon, MD ◆ Baltimore, MD ◆ Laurel, MD ◆ Frederick, MD ◆ Waldorf, MD ◆ Sterling, VA ◆ Fredericksburg, VA ◆ Malvern, OH
◆ Somerset, NJ ◆ NYC Metro ◆ New Castle, DE ◆ Georgetown, DE ◆ York, PA ◆ Quakertown, PA ◆ Charlotte, NC ◆ Raleigh, NC

Visit us on the web at www.gtaeng.com

Existing Site Conditions

The approximately 192-acre project site is located east of Laurel Bowie Road (MD Route 197) and Greenview Drive, south of Fort Meade Road (MD Route 198) in Laurel, Prince George's County, Maryland. The site is generally bound to the west by existing residential developments, to the north by a wooded City of Laurel property and an existing retail development, and to the northeast, east, and south by undeveloped, wooded land. The Patuxent River runs along the southeastern property boundary, and the Bear Branch runs in an approximately southeasterly direction along the northeastern boundary of the site. The adjacent wooded land to the east and southeast is a United States Fish and Wildlife Service Refuge.

At the time of GTA's exploration, the project site was developed with the Patuxent Greens Golf Club, which included an 18-hole golf course with paved access paths, ponds, and sand traps interspersed throughout. The eastern and northern portions of the site were wooded. The northwestern portion of the project site was developed with the following features:

- A two-story office building
- A one-story clubhouse with a partially below-grade level beneath a portion of the building footprint. A portion of this building extended over an adjacent pond and was supported on piles.
- A one-story banquet hall
- Two maintenance/storage sheds
- An in-ground swimming pool and kiddie pool
- Three tennis courts
- A paved parking area

Topographically, the existing ground surface on the site generally ranges from about 114 to 120 feet above Mean Sea Level (MSL), with localized ridges and depressions associated with the golf course features. The bottom elevations of the existing ponds are generally on the order of 113 to 114 feet above MSL. An elevated berm runs along the southeastern and northeastern portions of the site, with top elevations ranging from about 124 to 128 feet above MSL. Surface water is generally anticipated to flow radially from the knolls and berms toward the existing on-site ponds and, ultimately in the easterly or northeasterly direction toward the Patuxent River and its tributaries.

Proposed Construction

Based on the previously referenced plans, the site is planned to be developed with about 210 townhome units in the western portion of the site and 157 single-family homes in the central and northern portions. The site is planned to be accessible from a new, paved entrance extending east from the intersection of Greenview Drive and Clubhouse Boulevard, in roughly the same location as the entrance to the existing golf club. Several new roadways are planned throughout the site to

provide access to the proposed residences. Details regarding the proposed residences were not available at the time of this report. However, GTA understands that the townhomes are planned to be slab-on-grade units, while the single-family homes will include basements. Several of the existing site improvements in the northwestern portion of the site are planned to remain, including the two-story office building, the clubhouse, the tennis courts, and the in-ground pool. Several of the existing ponds are also planned to remain.

Based on the available plans and discussions with the design team, GTA understands that excavations are planned in the eastern and southern portions of the site for compensatory floodplain storage basins and the soil generated from these excavations will be used as fills to establish the proposed grades for the remainder of the site. The basins are planned with bottom elevations of 101 to 104 feet above MSL. Excavations on the order of 12 to 20 feet will generally be required to establish the proposed basin bottom elevations. Proposed grades for the residential portion of the site were not available at the time of this report. However, proposed spot elevations at the RD-series boring locations were provided by Rodgers. Based on this limited grading information, fills on the order of 4 to 8 feet are generally planned at the locations of borings performed within the proposed roadways. Further information regarding the proposed site development, including proposed slab elevations, utility locations/invert elevations, and SWM facilities were not available at the time of this report.

Site Geology

According to the Geologic Map of Maryland (1968) and the Geologic Map for Land Use Planning, Prince George's County, Maryland (1977), prepared by the Maryland Geological Survey, the site is located in the Coastal Plain Physiographic Province, which is characterized by interlayered sedimentary deposits from historic marine and estuarine environments. More specifically, the following geologic units are mapped in the site vicinity:

- *River Alluvium* is mapped at the ground surface over the majority of the site. The River Alluvium generally consists of silty and clayey sand, gravel, and silt-clay, with finer sediments more common near the surface. These sediments were likely deposited in major streams, and typically range in thickness from approximately 3 to 25 feet. Areas of this formation are poorly drained and can be subject to flooding, with the groundwater table at or near the ground surface during wet periods.
- The *Potomac Group* (sand facies) is mapped at the ground surface in the northwestern portion of the site. This unit is generally composed of interbedded fine- to coarse-grained quartz sands and gravels, typically white or reddish-brown in color, with subordinate silt and clay. Inclusions of iron-cemented sands are commonly encountered in this formation.

The mapped geology in the site vicinity is depicted on the *Site Geology Map*, included as Figure No. 2 within Appendix A. Please refer to the above-referenced publications for more details regarding these geologic units.

Subsurface Exploration

A subsurface exploration program consisting of 23 SPT borings, referenced as Borings SB-1 through SB-13 and RD-1 through RD-10, was performed at the site in November of 2017. The locations of the borings were selected and field located by Rodgers using an instrumented survey. Borings SB-3, SB-10, SB-13, RD-1, RD-4, RD-6, RD-9, and RD-10 were offset from their staked locations due to access constraints and close proximity to existing site improvements. Ground surface elevations at these boring locations were visually estimated in the field, using the known stakeout elevation as reference, and should be considered approximate. The approximate exploration locations are shown on the Exploration Location Plan, included as Figure No. 3 within Appendix A.

The borings were advanced to depths of 10 to 20 feet below existing grades using GTA's track-mounted, CME-45 drill rig, equipped with hollow-stem augers and split-spoon samplers. Temporary, perforated, PVC pipes were placed in selected boreholes to facilitate groundwater readings. Water levels were measured upon completion of the borings, as well as 1 to 3 days after completion. The soil samples recovered from the borings were returned to GTA's laboratory for visual classification and limited laboratory testing. The classification system shown on the logs are in general accordance with the Unified Soil Classification System (USCS) by visual/manual methods, supplemented by available laboratory testing.

Subsurface Conditions

At the ground surface, the borings encountered topsoil layers generally ranging from 2 to 4 inches in thickness. Beneath the topsoil, materials identified as existing fills were encountered in seven borings (Borings RD-1, RD-2, RD-10, SB-4, SB-5, SB-11, and SB-13) to depths of about 1 to 4 feet below existing grades. The existing fills were classified as Silty SAND (SM), SILT (ML), Lean CLAY (CL), and Elastic SILT (MH). SPT N-values within the existing fills ranged from 4 to 14, indicating very loose to medium dense or medium stiff to stiff soil conditions. Localized samples of existing fills materials included minor proportions of organic material (root/wood fragments), asphalt fragments, and gravel.

Underlying the topsoil and existing fills, where encountered, the native soils were generally consistent with the description of the River Alluvium presented in the *Site Geology* section of this report. Fine-grained soils were generally encountered within the top 5 to 8 feet of existing grades. The native, fine-grained soils were classified as SILT (ML), Lean CLAY (CL), and Elastic SILT (MH) and generally exhibited moderate to high plasticity. SPT N-values observed within the native silts and clays were variable, typically ranging from 2 to 15 bpf, indicating soft to stiff soil conditions. Very soft silts and clays which exhibited an SPT N-value of 1 bpf, or which were soft enough that the weight of the hammer was sufficient to advance the split spoon sampler (denoted as "WOH" on the boring logs), were encountered in localized layers at depths ranging from about 2 to 10 feet below existing grades. These very soft materials were generally saturated soils from near the observed groundwater depth.

Underlying the near-surface, fine-grained soils, the borings generally encountered native sands and gravels to their termination depths. These native, granular materials were classified as Silty SAND (SM), Poorly Graded SAND (SP), Well Graded SAND (SW), Poorly Graded GRAVEL (GP), Well Graded GRAVEL (GW), and Silty GRAVEL (GM). The relatively “clean” soils (SP, SW, GP, GW) were more not generally encountered at depths of less than 8 feet below existing grades. SPT N-values within the shallower sands and gravels (i.e. depths of less than 12 feet below existing grades) were highly variable, ranging from 2 to 63 bpf, indicating very loose to very dense soil conditions. Sands and gravels identified as very loose to loose were generally located near the observed groundwater table. At depths of greater than 12 feet below existing grades, SPT N-values in the native sands and gravels ranged from 12 bpf to 50 blows for 3 inches of penetration, indicating medium dense to very dense soil conditions. Materials sufficiently dense to impede advancement of the augers were not encountered in the borings. It should be noted, however, that very dense sand and gravel was encountered at the termination depths of several of the borings.

During drilling, groundwater was observed at depths of about 3 to 8 feet below existing grades in 21 of the 23 borings. Upon completion of drilling, groundwater was observed at typical depths of 3 to 10 feet in 21 of the 23 borings. Groundwater readings obtained one to three days after completion of drilling indicated the presence of groundwater at depths of about 3 to 7 feet below existing grades in 20 of the 23 borings. The remaining boreholes were dry to their cave-in depths of about 2 to 4 feet below existing grades. Note that groundwater levels can fluctuate with seasonal variations in precipitation. Also, due to the stratified nature of the site, perched groundwater conditions may develop where water becomes trapped in granular soils underlain by less permeable materials. Please refer to the Subsurface Profiles, included as Figure Nos. 4 through 6 within Appendix A, and the Subsurface Exploration Summary and individual SPT boring logs within Appendix B for further information.

Laboratory Testing

Three samples collected from the borings were subjected to grain size analyses and Atterberg Limits testing to determine the USCS and the American Association of State Highway and Transportation Officials (AASHTO) designations for the soils. The results of these tests are summarized in the following table:

SUMMARY OF CLASSIFICATION TESTING

Sounding No.	Depth (ft.)	Natural Moisture Content (%)	USCS Description	AASHTO Classification	LL (%)	PI (%)
SB-2	5.0 to 6.5	36.8	MH, Elastic SILT with Sand	A-7-5	51	15
SB-9	2.5 to 4.0	47.7	CL, Lean CLAY with Sand	A-7-6	49	23
SB-10	2.5 to 4.0	21.7	SM, Silty SAND	A-4	NP	NP

Note: LL=Liquid Limit PI=Plasticity Index NP=Non-Plastic

Bulk samples recovered from two borings were subjected to moisture-density relationship testing in general accordance with the Modified Proctor Test (ASTM D-1557, AASHTO T-180). These test results are summarized in the following table:

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTING

Boring No.	Depth (ft)	USCS Description	Maximum Dry Density (pcf)	Optimum Moisture (%)	Natural Moisture (%)
SB-9	0 to 6	CL, Lean CLAY with Sand	103.3	17.8	47.7
SB-10	0 to 6	SM, Silty SAND	124.8	9.8	21.7

Selected samples collected from the borings were tested for natural or ‘in-situ’ moisture contents. The results of the moisture content testing is summarized as follows:

- Gravels (GP, GW, GM) and Clean Sands (SP, SW) were typically saturated and exhibited moisture contents generally ranging from 10 to 19 percent, and as high as 33 percent.
- Silty Sands (SM) generally exhibited moisture contents of 11 to 25 percent, and as high as 28 percent in saturated samples.
- Low- to moderate-plasticity, fine-grained soils (ML, CL) exhibited typical moisture contents of 18 to 34 percent, and as high as 71 percent.
- High-plasticity silts (MH) exhibited typical moisture contents of 37 to 55 percent, and as high as 65 percent.

Please refer to the laboratory test results provided in Appendix C for further information.

Geotechnical Implications of Subsurface Conditions

Based upon the results of this exploration, it is GTA’s opinion that construction of the proposed development is feasible, provided the following geotechnical recommendations are observed and the standard level of care is maintained during construction. The proposed site development will be impacted by the presence of shallow groundwater and high moisture content soils. The following geotechnical concerns should be taken into consideration:

- Significant dewatering effort will be required for basin excavations and other construction which extends below existing grades.
- Extensive moisture conditioning of soils excavated from the basin will be required for reuse as structural fill.

- If basements are planned, site grades in the residential portion of the site should be planned such that basements are located at least 4 feet above the observed groundwater levels.
- Compressible, fine-grained soils which may consolidate under the loads of the additional mass grading fills may be present in portions of the site.
- Foundation subgrades bearing at or below existing grades will likely be impacted by the presence of loose/soft, native soils.
- Pavement subgrades will likely be impacted by the presence of plastic, moisture and disturbance-sensitive soils.
- Infiltration techniques for SWM purposes are not likely to be feasible for the project site.

This information was derived from engineering analysis of preliminary field and laboratory data and the plans available at the time of this study. The site development/grading plans, utility plans, and SWM details should be provided to GTA when available for a design-phase exploration and evaluation. Depending on the final details of the development and the design-phase exploration, revisions to the recommendations and assessments included herein may be necessary.

Site Grading

Preliminary proposed grading information was available for the eastern and southern portions of the site, in the areas of the proposed compensatory floodplain basins. Based on the proposed grading, excavations typically on the order of 12 to 18 feet below existing grades, and approaching 20 feet in localized areas, are planned for basin construction. Grading information was not available for the remaining portions of the site where residential development is planned. However, limited proposed spot grades indicate that fills on the order of 4 to 8 feet are generally planned at the locations of borings performed within the residential area. Based on the limited available grading information and discussions with the design team, GTA understands that materials generated from the basin excavations are generally planned to be used as fill materials within the residential portion of the site.

Based on the results of the borings, the proposed basin excavations can likely be made using standard excavation techniques (i.e. scraping). However, layers of very dense sands and gravels were encountered in some borings at depths greater than 8 feet below existing grades. Such materials will likely require increased excavation effort for removal.

Groundwater was observed at typical depths of 3 to 8 feet below existing grades in the majority of the borings. Based on the proposed depths of excavation for basin construction, the basin excavations, and other site excavations which extend greater than several feet below existing grades, will be impacted by the presence of groundwater on a widespread basis. Significant dewatering measures will be required to control groundwater during basin construction. The use of perimeter diversion trenches in conjunction with dewatering sumps may be a feasible option for groundwater control of mass excavations. A perimeter diversion trench system involves excavation of trenches

around the active excavation zone which extend deeper than the excavation zone. The diversion trenches collect groundwater and direct the groundwater to a sump pit for discharge. A system to control discharge of sediments will likely be required in order to discharge groundwater off-site. Sediment control dewatering bags or similar systems may be feasible for this purpose. GTA recommends discussing possible dewatering options with a local earthwork contractor and including a contingency for dewatering and sediment filtering during basin construction. Excavations should be properly shored in accordance with the latest OSHA standards.

Very soft, fine-grained soils were encountered in localized layers. If such materials are present in areas where significant new fills are planned, delayed consolidation settlement may occur. Depending on the proposed grading, special measures may be recommended in order to reduce the potential for impacts caused by long-term consolidation. Such measures may include the installation of settlement monitoring plates and the incorporation of a waiting period following fill placement. Additional explorations and laboratory testing are recommended to evaluate the potential for long-term settlement of the soft, native soils and to provide recommendations regarding the need for such measures.

Existing fills were encountered in seven borings across the site to depths of about 1 to 4 feet below existing grades. Fill compaction records for these fills were not available and, as such, the existing fills are considered to be undocumented. Where encountered, existing fills should be removed and replaced with controlled, compacted fills.

Prior to the placement of controlled, compacted fill, the area to receive fill should be stripped of vegetation, topsoil, soils containing significant organic content, existing fills, or other deleterious materials. Topsoil thicknesses typically ranged from about 2 to 4 inches at the boring locations. GTA anticipates an average stripping thickness on the order of 6 inches over the majority of the site. Greater stripping thicknesses will likely be required in wooded areas, where tree roots can extend several feet below the ground surface. Following stripping, the areas to receive fill should be proofrolled in the presence of the geotechnical engineer or his approved representative to identify any loose, soft, wet, or otherwise unsuitable areas. Surficial materials identified to be unstable or unsuitable should be undercut to a stable stratum and backfilled with controlled, compacted fill as recommended in the field by the geotechnical engineer.

Slab/basement elevations for the proposed townhomes and single-family homes were not available at the time of this report. If building foundations are planned below existing grades, it is likely that soft/loose native soils will be present at the foundation subgrades. If present at the foundation subgrade during foundation construction, such soft/loose soils would require undercutting and replacement, which would likely be costly due to the presence of shallow groundwater. To avoid widespread undercutting of foundation subgrades, the project team should consider planning sufficient depths of new fills in the residential areas such that building foundations bear at or above existing grades. However, this may not be practical for units with basements.

If building foundations are planned to bear in the near-surface, native soils, widespread undercutting of soft/loose soils will likely be required. Undercutting and replacement of such soils during mass grading will likely be more cost effective than performing undercuts during foundation construction. The need for mass undercuts should be further evaluated when building elevations are available and once a more extensive, design-phase geotechnical exploration is performed.

Significant quantities of native soils will be generated from the proposed basin excavations. GTA understands that these native materials will be utilized as fill materials in the residential areas of the site. GTA recommends that fills should generally be placed within 2 to 4% of the optimum moisture content. Fine-grained soils (ML, CL, MH) should be placed at moisture contents 2 to 4% above the optimum moisture content. Based on the available laboratory test data, significant proportions of the materials generated from site excavations are expected to be significantly wetter than the optimum moisture content for compaction. Significant cost and effort will be required for moisture conditioning of wet, excavated soils. In order to reduce the cost of moisture conditioning, GTA recommends the following:

- When high natural moisture content soils are generated from excavations, they should be spread in thin lifts, aerated, and allowed to air dry. A summer construction season is strongly recommended to improve the effectiveness of air drying.
- Chemical admixtures, such as cement or lime, may be used to lower the moisture content of wet soils. However, the use of chemical admixtures is likely not practical or cost-effective for soils which have natural moisture contents significantly higher than optimum moisture contents (i.e. greater than 10% above optimum).
- Compaction requirements may be reduced for fills which are placed in non-structural areas or in deeper fills placed greater than 10 feet below existing grades. This will allow for placement of soils at higher moisture contents. However, in areas where significant depths of wet fill are placed, the Client must accept some risk of settlement due to long-term consolidation of these materials. Mitigating measures can be incorporated to reduce such risks.

New fills constructed on slopes steeper than 5H:1V should be keyed into existing slopes for stability considerations and should be placed as structural fill. Cut and fill slopes should be graded to no steeper than 3H:1V unless specifically engineered. Fill slopes should be constructed using the most granular material available on site.

Significant quantities of granular soils (SM, SP) will likely be generated from the deeper basin excavations. Such materials will be preferred for use as fill for pavement subgrades and utility trench backfill. Where encountered in basin excavations, granular soils should be segregated for later re-use as select backfill material.

Structural fills should be placed and compacted in a controlled manner in accordance with project and county specifications. The removal of existing fills, proofrolling of fill subgrades, undercutting of any uncontrolled or unsuitable material, and the placement of controlled, compacted fill should be observed and tested by the geotechnical engineer or his qualified representative.

Structural Support

Proposed slab elevations were not available at the time of this report. Due to the presence of shallow groundwater, proposed basement grades will likely be influenced by Prince George's County permitting requirements for single-family homes, summarized as follows:

- Where groundwater is present 2.5 feet or less below the proposed basement floor elevation, an underdrain system that connects, by gravity, to a storm drain system or to daylight is required.
- Basement floors may not extend below the observed groundwater elevation.

The civil engineer should consider the relatively shallow groundwater depths and the potential need for foundation drain connections to the storm drain system when planning basement and storm drain elevations. Based on the limited available groundwater information, site grades will likely need to be raised to allow for construction of basements.

Limited proposed spot grades indicate that fills of 4 to 8 feet are generally planned at the boring locations within the residential area. The proposed single-family homes and townhomes will likely be supported in native soils, or in new fills placed during mass grading. The native soils are generally considered suitable for support of lightly loaded structures. However, soft, fine-grained soils were commonly observed in the borings. Soft, native soils present at the foundation subgrade should be undercut and replaced with open-graded stone (e.g. No. 57 stone) or lean concrete. If a significant portion of footings are expected to bear in native soils, the Client should consider stockpiling No. 57 stone on site for backfill of foundation undercuts.

Existing fill materials were encountered in localized borings across the site. Documentation regarding placement of the existing fills was not available at the time of this report. Therefore, the existing fills are considered undocumented and are not considered suitable for support of the proposed structures. Where present at the foundation subgrade, existing fills should be undercut to a stable, native stratum and replaced with open-graded stone or lean concrete.

The proposed townhomes should be proportioned for a net allowable bearing pressure of 2,000 pounds per square foot (psf). Exterior footings should be founded a minimum of 30 inches below final exterior grade to provide protection from frost action. Minimum widths of 16 inches for wall footings and 24 inches for column footings are recommended when design based on the

recommended bearing pressure yields a narrower footing. All footings should be supported on firm, native soils or newly placed, controlled, compacted fill.

Foundation excavations should be reviewed by a professional geotechnical engineer or his qualified representative prior to concrete placement. Penetration testing should be performed upon exposed foundation subgrades to confirm the design allowable bearing capacity. Foundations should be concreted on the day they are excavated.

Roadway/Utility Considerations

Based on limited available grading information in the residential portion of the site, the proposed roadway subgrades are likely to generally consist of new fills placed during mass grading. In general accordance with Prince George's County requirements, GTA recommends that the upper 12 inches of pavement subgrade be constructed of soils meeting the following characteristics:

Liquid Limit (AASHTO T 89)	40 or less
Plastic Index (AASHTO T 89, T 90)	12 or less
Maximum Dry Density (AASHTO T 99)	105 pcf or higher
California Bearing Ratio (T 193)	7 percent or higher

The native soils classified as SP or SM will likely meet the above criteria. Such soils were commonly encountered in the borings, generally at depths of about 10 feet or more below existing grades. Based on the depths of the proposed basin excavations, significant amounts of this suitable, granular material will likely be generated from site excavations. GTA recommends that excavated granular materials which meet the above criteria should be segregated for later use as fill within 2 feet of the roadway subgrades.

The borings generally encountered fine-grained soils (ML, CL, MH) at shallow depths. If the roadways are planned at or below existing grades, such fine-grained materials will likely be present at the roadway subgrade. These fine-grained soils will not meet the above requirements for pavement subgrades and are considered poor for pavement support. Where present at the pavement subgrade, fine-grained soils should be chemically stabilized with cement or lime to a depth of at 12 inches. This site is considered to be well-suited for the use of chemical admixtures for the stabilization of roadway subgrades. Alternatively, the top 12 inches of pavement subgrade may be chemically stabilized with cement or lime.

Prior to construction of pavement sections, the pavement subgrade should be proofrolled with a loaded, tandem-axle dump truck under the direct supervision of the geotechnical engineer to verify stability. Assuming fills are placed to establish the roadway subgrade elevations, it is GTA's opinion that full-length underdrains, typically required by Prince George's County, are not necessary. Transverse pavement drains ("finger" or "stub" drains) should be installed near catch basins to reduce the potential for saturation of the pavement subgrade. A typical pavement drain detail is

ADC Builders, Inc.

Re: Patuxent Greens Golf Club – Report of Preliminary Geotechnical Exploration

December 20, 2017

Page 12

included as Figure No. 7 within Appendix A. It should be noted that reducing the planned underdrains will require County approval.

Detailed utility plans showing proposed utility layouts and invert elevations were not available at the time of this report. Based on the results of the borings, excavations to depths of 10 to 20 feet can likely be made using standard excavation techniques (e.g. scraping). Very dense, native sands and gravels may be encountered in deeper utility excavations (i.e. greater than 10 feet below existing grades). If encountered in utility excavations, increased excavation effort will be required for removal of such materials.

Groundwater was generally encountered at depths of 3 to 8 feet below existing grades in the borings. Therefore, utility excavations which extend more than several feet below existing grades are likely to be impacted by the presence of groundwater. Proposed utility depths should be limited to the extent feasible to reduce groundwater impacts during construction. If utility construction is planned to extend more than a few feet below the groundwater table, a significant dewatering effort including the use of well points will likely be required during construction. Additional subsurface explorations should be performed along proposed utility alignments in an effort to characterize groundwater depths and evaluate the need for such dewatering systems. Please note that groundwater levels may fluctuate with seasonal variations in precipitation, and perched water conditions may develop where granular soils are underlain by less permeable materials.

The use of fine-grained, plastic soils (ML, CL, MH) for utility backfill should be limited to the extent feasible. The most granular, low plasticity materials available should be used for utility backfill. Low to moderate plasticity soils used as utility backfill should be placed in maximum 6-inch loose lifts and compacted with a sheep's-foot type roller at moisture content 2 to 4 percent above optimum. Care should be taken to ensure that these materials are not placed within 12 inches of final subgrade, unless chemical stabilization of the pavement subgrade is planned.

The use of plastic soils (ML, CL, MH) for utility trench backfill will entail some risk of trench settlement and associated impacts. The extent of adverse impacts and the potential for such risks to materialize is totally dependent on the contractor care and adherence to strict quality control by their field personnel including lift thickness, moisture content, breaking down of lumps/clods, and use of sheep's-foot rollers or other suitable compaction equipment. The risk of poor utility trench performance, associated settlements, and other impacts can be mitigated by using only granular backfill (SP, SW, SM, GP, GW, GM) as utility backfill. If, due to economic or other considerations, fine-grained or plastic soils must be used as utility backfill, strict adherence to the recommendations included herein is required. Based on GTA's experience, it is difficult to get the utility contractor to "buy in to" the level of care required for utility trench backfill. GTA recommends that the Client's contract with the utility contractor should include language making the contractor responsible for the adequate performance of the trench backfill irrespective of the presence and spot observation and testing performed by the third-party testing company. Appropriate contingency should also be included to repair utility backfill where poor performance or settlement is noted. Full-time

observation/testing of the utility backfill is also recommended to verify proper backfill and compaction of utility trenches and to reduce the potential for trench settlement. However, such observation is not to be construed to relieve the utility contractor to provide proper quality control and follow appropriate construction means and methods.

Stormwater Management Considerations

Plans showing the proposed locations, types, or depths of proposed SWM facilities were not available at the time of this report. The design and construction of SWM facilities will likely be impacted by the presence of shallow groundwater and fine-grained soils. For SWM facilities which utilize infiltration techniques, the Maryland Department of the Environment (MDE) provides the following requirements.

- Infiltration cannot be located within fill soils.
- The bottom of the infiltration facility shall be separated by at least 4 feet vertically from rock or groundwater.
- Soils underlying the SWM facility shall have an infiltration rate of 0.52 inches per hour or greater.

Based on the available subsurface information, the near-surface soils are predominantly fine-grained materials which will not provide the required infiltration rate. The deeper, granular soils are generally located below the observed groundwater levels. Therefore, the use of infiltration techniques for SWM purposes is not likely to be feasible for this project.

Depending on the proposed facility bottom elevations, excavations for SWM facilities will likely be impacted by the presence of groundwater. Subsurface explorations should be performed at the locations of proposed SWM facilities to evaluate potential groundwater impacts.

Additional Services

We recommend that, during design and construction of the project site, a geotechnical engineer should be retained to provide further geotechnical consultation and observation/testing services for the following items:

- Perform a geotechnical review and design-phase explorations to provide more detailed recommendations. These additional explorations will be required for permitting of various improvements, including SWM facilities, roadways, and single-family homes.
- Provide testing and observation services during basin excavations and new fill placement to evaluate if the work is being performed in accordance with the project specifications and intent of this report.

- Observe the proofroll of fill and pavement subgrades prior to placing fill to evaluate stability.
- Review excavated footings for compliance with the project drawings and the intent of this geotechnical report.

Limitations

This report, including all supporting boring logs, field data, field notes, laboratory test data, calculations, estimates and other documents prepared by GTA in connection with this project have been prepared for the exclusive use of ADC Builders, Inc. pursuant to agreements between GTA and ADC Builders, Inc. 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 ADC Builders, Inc. 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. Test borings 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 or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our client.

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

ADC Builders, Inc.

Re: Patuxent Greens Golf Club – Report of Preliminary Geotechnical Exploration

December 20, 2017

Page 15

Soil samples recovered in conjunction with this report will be discarded approximately 60 days after the date of this report unless other arrangements are made by the client. Thank you for this opportunity to assist you. Should you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,

GEO-TECHNOLOGY ASSOCIATES, INC.



John P. Ermer, P.E.

Project Engineer



Benjamin T. Dinsmore, P.E.

Associate

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No.: 29184, Expiration Date: 08/16/2019. BTD

\\laurel\data\docs\Project Files\2017\171358 Patuxent Greens\Doc\GEO 171358 Patuxent Greens.doc

GTA Project # 171358

cc: Mr. Alex Villegas, Rodgers

Mr. Milt McCarthy

Attachments:

GBA – Important Information About Your Geotechnical Engineering Report (2 Pages)

Appendix A Figures

Figure No. 1 – Site Location Plan (1 sheet, color)

Figure No. 2 – Site Geology Map (1 sheet, color)

Figure No. 3 – Exploration Location Plan (1 sheet, 24"x36")

Figure Nos. 4 through 6 – Subsurface Profiles (3 sheets, 11"x17", color)

Figure No. 7 – Typical Pavement Drain Detail (1 sheet)

Appendix B Exploration Logs

Notes for Exploration Logs (1 sheet)

Subsurface Exploration Summary (1 sheet)

SPT Boring Logs (23 sheets)

Appendix C Laboratory Data (9 sheets)

Important Information about Your 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.

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 many 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 a light-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, droughts, 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, many 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 GBA-Member Geotechnical Engineer for Additional Assistance

Membership in the GEOPROFESSIONAL BUSINESS ASSOCIATION exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your GBA-member geotechnical engineer for more information.



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

Copyright 2014 by Geoprofessional Business Association, Inc.(GBA). Duplication, reproduction, or copying of this document, in whole or in part, by any means whatsoever, is strictly prohibited, except with GBA's specific written permission. Excerpting, quoting, or otherwise extracting wording from this document is permitted only with the express written permission of GBA, and only for purposes of scholarly research or book review. Only members of GBA may use this document as a complement to or as an element of a geotechnical-engineering report. Any other firm, individual, or other entity that so uses this document without being a GBA member could be committing negligent or intentional (fraudulent) misrepresentation.

APPENDIX A
FIGURES

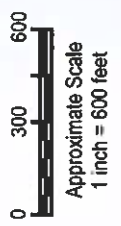


Notes

Base image obtained from Google Earth. Imagery date: 12/19/2016



GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
 14280 PARK CENTER DRIVE, SUITE A
 LAUREL, MARYLAND 20707
 (410) 792-9446 or (301) 470-4470
 FAX: (410) 792-7395
www.glaeng.com
 © Geo-Technology Associates, Inc.



PATUXENT GREENS
 PRINCE GEORGE'S COUNTY, MARYLAND

SITE LOCATION MAP

PROJECT: 171358

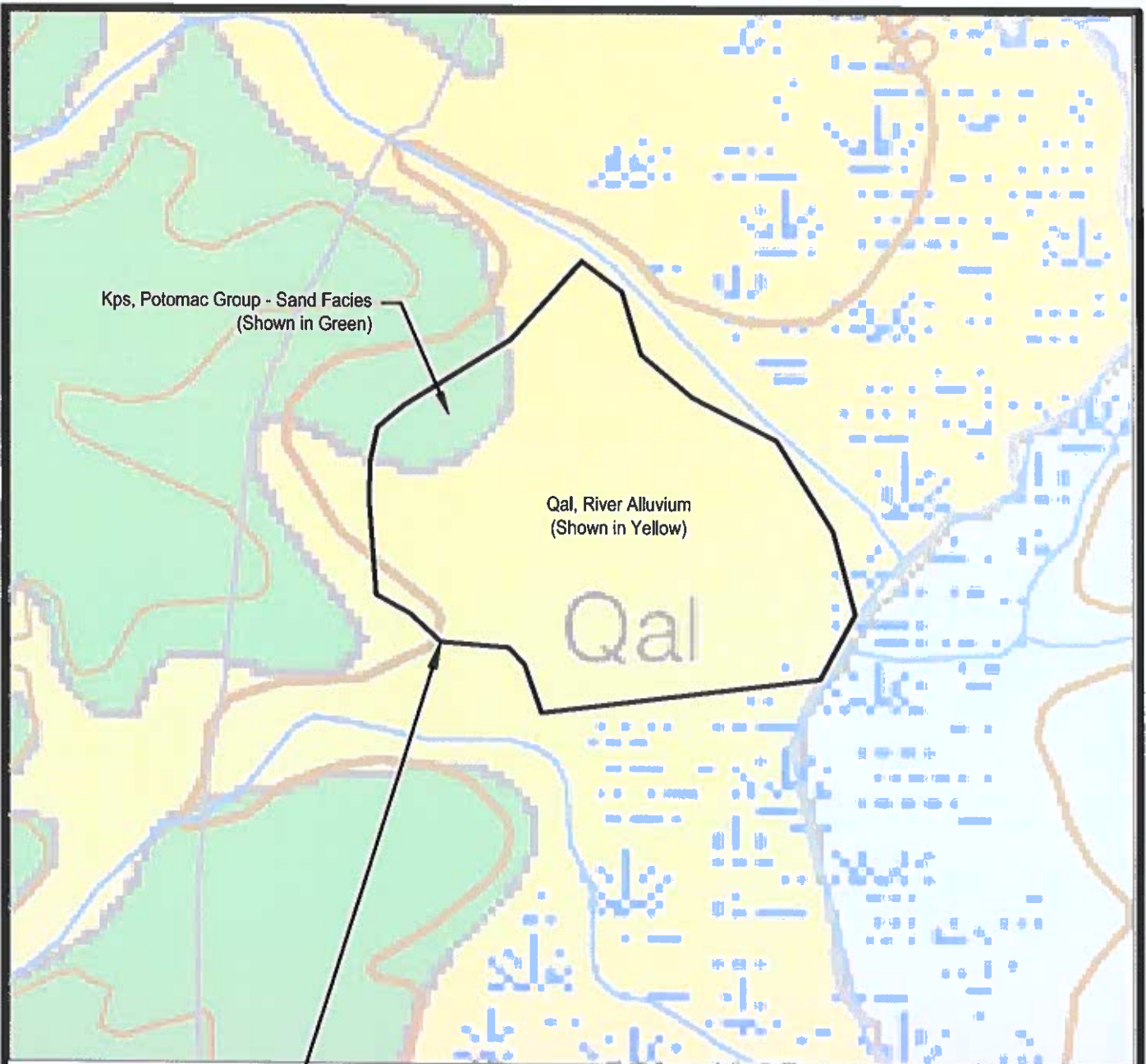
DATE: Dec. 2017

SCALE: 1" = 600'

DESIGN BY: JPE

REVIEW BY: BTD

FIGURE: 1



Kps, Potomac Group - Sand Facies
(Shown in Green)

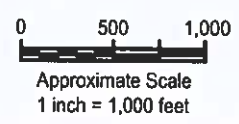
Qal, River Alluvium
(Shown in Yellow)

Qal

Approximate
Site Location

Notes

Base image obtained from the *Geologic Map of Prince George's County, Maryland (1977)*, prepared by the Maryland Geological Survey.



GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
 14280 PARK CENTER DRIVE, SUITE A
 LAUREL, MARYLAND 20707
 (410) 792-9446 OR (301) 470-4470
 FAX: (410) 792-7395
 www.gtaeng.com
 © Geo-Technology Associates, Inc.

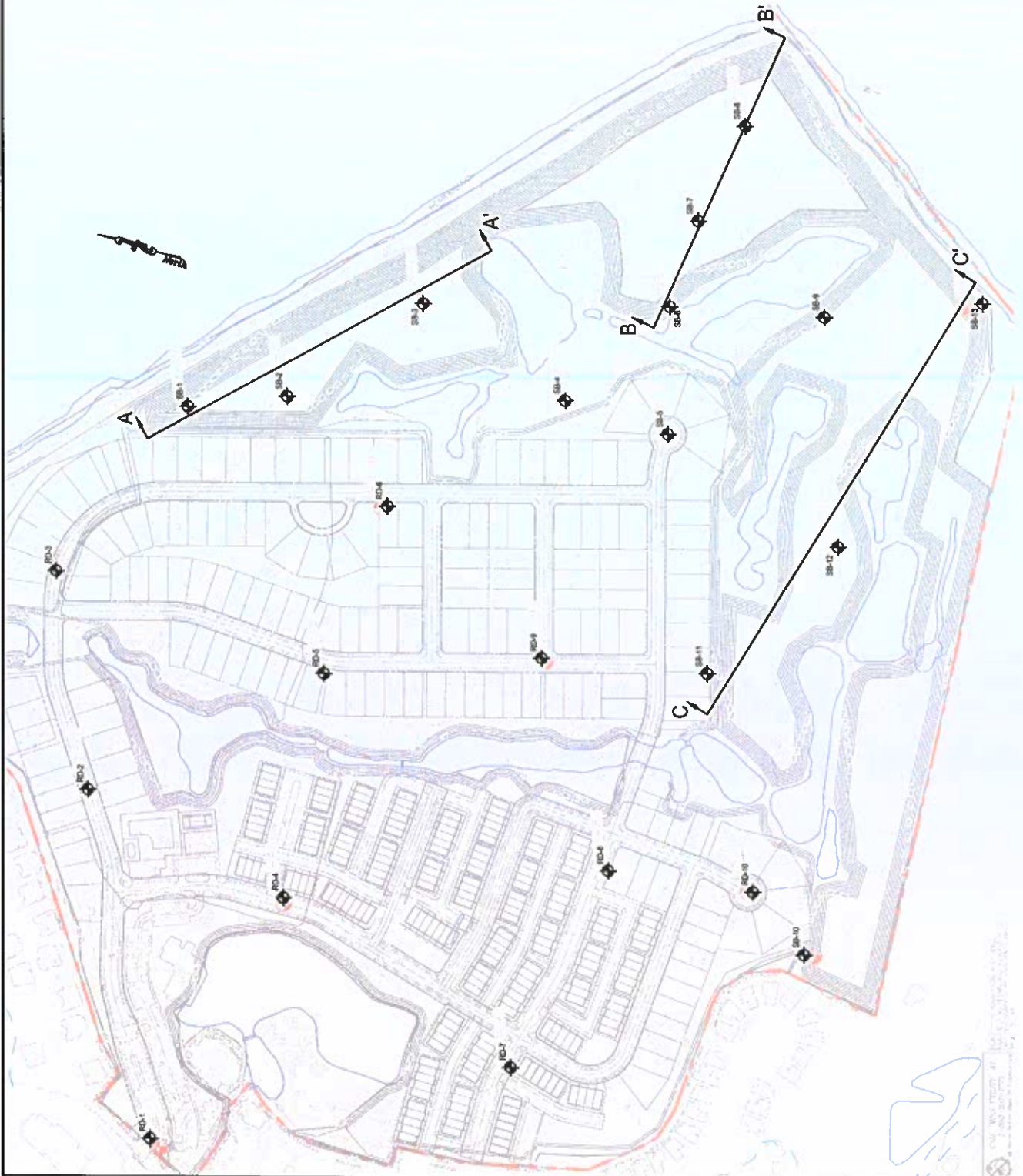
PATUXENT GREENS
 PRINCE GEORGE'S COUNTY, MARYLAND

SITE GEOLOGY MAP

PROJECT: 171358	DATE: Dec. 2017	SCALE: 1" = 1,000'	DESIGN BY: JPE	REVIEW BY: BTD	FIGURE: 2
-----------------	-----------------	--------------------	----------------	----------------	-----------

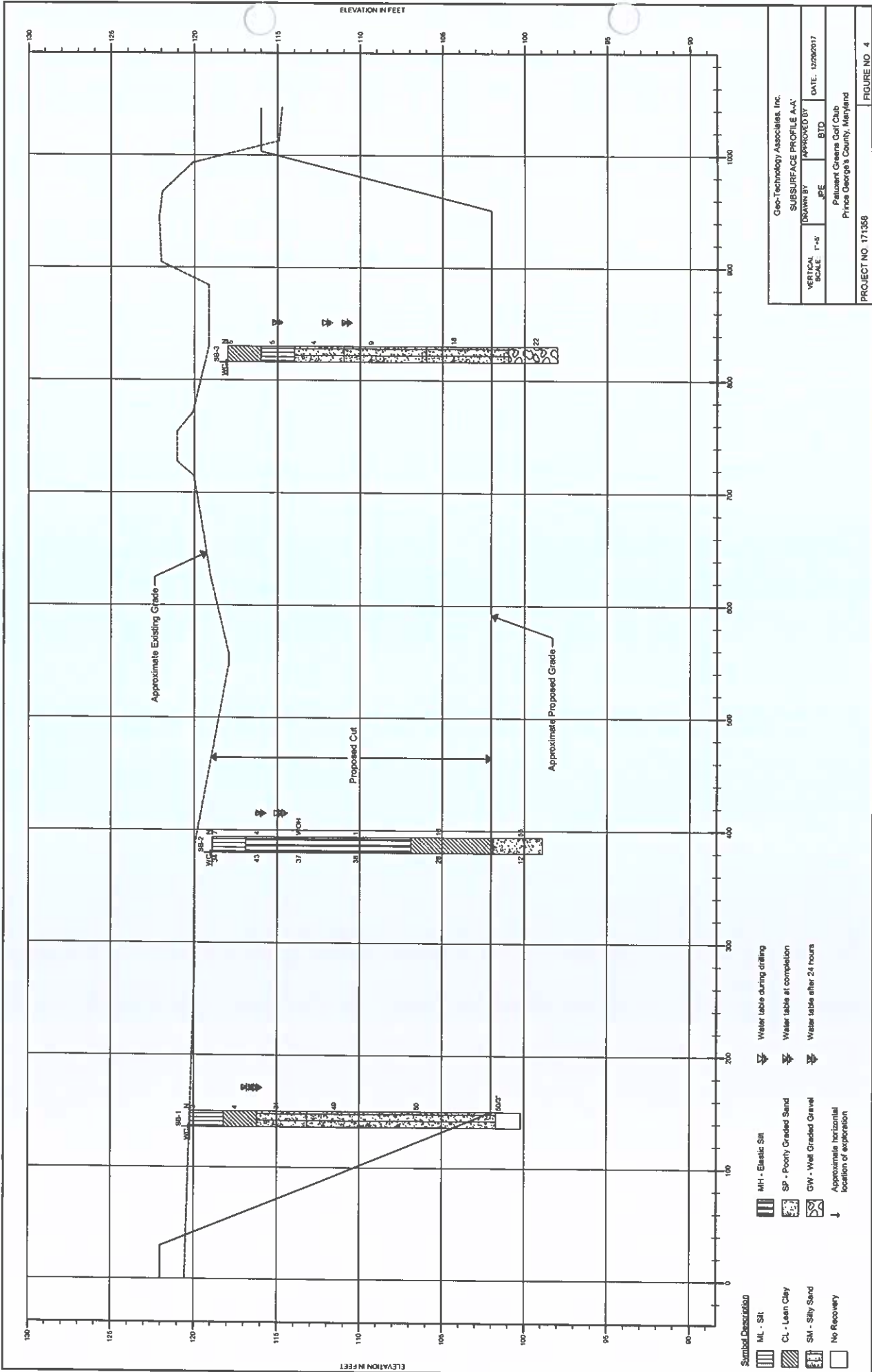
- Legend**
- SB-1 Includes all general conditions of Standard Practice "Set" (SP) drawings submitted to GSA for Project Review
 - SB-2 Includes all general conditions of Standard Practice "Set" (SP) drawings submitted to GSA for Project Review
 - RD-1 Includes all general conditions of Standard Practice "Set" (SP) drawings submitted to GSA for Project Review
 - RD-2 Includes all general conditions of Standard Practice "Set" (SP) drawings submitted to GSA for Project Review

This document is the property of Geo-Technology Associates, Inc. It is to be used only for the project and site specifically identified herein. It is not to be used for any other project or site without the written consent of Geo-Technology Associates, Inc. The user of this document is advised that the user is responsible for obtaining all necessary permits and approvals from the appropriate authorities. Geo-Technology Associates, Inc. is not responsible for any errors or omissions in this document. © Geo-Technology Associates, Inc.

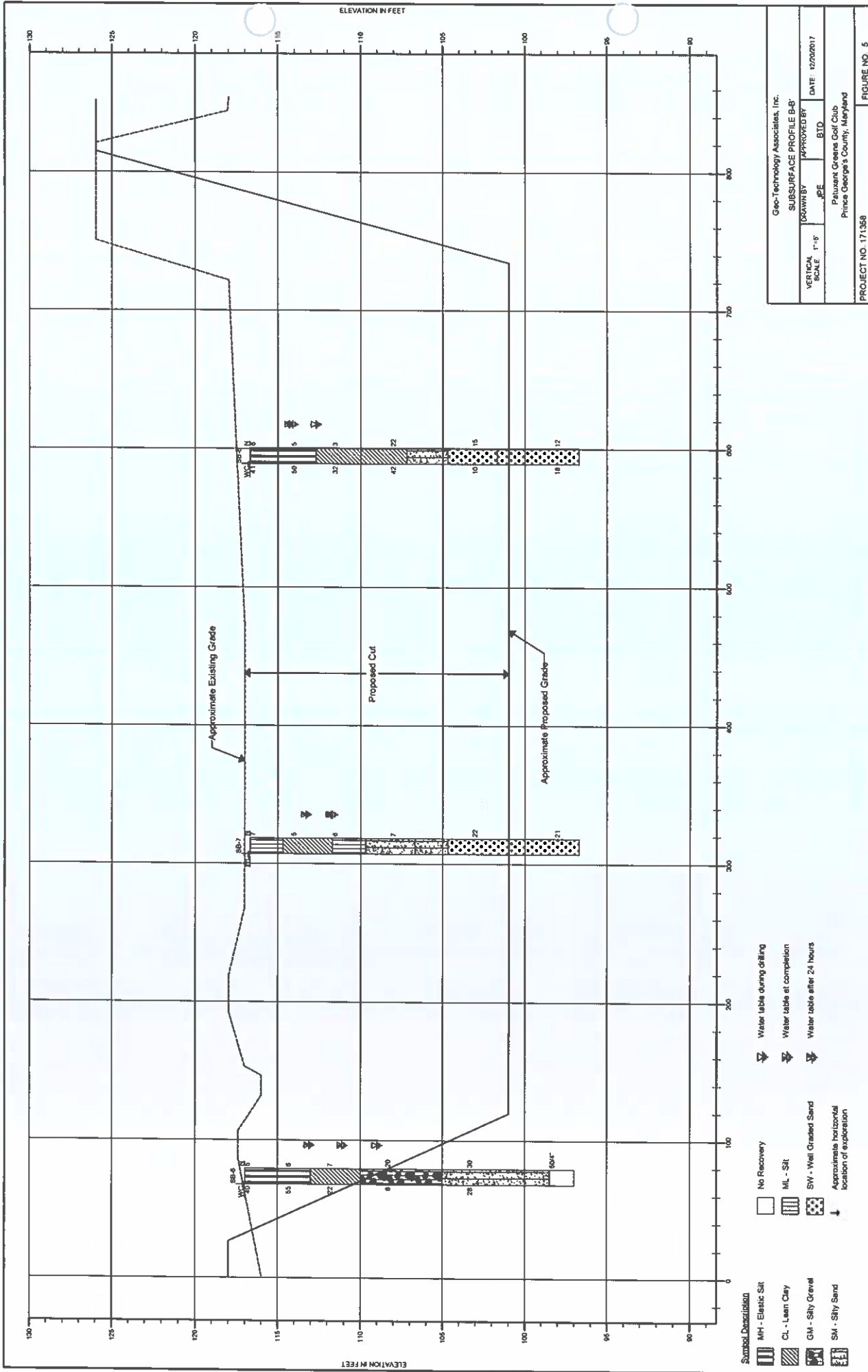


Geo-Technology Associates, Inc.
 1400 PARK CENTER DRIVE, SUITE A
 PATUXENT GREENS GOLF CLUB
 1400 PARK CENTER DRIVE
 PATUXENT GREENS GOLF CLUB
 PATUXENT GREENS GOLF CLUB
 © Geo-Technology Associates, Inc.

PATUXENT GREENS GOLF CLUB
PROJECT: COURSE, LEVELS
EXPLORATION LOCATION PLAN



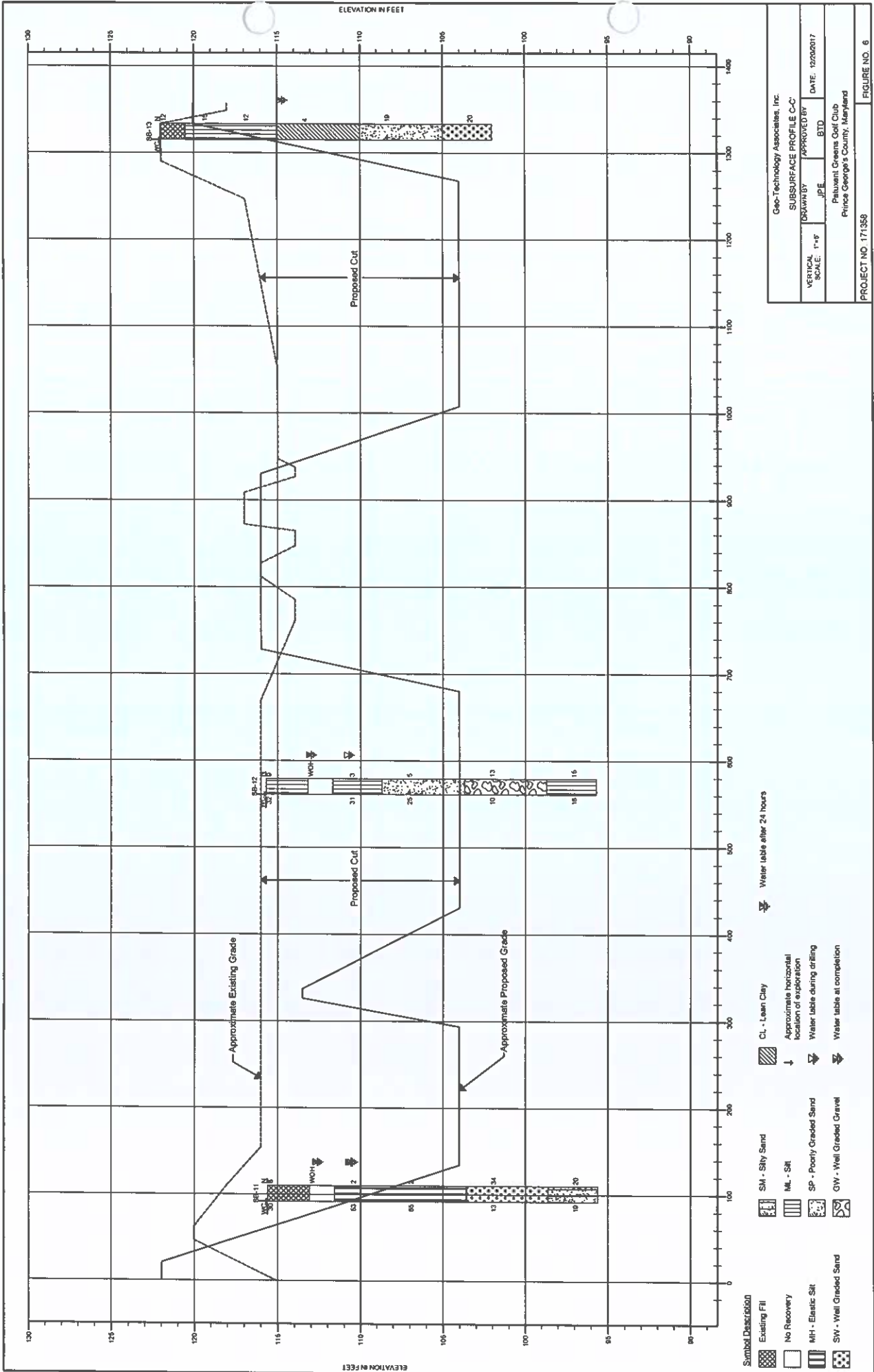
Geo-Technology Associates, Inc.	
SUBSURFACE PROFILE A-A'	
VERTICAL SCALE: 1"=5'	DATE: 12/26/2017
DRAWN BY: JFE	APPROVED BY: BTB
Palouant Greens Golf Club Prince George's County, Maryland	
PROJECT NO. 171358	
FIGURE NO. 4	



Geo-Technology Associates, Inc.		SUBSURFACE PROFILE E-B	
DESIGNED BY	DATE	DRAWN BY	APPROVED BY
JCE	12/20/01	BTD	
PROJECT NO. 171388		PRINCE GEORGE'S COUNTY, MARYLAND	

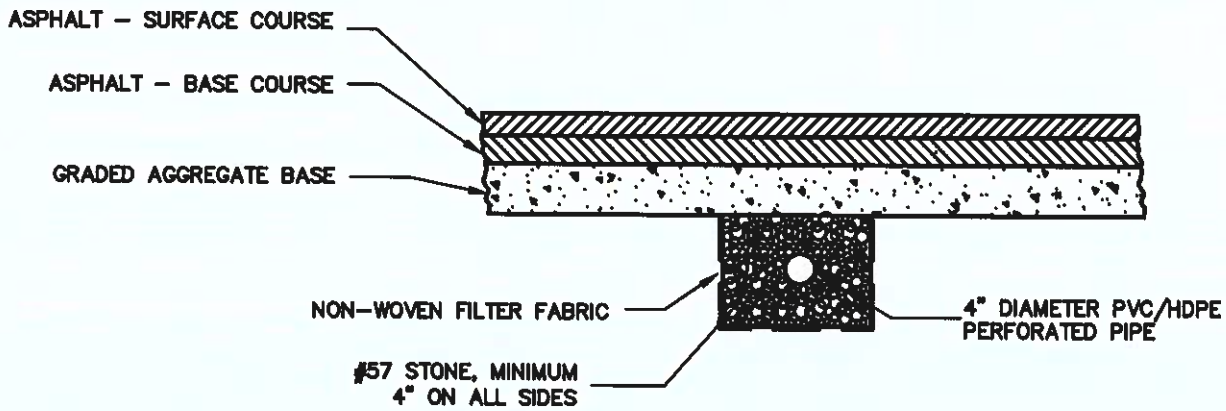
- Symbol Description**
- MH - Elastic Silt
 - CL - Lean Clay
 - GM - Silty Gravel
 - SM - Silty Sand
 - No Recovery
 - ML - Silt
 - SW - Well Graded Sand
 - Water table during drilling
 - Water table at completion
 - Water table after 24 hours
 - Approximate horizontal location of exploration

FIGURE NO. 5

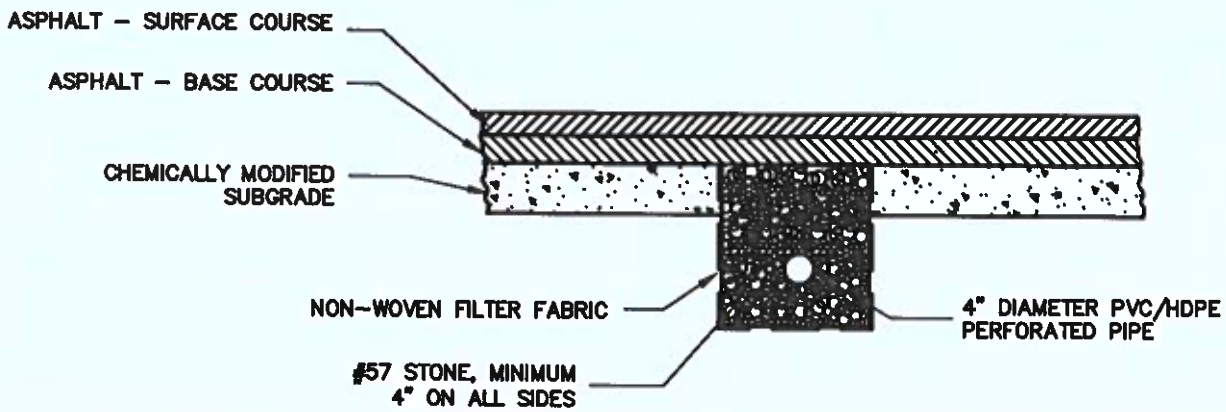


- Symbol Description**
- Existing Fill
 - No Recovery
 - MH - Elastic Silt
 - SW - Well Graded Sand
 - SM - Silty Sand
 - ML - Silt
 - SP - Poorly Graded Sand
 - GW - Well Graded Gravel
 - CL - Lean Clay
 - Approximate horizontal location of exploration
 - Water table during drilling
 - Water table at completion
 - Water table after 24 hours

Geo-Technology Associates, Inc.	
SUBSURFACE PROFILE C-C	
DESIGNED BY	APPROVED BY
SCALE: 1"=8'	JPE
DATE: 12/20/01	BTD
Paluxy Greens Golf Club	
Prince George's County, Maryland	
PROJECT NO. 171388	
FIGURE NO. 6	



UNDERDRAIN DETAIL FOR UNTREATED
PAVEMENT SECTION



UNDERDRAIN DETAIL FOR TREATED
PAVEMENT SECTION

NOTES:

1. PERFORATED PIPE SHOULD BE CONNECTED TO THE SITE STORM DRAINAGE SYSTEM TO ALLOW GRAVITY FLOW OF COLLECTED WATER.
2. INSTALL UNDERDRAINS AFTER CHEMICAL STABILIZATION OF THE SUBGRADE.



GEO-TECHNOLOGY ASSOCIATES, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
 14280 PARK CENTER DRIVE, SUITE A
 LAUREL, MARYLAND 20707
 (410) 792-9446 OR (301) 470-4470
 FAX: (410) 792-7395
 www.gtaeng.com
 © Geo-Technology Associates, Inc.

PATUXENT GREENS
 PRINCE GEORGE'S COUNTY, MARYLAND
**PAVEMENT
 DRAIN DETAIL**

PROJECT: 171358

DATE: Dec. 2017

SCALE: NTS

DRAWN BY: JPE

REVIEW BY: BTD

FIGURE: 7

APPENDIX B
SOIL BORING LOGS

NOTES FOR EXPLORATION LOG

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

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

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-

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

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

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.

Table No. 1 - Subsurface Exploration Summary
 Patuxent Greens
 GTA Project No. 171358

Boring No.	Existing Surface Elevation ¹ (ft. MSL)	Proposed Surface Elevation ² (ft. MSL)	Approx. Proposed Cut/Fill (+/-) (ft.)	Boring Depth (ft.)	Approx. Termination Elevation (ft. MSL)	Existing Fills		Groundwater Observations ³				Topsoil (in.)			
						Depth (ft.)	Approx. Bottom Elevation (ft. MSL)	Depth (ft.)	Elev. (ft. MSL)	Upon Completion of Drilling	1 to 3 Days After Completion		Cave-In	Cave-In	
								Depth (ft.)	Elev. (ft. MSL)	Depth (ft.)	Elev. (ft. MSL)	Depth (ft.)	Elev. (ft. MSL)	Depth (ft.)	Elev. (ft. MSL)
RD-1	123	122	-1	10	113	4	119	Dry	<113	Dry	<113	4.2	Dry	<119	3.9
RD-2	118.0	123.5	6	10	108	4	10	8	110	9.8	108	3.5	Dry	<116	1.9
RD-3	118.2	126	8	10	108	Not encountered		5	113	8.0	110	2.6	Dry	<116	2.0
RD-4	118	124	6	10	108	Not encountered		8	110	9.0	109	5.7	5.0	113	5.6
RD-5	116.1	123.5	7	10	106	Not encountered		5	111	5.4	111	4.9	3.3	113	4.9
RD-6	119	124.3	6	10	109	Not encountered		3	116	3.7	115	5.7	3.7	115	5.2
RD-7	116.3	122	6	10	106	Not encountered		8	108	9.6	107	6.2	4.5	112	4.7
RD-8	115.2	122	7	10	105	Not encountered		8	107	3.4	112	7.0	3.0	112	4.9
RD-9	116	122	7	10	106	Not encountered		5	111	3.2	112	6.0	2.5	113	4.7
RD-10	118	122	4	10	108	1	117	8	110	5.0	113	6.8	2.7	115	4.0
SB-1	120.2	102	-18	20	100	Not encountered		4	116	3.4	117	7.6	3.8	116	6.7
SB-2	118.9	102	-17	20	99	Not encountered		4	115	4.2	115	Pipe	2.9	116	Pipe
SB-3	118	102	-16	20	98	Not encountered		6	112	7.2	111	8.5	3.0	115	8.2
SB-4	117.0	118	1	20	97	2	115	7	110	3.2	114	8.0	2.7	114	6.9
SB-5	116.7	123	6	20	97	2	115	3	114	2.8	114	10.2	3.0	114	9.2
SB-6	117.0	112	-5	20	97	Not encountered		8	109	5.9	111	11.0	3.9	113	9.0
SB-7	116.7	101	-16	20	97	Not encountered		5	112	4.9	112	Pipe	3.4	113	Pipe
SB-8	116.7	101	-16	20	97	Not encountered		4	113	2.6	114	10.0	2.4	114	6.9
SB-9	116.9	104	-13	20	97	Not encountered		5	112	13.5	103	Pipe	4.9	112	Pipe
SB-10	117	108	-9	20	97	Not encountered		4	113	2.5	114	Pipe	3.9	113	Pipe
SB-11	115.6	122	6	20	96	2	114	5	111	5.1	111	Pipe	3.0	113	Pipe
SB-12	115.7	104	-12	20	96	Not encountered		5	111	2.7	113	11.2	2.7	113	7.0
SB-13	122	110	-12	20	102	1.5	121	Dry	<102	Dry	<102	9.2	7.3	115	9.2

¹Existing ground surface elevations at the boring locations were provided by Rodgers Consulting (Rodgers) based on an instrumented survey. Borings RD-1, RD-4, RD-6, RD-9, RD-10, SB-3, SB-10, and SB-13 were offset from their originally planned locations due to access constraints or to avoid conflict with existing utilities. The existing ground surface elevations at these boring locations were visually estimated, using the known stakeout elevation as reference, and should be considered approximate.

²Proposed ground surface elevations were referenced from the *Soil Boring Exhibit*, prepared by Rodgers, dated November 2017.

³At-completion groundwater readings were taken from within the hollow-stem augers prior to auger removal.

LOG OF BORING NO. RD-1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ Dry ∇ Dry ∇ _____
 DATE: 11-27-2017 11-28-2017 _____
 CAVED (ft): 4.2 3.9 _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ Dry
 GROUND SURFACE ELEVATION: **123**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
S-1	0.0	6	2-2-2	4	123.0	0	FILL		Light Brown, moist, very loose, Silty SAND with Gravel, trace Organics (Fill).		Topsoil: 3 in.
					121.0		FILL		Gray, moist, stiff, Lean CLAY with Sand, trace Plastic Fibers, Organics (Root Fragments) (Fill).		
S-2	2.5	10	5-6-8	14	119.0	4	MH		Brown to Gray, moist, stiff, Elastic SILT.		
S-3	5.0	18	3-4-5	9	116.0	8	CL		Brown to Light Gray, moist, stiff, Sandy Lean CLAY.		
S-4	8.5	18	3-5-5	10	113.0				Boring terminated at 10 feet.		
						12					
						16					
						20					
						24					

NOTES: Boring was offset approximately 36 feet northeast to avoid damage to existing landscaping. Ground surface elevation should be considered approximate.



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-1

LOG OF BORING NO. RD-2





Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 9.8 ∇ Dry ∇ _____
 DATE: 11-20-2017 11-21-2017 _____
 CAVED (ft): 3.5 1.9 _____

DATE STARTED: **11-20-2017**
 DATE COMPLETED: **11-20-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **C. Mollineau**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **8**
 GROUND SURFACE ELEVATION: **118**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	
									DESCRIPTION	REMARKS
S-1	0.0	12	4-5-6	11	118.0	0	FILL		Brown to Gray, moist, stiff, Sandy SILT with Gravel (Fill).	Topsoil: 3 in.
S-2	2.5	8	5-5-4	9	116.0		FILL		Brown, moist, stiff, Sandy SILT (Fill).	
S-3	5.0	18	WOH- WOH-3	3	114.0	4	SM		Gray, moist, very loose, Silty SAND.	
S-4	8.5	18	6-8-11	19	111.0	8	SP		Light Brown, wet, medium dense, Poorly Graded SAND with Gravel, trace Silt.	∇
					108.0				Boring terminated at 10 feet.	∇
						12			Note: At-completion groundwater readings was taken prior to auger removal.	
						16				
						20				
						24				

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-2

Sheet 1 of 1





LOG OF BORING NO. RD-3

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 8.0 ∇ Dry ∇ _____
 DATE: 11-20-2017 11-21-2017 _____
 CAVED (ft): 2.6 2.0 _____

DATE STARTED: **11-20-2017**
 DATE COMPLETED: **11-20-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **C. Mollineau**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ 5
 GROUND SURFACE ELEVATION: **118.2**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	18	2-1-3	4	118.2	0	ML		Light Brown with Orangish Brown Mottling, moist, soft, Sandy SILT.	Topsoil: 2 in.
S-2	2.5	18	4-3-4	7	116.2	2.5	CL		Light Gray, moist, medium stiff, Lean CLAY with Sand.	Qu = 2 tsf
S-3	5.0	18	3-8-9	17	114.2	4	SM		Light Gray, moist to wet, medium dense, Silty SAND, trace Gravel.	∇
S-4	8.5	18	6-9-8	17	111.2	8	SM		Gray to Reddish Brown, wet, medium dense, Silty SAND with Gravel.	∇
					108.2	10			Boring terminated at 10 feet.	
						12			Qu indicates unconfined compressive strength, given in tons per square foot (tsf) and measured using a pocket penetrometer.	
						16			Note: At-completion groundwater readings was taken prior to auger removal.	
						20				
						24				

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-3

LOG OF BORING NO. RD-4


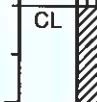

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 9.0 ∇ 5.0 ∇ _____
 DATE: 11-27-2017 11-28-2017 _____
 CAVED (ft): 5.7 5.6 _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **8**
 GROUND SURFACE ELEVATION: **118**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	6	4-3-4	7	118.0	0	ML		Brown, dry, medium stiff, Sandy SILT with Gravel.	Topsoil: 3 in.
S-2	2.5	18	3-3-5	8	116.0	4	CL		Light Gray with Light Brown, moist, medium stiff, Sandy Lean CLAY.	
S-3	5.0	18	5-5-5	10	113.0	8	SM		Light Brown to Light Gray, moist to wet, loose to very loose, Silty SAND.	∇
S-4	8.5	7	1-2-1	3	108.0	10			Boring terminated at 10 feet.	∇ ∇ ∇
						12			Note: At-completion groundwater readings was taken prior to auger removal.	
						16				
						20				
						24				

NOTES: Boring was offset approximately 16 feet east due to close proximity with an existing irrigation line. Ground surface elevation should be considered approximate.



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-4

Sheet 1 of 1

LOG OF BORING NO. RD-5

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 5.4 ∇ 3.3 ∇ _____
 DATE: 11-27-2017 11-28-2017 _____
 CAVED (ft): 4.9 4.9 _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **5**
 GROUND SURFACE ELEVATION: **116.1**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	18	3-3-5	8	116.1	0	ML		Brown, moist, medium stiff, SILT with Sand.		Topsoil: 3 in. ∇ ∇ Organic odor noted.
S-2	2.5	8	WOH/18"	WOH	114.1	4	CL		Brown to Dark Gray, moist, very soft, Lean CLAY with Sand.		
S-3	5.0	18	6-7-6	13	112.3	4	SM		Brown to Light Gray, wet, medium dense, Silty SAND with Gravel.		
S-4	8.5	18	4-6-4	10	109.1	8	SW		Light Brown to Orangish Brown, wet, loose, Well-Graded SAND with Gravel, trace Silt, Lenses of Gray Clay.		
					106.1				Boring terminated at 10 feet.		
						12			Note: At-completion groundwater readings was taken prior to auger removal.		
						16					
						20					
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-5

LOG OF BORING NO. RD-6

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 3.7 ∇ 3.7 ∇ _____
 DATE: 11-27-2017 11-28-2017 _____
 CAVED (ft): 5.7 5.5 _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **3**
 GROUND SURFACE ELEVATION: **119**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	18	2-2-3	5	119.0	0	ML		Brown, moist, medium stiff, Sandy SILT.	Topsoil: 2 in.	
S-2	2.5	18	2-2-7	9	117.0	4	SM		Brown, moist to wet, loose, Silty SAND.	∇	
S-3	5.0	8	7-7-6	13	115.0	4	SP		Orangish Brown to Brown, wet, medium dense, Poorly Graded SAND with Gravel.	∇	
S-4	8.5	12	6-16-22	38	112.0	8	SW		Orangish Brown, wet, dense, Well-Graded SAND with Gravel.		
					109.0				Boring terminated in 10 feet.		
						12					
						16					
						20					
						24					

NOTES: Boring was offset approximately 15 feet south due to close proximity with an existing tree. Ground surface elevation should be considered approximate.



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-6

Sheet 1 of 1

LOG OF BORING NO. RD-7

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 9.6 ∇ 4.5 ∇ _____
 DATE: 11-27-2017 11-28-2017 _____
 CAVED (ft): 6.2 4.7 _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **8**
 GROUND SURFACE ELEVATION: **116.3**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	7	5-4-7	11	116.3	0	ML		Light Gray with Orangish Brown Mottling, moist, stiff SILT with Sand.		Topsoil: 4 in.
					114.3		ML		Light Gray, moist, very stiff, Sandy SILT.		
S-2	2.5	18	10-10-10	20							
					112.3	4	CL		Brown, moist, stiff, Lean CLAY with Sand.		∇
S-3	5.0	18	6-7-6	13							
					109.3	8	CL		Light Brown, wet, stiff, Sandy Lean CLAY with Gravel.		∇
S-4	8.5	4	5-7-8	15							∇
					106.3				Boring terminated at 10 feet.		
						12			Note: At-completion groundwater readings was taken prior to auger removal.		
						16					
						20					
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-7

Sheet 1 of 1

LOG OF BORING NO. RD-8

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 3.4 ∇ 3.0 ∇ _____
 DATE: 11-22-2017 11-27-2017 _____
 CAVED (ft): 7.0 4.9 _____

DATE STARTED: **11-22-2017**
 DATE COMPLETED: **11-22-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **Hand Auger**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **9**
 GROUND SURFACE ELEVATION: **115.2**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	12	2-5-7	12	115.2	0	ML		Brown, moist, stiff, Sandy SILT with Gravel.		Topsoil: 2 in.
S-2	2.5	8	WOH/12"-3	3	112.2		CL		Brown, moist, soft, Sandy Lean CLAY with Gravel.		∇
					111.2	4	SM		Gray to Brown, moist, loose, Silty SAND, trace Mica.		
S-3	5.0	12	4-3-5	8							
					108.2	8	SM		Orangish Brown to Brown, moist to wet, dense, Silty SAND, trace Gravel.		∇
S-4	8.5	10	14-14-17	31	105.2				Boring terminated at 10 feet.		
						12					
						16					
						20					
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-8

Sheet 1 of 1

LOG OF BORING NO. RD-9





Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 3.2 ∇ 2.5 ∇ _____
 DATE: 11-27-2017 11-28-2017 _____
 CAVED (ft): 6.0 4.7 _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **5**
 GROUND SURFACE ELEVATION: **116**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
S-1	0.0	8	1-2-2	4	116.0	0	ML		Brown, moist, soft, Sandy SILT.		Topsoil: 2 in.
S-2	2.5	12	1-2-2	4	114.0	4	CL		Brown to Gray with Reddish Brown Mottling, moist, soft, Lean CLAY, trace Sand, Organics (Root Fragments).		∇ ∇
S-3	5.0	14	WOH/18"	WOH	112.0	4	MH		Dark Gray, wet, very soft, Elastic SILT with Sand, trace Organics (Root Fragments).		∇
					109.0	8	SW		Brown, wet, very loose, Well-Graded SAND, trace Silt.		
S-4	8.5	8	1-1-1	2	106.0				Boring terminated at 10 feet.		
						12					
						16					
						20					
						24					

NOTES: Boring was offset approximately 12 feet northeast due to close proximity with existing drain lines. Ground surface elevation should be considered approximate.



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-9

Sheet 1 of 1





LOG OF BORING NO. RD-10

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 5.0 ∇ 2.7 ∇ _____
 DATE: 11-22-2017 11-27-2017 _____
 CAVED (ft): 6.8 4.0 _____

DATE STARTED: **11-22-2017**
 DATE COMPLETED: **11-22-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **Hand Auger**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **8**
 GROUND SURFACE ELEVATION: **118**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	12	4-5-7	12	118.0	0	FILL		Light Brown to Brown, moist, medium dense, Silty SAND, trace Gravel (Fill). Fragments) (Fill).		Topsoil: 2 in.
					117.0		ML		Light Brown to Orangish Brown, moist, stiff, Sandy SILT.		
S-2	2.5	14	7-5-7	12	114.0	4	ML		Light Gray, moist, stiff, SILT with Sand.		∇
S-3	5.0	16	5-5-7	12	111.0	8	SM		Orangish Brown, moist to wet, very dense, Silty SAND with Gravel.		∇
S-4	8.5	12	33-36-15	51	108.0				Boring terminated at 10 feet.		∇
						12					
						16					
						20					
						24					

NOTES: **Boring was offset approximately 14 feet south due to close proximity with an existing irrigation line. Ground surface elevation should be considered approximate.**



GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. RD-10

LOG OF BORING NO. SB-1

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 3.4 ∇ 3.8 ∇ _____
 DATE: 11-20-2017 11-21-2017 _____
 CAVED (ft): 7.6 6.7 _____

DATE STARTED: **11-20-2017**
 DATE COMPLETED: **11-20-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **C. Mollineau**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **4**
 GROUND SURFACE ELEVATION: **120.2**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	
									DESCRIPTION	REMARKS
S-1	0.0	12	1-2-1	3	120.2	0	ML		Brown, moist, soft, SILT with Sand.	Topsoil: 4 in.
S-2	2.5	18	2-2-2	4	118.2	4	CL		Light Brown to Light Gray, moist to wet, soft, Sandy Lean CLAY.	
S-3	5.0	18	2-10-21	31	116.2	4	SM		Light Gray, wet, dense, Silty SAND.	
S-4	8.5	14	15-21-28	49	113.2	8	SM		Brown, moist, dense, Silty SAND with Gravel.	
S-5	13.5	8	18-25-25	50						
S-6	18.5	0	50/3"	50/3"	101.7				No Recovery.	
					100.2	20			Boring terminated at 20 feet.	
						24				

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-1

Sheet 1 of 1

LOG OF BORING NO. SB-2

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ **4.2** ∇ **2.9** ∇ _____
 DATE: **11-20-2017** **11-21-2017** _____
 CAVED (ft): **Pipe** **Pipe** _____

DATE STARTED: **11-20-2017**
 DATE COMPLETED: **11-20-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **C. Mollineau**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **4**
 GROUND SURFACE ELEVATION: **118.9**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS GRAPHIC SYMBOL	DESCRIPTION		REMARKS
S-1	0.0	12	3-3-4	7	118.9	0	ML	Light Brown, moist, medium stiff, Sandy SILT.		Topsoil: 2 in.
S-2	2.5	16	2-2-2	4	116.9	4	MH	Light Brown to Light Gray, moist to wet, soft to very soft, Elastic SILT with Sand.		∇ ∇ Qu < 0.25 tsf
S-3	5.0	18	WOH/18"	WOH		8				
S-4	8.5	18	WOH/12"-1	1		12				Qu = 0.75 tsf
S-5	13.5	18	2-7-9	16	106.9	16	CL	Brown to Gray, wet, very stiff, Lean CLAY with Gravel, trace Sand.		
S-6	18.5	18	14-27-28	55	101.9	20	SP	Orangish Brown, moist to wet, very dense, Poorly Graded SAND with Gravel, trace Silt.		
					98.9	20		Boring terminated at 20 feet.		
						24		Qu indicates unconfined compressive strength, given in tons per square foot (tsf) and measured using a pocket penetrometer.		

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-2

Sheet 1 of 1

LOG OF BORING NO. SB-3







Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 7.2 ∇ 3.0 ∇ _____
 DATE: 11-20-2017 11-21-2017 _____
 CAVED (ft): 8.5 8.2 _____

DATE STARTED: **11-20-2017**
 DATE COMPLETED: **11-20-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **C. Mollineau**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **6**
 GROUND SURFACE ELEVATION: **118**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	18	2-3-2	5	118.0	0	CL		Brown, moist, medium stiff, Lean CLAY.		Topsoil: 1 in.
S-2	2.5	18	2-3-2	5	116.0	2	ML		Light Brown to Light Gray with Reddish Brown Mottling, moist, medium stiff, SILT with Sand.		$q_u = 0.5$ tsf
S-3	5.0	18	WOH-2-2	4	114.0	4	SM		Gray, moist to wet, very loose, Silty SAND.		∇
S-4	8.5	16	2-3-6	9	111.0	8	SM		Gray, moist, loose, Silty SAND.		∇
S-5	13.5	14	8-8-10	18	106.0	12	SM		Brown to Gray, moist to wet, medium dense, Silty SAND with Gravel.		
S-6	18.5	10	5-9-13	22	101.0	16	GW		Gray, wet, medium dense, Well-Graded GRAVEL with Sand, trace Silt.		
					98.0	20			Boring terminated at 20 feet.		
						24					

NOTES: Boring was offset approximately 16 feet west due to close proximity with an existing irrigation line. Ground surface elevation should be considered approximate.



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-3

Sheet 1 of 1

LOG OF BORING NO. SB-4





Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 3.2 ∇ 2.7 ∇ _____
 DATE: 11-20-2017 11-21-2017 _____
 CAVED (ft): 8.0 6.9 _____

DATE STARTED: **11-20-2017**
 DATE COMPLETED: **11-20-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **C. Mollineau**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **7**
 GROUND SURFACE ELEVATION: **117**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	8	1-2-4	6	117.0	0	FILL		Brown to Gray, moist, medium stiff, Sandy SILT, trace Organics (Wood Fragments) (Fill).		Topsoil: 4 in.
S-2	2.5	3	3-2-3	5	115.0	4	ML		Brown, moist, medium stiff, Sandy SILT.		∇
S-3	5.0	0	1-2-1	3	112.0				No Recovery.		
S-4	8.5	8	5-7-11	18	110.5	8	SP		Gray, wet, medium dense, Poorly Graded SAND with Gravel.		∇
S-5	13.5	10	14-11-13	24	105.0	12	GP		Brown to Gray, wet, medium dense, Poorly Graded GRAVEL with Sand.		
S-6	18.5	0	50/6"	50/6"	98.5				No Recovery.		
					97.0	20			Boring terminated at 20 feet.		
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-4

Sheet 1 of 1








LOG OF BORING NO. SB-5

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft.): ∇ **2.8** ∇ **3.0** ∇ _____
 DATE: **11-27-2017** **11-28-2017** _____
 CAVED (ft): **10.2** **9.2** _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **C. Mollineau**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **3**
 GROUND SURFACE ELEVATION: **116.7**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	6	2-4-4	8	116.7	0	FILL		Light Brown, moist, medium stiff, Sandy Elastic SILT, trace Organics (Wood Fragments) (Fill).		Topsoil: 3 in.
					114.7		MH		Light Brown, moist to wet, soft, Elastic SILT with Sand.		∇
S-2	2.5	8	2-2-2	4	112.7	4	MH		Brown to Gray, moist to wet, soft, Elastic SILT with Sand, trace Organics (Wood Fragments).		
S-3	5.0	6	3-1-2	3	109.7	8	CL		Brown, wet, very soft, Lean CLAY with Sand, trace Organics (Wood Fragments).		
S-4	8.5	4	WOH/18"	WOH	104.7	12	CL		Brown, wet, very stiff, Lean CLAY with Sand, trace Organics (Wood Fragments).		
S-5	13.5	4	7-7-15	22	102.2	16	SW		Brown, wet, medium dense, Well Graded SAND with Gravel.		
					99.7		SP		Brown, wet, medium dense, Poorly Graded SAND.		
S-6	18.5	2	7-8-11	19	96.7	20			Boring terminated at 20 feet.		
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-5

LOG OF BORING NO. SB-6

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 5.9 ∇ 3.9 ∇ _____
 DATE: 11-21-2017 11-22-2017 _____
 CAVED (ft): 11.0 9.0 _____

DATE STARTED: **11-21-2017**
 DATE COMPLETED: **11-21-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **8**
 GROUND SURFACE ELEVATION: **117**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	16	2-2-3	5	117.0	0	MH		Brown, moist, medium stiff, Elastic SILT with Sand.		Topsoil: 3 in.
					115.0		MH		Brown, moist, medium stiff, Elastic SILT, trace Sand.		
S-2	2.5	18	3-3-3	6		4	CL		Brown, moist, medium stiff, Sandy Lean CLAY with Gravel, trace Organics (Root Fragments).		∇
S-3	5.0	18	WOH-3-4	7							∇
					110.0	8	GM		Brown to Gray, wet, medium dense, Silty GRAVEL with Sand, trace Organics (Root Fragments).		∇
S-4	8.5	16	8-12-8	20							
					105.0	12	SM		Brown, wet, medium dense, Silty SAND with Gravel.		
S-5	13.5	6	12-14-16	30							
S-6	18.5	0	50/4"	50/4"	98.5				No Recovery.		
					97.0	20			Boring terminated at 20 feet.		
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-6

Sheet 1 of 1

LOG OF BORING NO. SB-7

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 4.9 ∇ 3.4 ∇ _____
 DATE: 11-21-2017 11-22-2017 _____
 CAVED (ft): Pipe Pipe _____

DATE STARTED: **11-21-2017**
 DATE COMPLETED: **11-21-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **5**
 GROUND SURFACE ELEVATION: **116.7**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	15	3-3-4	7	116.7	0	ML		Brown, moist, medium stiff, SILT with Sand.		Topsoil: 2 in.
S-2	2.5	18	3-2-3	5	114.7	4	CL		Brown to Reddish Brown, moist, medium stiff, Lean CLAY with Sand.		∇
S-3	5.0	18	3-3-3	6	111.7	8	ML		Light Brown to Olive Green, wet, medium stiff, Sandy SILT.		∇
S-4	8.5	18	4-4-3	7	109.7	12	SM		Brown, wet, medium stiff, Sandy Lean CLAY.		
					106.7	16	SM		Gray, wet, loose, Silty SAND.		
S-5	13.5	18	11-12-10	22	104.7	20	SW		Brown to Gray, wet, medium dense, Well-Graded SAND with Gravel.		
S-6	18.5	18	14-13-8	21	96.7	24			Boring terminated at 20 feet.		

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-7

Sheet 1 of 1

LOG OF BORING NO. SB-8






Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 2.6 ∇ 2.4 ∇ _____
 DATE: 11-21-2017 11-22-2017 _____
 CAVED (ft): 10.0 6.9 _____

DATE STARTED: **11-21-2017**
 DATE COMPLETED: **11-21-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **4**
 GROUND SURFACE ELEVATION: **116.7**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	15	WOH-2-4	6	116.7	0	MH		Brown to Reddish Brown, moist, medium stiff, Elastic SILT with Sand.		Topsoil: 4 in.
S-2	2.5	18	3-2-3	5	112.7	4	CL		Gray, wet, soft to very stiff, Lean CLAY with SAND.		∇
S-3	5.0	18	2-2-1	3		8					
S-4	8.5	18	9-13-9	22	107.2		SM		Gray, wet, medium dense, Silty SAND.		
					104.7	12	SW		Brown to Gray, wet, medium dense, Well Graded SAND with Gravel, trace Organics (Wood Fragments).		
S-5	13.5	18	4-5-10	15	101.7	16	SW		Brown to Gray, wet, medium dense, Well Graded SAND, trace Silt.		
S-6	18.5	18	4-4-8	12	96.7	20			Boring terminated at 20 feet.		
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-8

Sheet 1 of 1

LOG OF BORING NO. SB-9






Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 13.5 ∇ 4.9 ∇ _____
 DATE: 11-21-2017 11-22-2017 _____
 CAVED (ft): Pipe Pipe _____

DATE STARTED: **11-21-2017**
 DATE COMPLETED: **11-21-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ 5
 GROUND SURFACE ELEVATION: **116.9**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
S-1	0.0	13	2-4-3	7	116.9	0	CL		Brown to Orangish Brown, moist, medium stiff, Sandy Lean CLAY.		Topsoil: 2 in.
S-2	2.5	18	3-2-2	4	114.9	4	CL		Brown to Gray, moist to wet, soft to stiff, Lean CLAY with Sand.		∇
S-3	5.0	18	5-6-5	11	109.9	8	SM		Orangish Brown to Gray, wet, medium dense, Silty SAND with Lenses of Clay.		
S-4	8.5	18	3-9-12	21	104.9	12	CL		Brown to Light Brown, wet, stiff, Lean CLAY.		∇
S-5	13.5	18	5-5-5	10	101.9	16	SW		Brown, wet, medium dense, Well-Graded SAND with Gravel.		
S-6	18.5	18	8-6-7	13	96.9	20			Boring terminated at 20 feet.		
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-9

Sheet 1 of 1

LOG OF BORING NO. SB-10

Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 2.5 ∇ 3.9 ∇ _____
 DATE: 11-22-2017 11-27-2017 _____
 CAVED (ft): Pipe Pipe _____

DATE STARTED: **11-22-2017**
 DATE COMPLETED: **11-22-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **Hand Auger**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **4**
 GROUND SURFACE ELEVATION: **117**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		REMARKS
S-1	0.0	6	3-4-5	9	117.0	0	ML		Brown to Light Brown, dry, stiff, Sandy SILT.	Topsoil: 2 in.	
S-2	2.5	14	6-8-7	15	115.0		SM		Orangish Brown to Light Gray, moist, medium dense, Silty SAND.	∇	
S-3	5.0	12	6-9-15	24	113.0	4	GM		Orangish Brown, wet, medium dense to very dense, Silty GRAVEL with Sand.	∇	
S-4	8.5	12	23-31-32	63		8					
S-5	13.5	1	50/5"	50/5"	105.0	12	SP		Orangish Brown, wet, very dense, Poorly Graded SAND.		
S-6	18.5	14	10-12-15	27	100.0	16	CL		Light Gray to Gray, moist, very stiff, Lean CLAY, trace Sand.		
					97.0	20			Boring terminated at 20 feet.		
						24					

NOTES: **Boring was offset approximately 26 feet north due to access constraints. Ground surface elevation should be considered approximate.**



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-10

Sheet 1 of 1

LOG OF BORING NO. SB-11




Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ **5.1** ∇ **3.0** ∇ _____
 DATE: **11-27-2017** **11-28-2017** _____
 CAVED (ft): **Pipe** **Pipe** _____

DATE STARTED: **11-27-2017**
 DATE COMPLETED: **11-27-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **HSA**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **5**
 GROUND SURFACE ELEVATION: **115.6**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	7	3-4-4	8	115.6	0	FILL		Brown to Light Brown, moist, medium stiff, SILT with Sand (Fill).		Topsoil: 2 in. Organic odor noted.
S-2	2.5	0	WOH/18"	WOH	113.1				No Recovery.		
S-3	5.0	6	1-1-1	2	111.6	4	MH		Brown, wet, soft, Elastic SILT with Sand, trace Organics (Root Fragments).		Organic odor noted.
S-4	8.5	18	WOH-1-1	2		8					
S-5	13.5	18	15-16-18	34	103.6	12	SW		Orangish Brown to Light Gray, moist to wet, dense, Well-Graded SAND with Gravel.		
S-6	18.5	18	6-8-12	20	98.6	16	SM		Light Gray, wet, medium dense, Silty SAND, trace Clay Lenses and Lignitic Fragments.		
					95.6	20			Boring terminated at 20 feet.		
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-11

Sheet 1 of 1

LOG OF BORING NO. SB-12






Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ∇ 2.7 ∇ 2.7 ∇ _____
 DATE: 11-22-2017 11-27-2017 _____
 CAVED (ft): 11.2 7.0 _____

DATE STARTED: **11-22-2017**
 DATE COMPLETED: **11-22-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **Hand Auger**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ∇ **5**
 GROUND SURFACE ELEVATION: **115.7**
 DATUM: **Survey**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	12	3-4-5	9	115.7	0	ML		Brown, moist, stiff, SILT with Sand.		Topsoil: 2 in.
S-2	2.5	0	WOH/18"	WOH	113.2				No Recovery.		∇
S-3	5.0	18	WOH/12"-3	3	111.7	4	ML		Gray to Light Brown, moist to wet, soft, Sandy SILT.		∇
S-4	8.5	18	4-3-2	5	108.7	8	SP		Light Gray, wet, loose, Poorly Graded SAND.		
S-5	13.5	8	6-6-7	13	103.7	12	GW		Light Brown to Light Gray, wet, medium dense, Well Graded GRAVEL with Sand, trace Silt.		
S-6	18.5	14	6-7-8	15	98.7	16	ML		Light Gray, dry, stiff, Sandy SILT.		
					95.7	20			Boring terminated at 20 feet.		
						24					

NOTES:



GEO-TECHNOLOGY ASSOCIATES, INC.

14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-12

Sheet 1 of 1

LOG OF BORING NO. SB-13






Sheet 1 of 1

PROJECT: **Patuxent Greens Golf Club**
 PROJECT NO.: **171358**
 PROJECT LOCATION: **Prince George's County, Maryland**

WATER LEVEL (ft): ☒ Dry ☒ 7.3 ☒
 DATE: 11-22-2017 11-27-2017
 CAVED (ft): 9.2 9.2

DATE STARTED: **11-22-2017**
 DATE COMPLETED: **11-22-2017**
 DRILLING CONTRACTOR: **Geo-Technology Associates, Inc.**
 DRILLER: **G. Palmer**
 DRILLING METHOD: **Hand Auger**
 SAMPLING METHOD: **Split Spoon / Automatic Hammer**

WATER ENCOUNTERED DURING DRILLING (ft) ☒ Dry
 GROUND SURFACE ELEVATION: **122**
 DATUM: **Topo**
 EQUIPMENT: **CME-550**
 LOGGED BY: **TLC**
 CHECKED BY: **JPE**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
S-1	0.0	6	4-6-6	12	122.0	0	FILL		Brown, moist, medium dense, Silty SAND, trace Gravel, Asphalt Rubble, Organics (Wood Fragments) (Fill).		Topsoil: 2 in.
					120.5		ML		Light Brown, dry to moist, stiff, Sandy SILT, trace Gravel.		
S-2	2.5	12	6-6-9	15		4					
S-3	5.0	10	5-6-6	12							
					115.0	8	CL		Brown to Gray, moist, soft, Sandy Lean CLAY.		☒
S-4	8.5	6	2-2-2	4							
					110.0	12	SP		Brown to Gray, wet, medium dense, Poorly Graded SAND, trace Clay.		
S-5	13.5	18	5-7-12	19		16					
					105.0		SW		Brown, wet, medium dense, Well-Graded SAND with Gravel, trace Silt.		
S-6	18.5	8	10-11-9	20		20					
					102.0				Boring terminated at 20 feet.		
						24					

NOTES: **Boring was offset approximately 40 feet southeast due to access constraints and close proximity to existing irrigation and electric lines. Ground surface elevation should be considered approximate.**



GEO-TECHNOLOGY ASSOCIATES, INC.

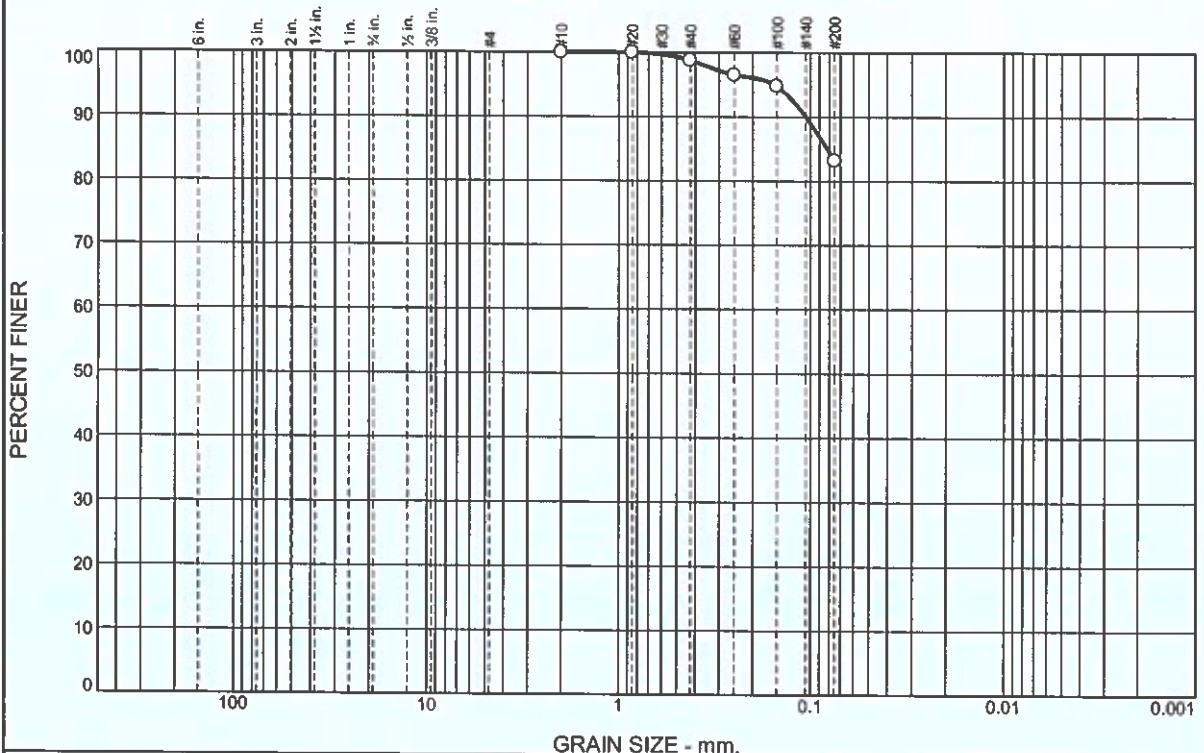
14280 Park Center Drive, Suite A
 Laurel, MD 20707

LOG OF BORING NO. SB-13

Sheet 1 of 1

APPENDIX C
LABORATORY DATA

Particle Size Distribution Report



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

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.2	15.6	83.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	98.8		
#60	96.5		
#100	94.8		
#200	83.2		

Soil Description

Gray to Brown, Elastic SILT with Sand

Atterberg Limits

PL= 36 LL= 51 PI= 15 NM= 36.8

Coefficients

D₉₀= 0.1057 D₈₅= 0.0818 D₆₀=
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= MH AASHTO= A-7-5(16)

Remarks

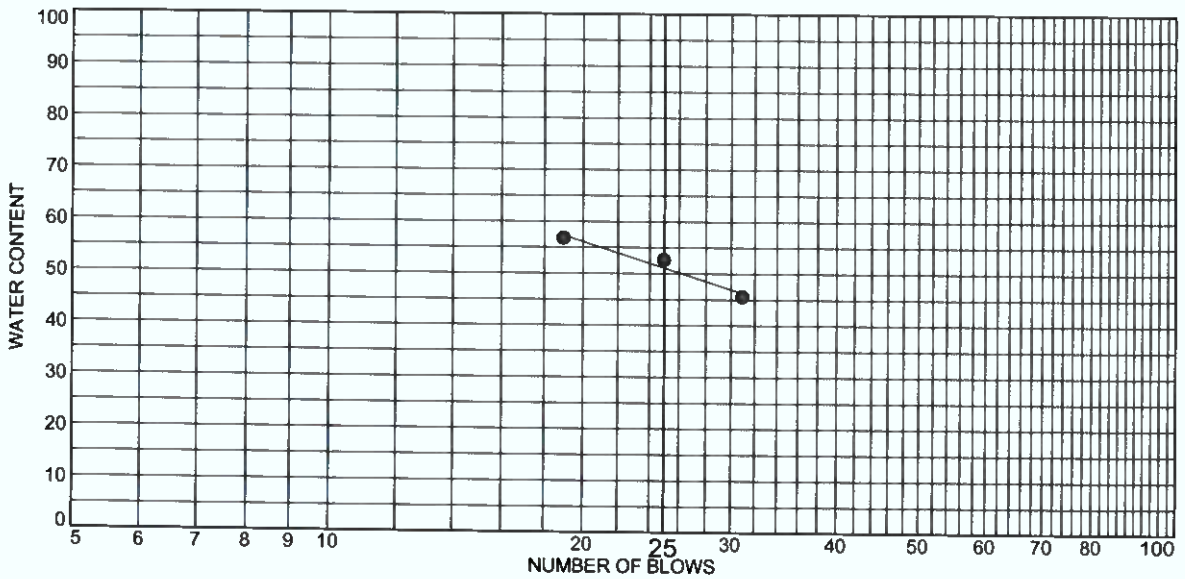
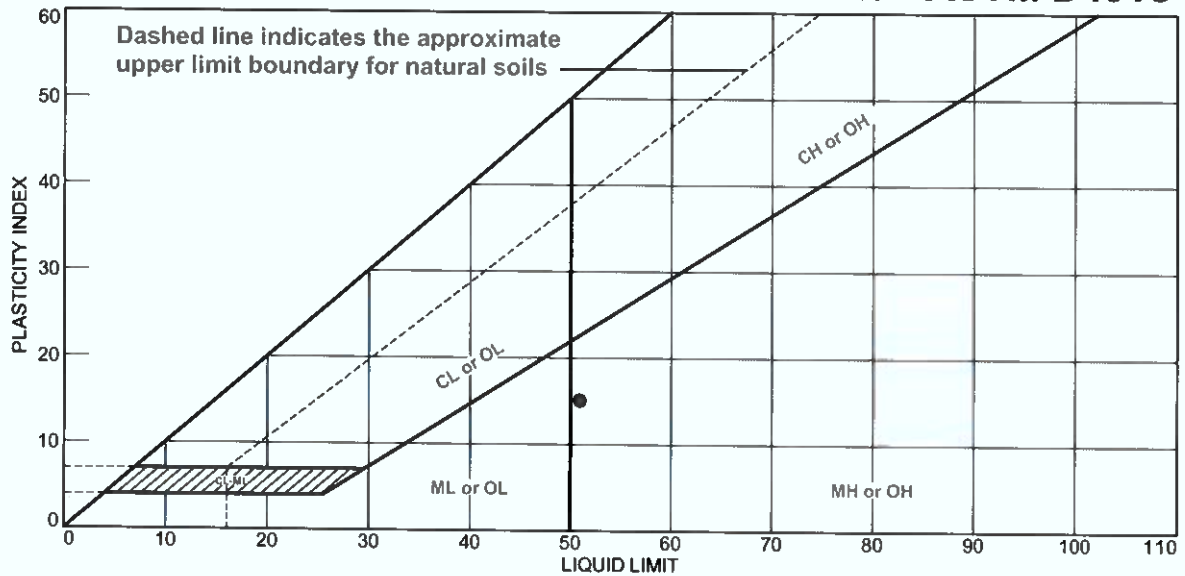
* (no specification provided)

Location: SB-2 Sample Number: S-3 Depth: 5.0-6.5 Date: 12/7/17

	GEO-TECHNOLOGY ASSOCIATES, INC. 14280 Park Center Drive, Suite A Laurel, MD 20707	Client: ADC Builders, Inc. Project: Patuxent Greens Golf Club	Project No: 171358 Figure
--	--	--	--

Tested By: J.Ayala Checked By: J.Andrews

LIQUID AND PLASTIC LIMITS TEST REPORT - ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Gray to Brown, Elastic SILT with Sand	51	36	15	98.8	83.2	MH

Project No. 171358 **Client:** ADC Builders, Inc.
Project: Patuxent Greens Golf Club
Location: SB-2
Sample Number: S-3 **Depth:** 5.0-6.5

GEO-TECHNOLOGY ASSOCIATES, INC.
14280 Park Center Drive, Suite A
Laurel, MD 20707

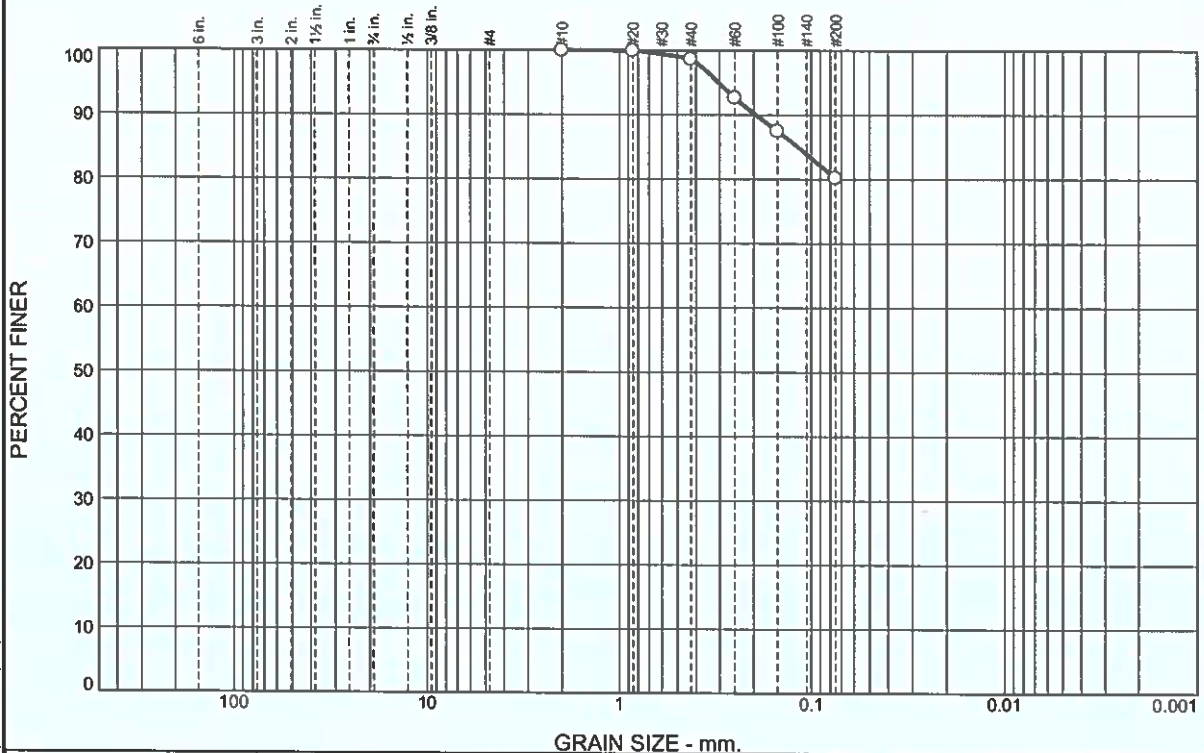
Remarks:

Figure

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

Tested By: J. Ayala **Checked By:** J. Andrews

Particle Size Distribution Report



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

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.3	18.5	80.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	98.7		
#60	92.7		
#100	87.4		
#200	80.2		

Soil Description
Gray with Brown, Lean CLAY with Sand

Atterberg Limits
PL= 26 LL= 49 PI= 23 NM= 47.7

Coefficients
 D₉₀= 0.1952 D₈₅= 0.1178 D₆₀=
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
USCS= CL AASHTO= A-7-6(19)

Remarks

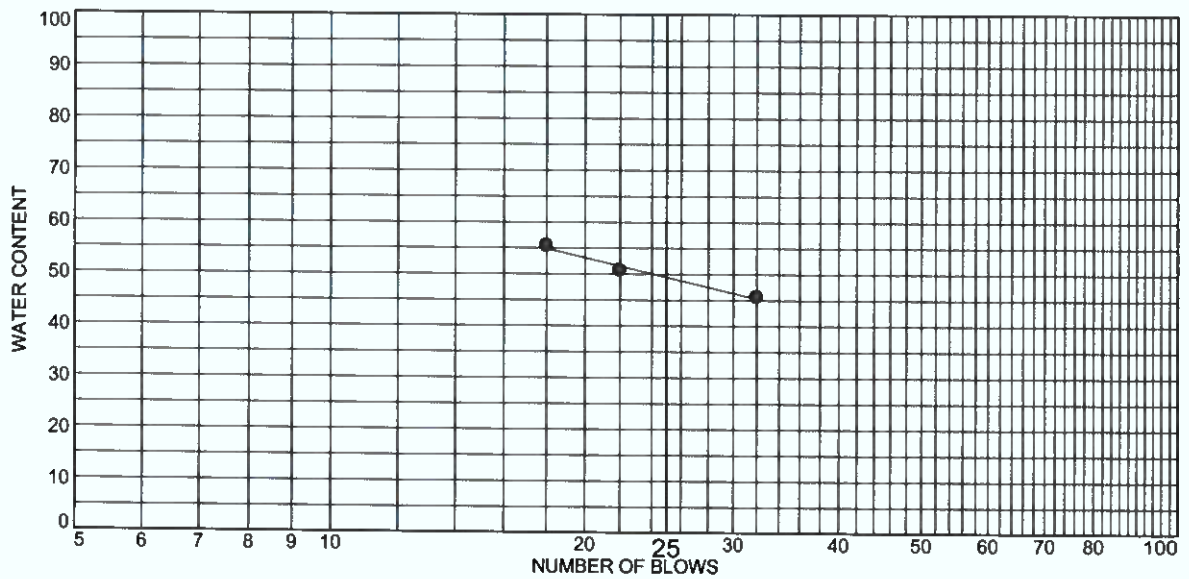
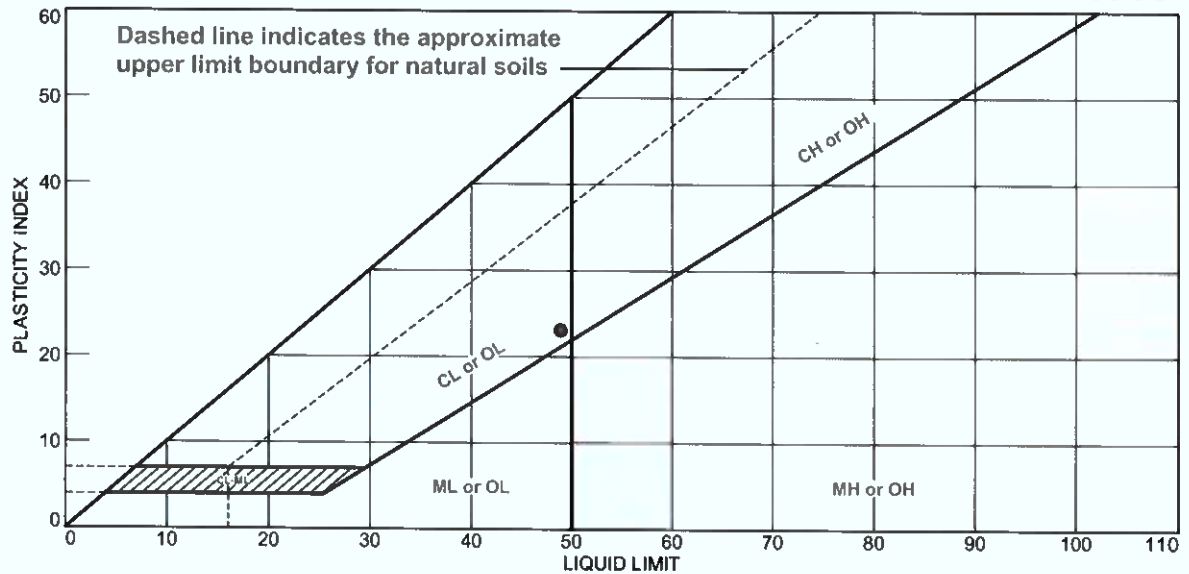
* (no specification provided)

Location: SB-9 Depth: 2.5-4.0 Date: 12/7/17
 Sample Number: S-2

	GEO-TECHNOLOGY ASSOCIATES, INC. 14280 Park Center Drive, Suite A Laurel, MD 20707	Client: ADC Builders, Inc. Project: Patuxent Greens Golf Club	Project No: 171358 Figure
--	--	--	---

Tested By: J.Ayala Checked By: J.Andrews


LIQUID AND PLASTIC LIMITS TEST REPORT - ASTM D4318



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

MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
Gray with Brown, Lean CLAY with Sand	49	26	23	98.7	80.2	CL

Project No. 171358 **Client:** ADC Builders, Inc.
Project: Patuxent Greens Golf Club
Location: SB-9
Sample Number: S-2 **Depth:** 2.5-4.0

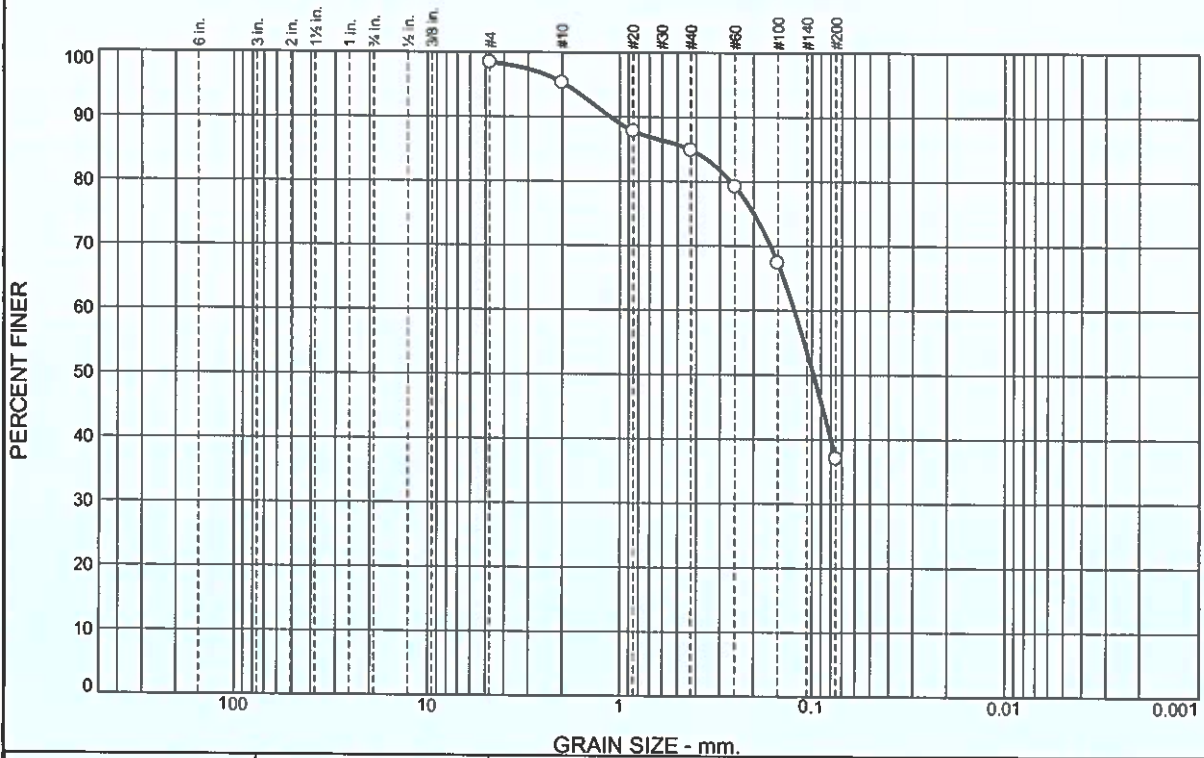

GEO-TECHNOLOGY ASSOCIATES, INC.
 14280 Park Center Drive, Suite A
 Laurel, MD 20707

Remarks:

Figure

Tested By: J. Ayala **Checked By:** J. Andrews

Particle Size Distribution Report



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

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			3.1	10.4	47.9		37.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	98.4		
#10	95.3		
#20	87.8		
#40	84.9		
#60	79.2		
#100	67.4		
#200	37.0		

Soil Description
Light Gray with Orange, Silty SAND

Atterberg Limits
PL= NP LL= NP PI= NP NM= 21.7

Coefficients
D₉₀= 1.1237 D₈₅= 0.4337 D₆₀= 0.1230
D₅₀= 0.0981 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification
USCS= SM AASHTO= A-4(0)

Remarks

* (no specification provided)

Location: SB-10 Sample Number: S-2 Depth: 2.5-4.0 Date: 12/7/17

	GEO-TECHNOLOGY ASSOCIATES, INC. 14280 Park Center Drive, Suite A Laurel, MD 20707	Client: ADC Builders, Inc. Project: Patuxent Greens Golf Club
		Project No: 171358

Tested By: J.Ayala Checked By: J.Andrews

COMPACTION TEST REPORT
ASTM D 1557-12 Method B Modified

Project No.: 171358
Project: Patuxent Greens Golf Club
Client: ADC Builders, Inc.
Location: SB-9
Sample Number: S-2 **Depth:** 1.0-5.0
Remarks:

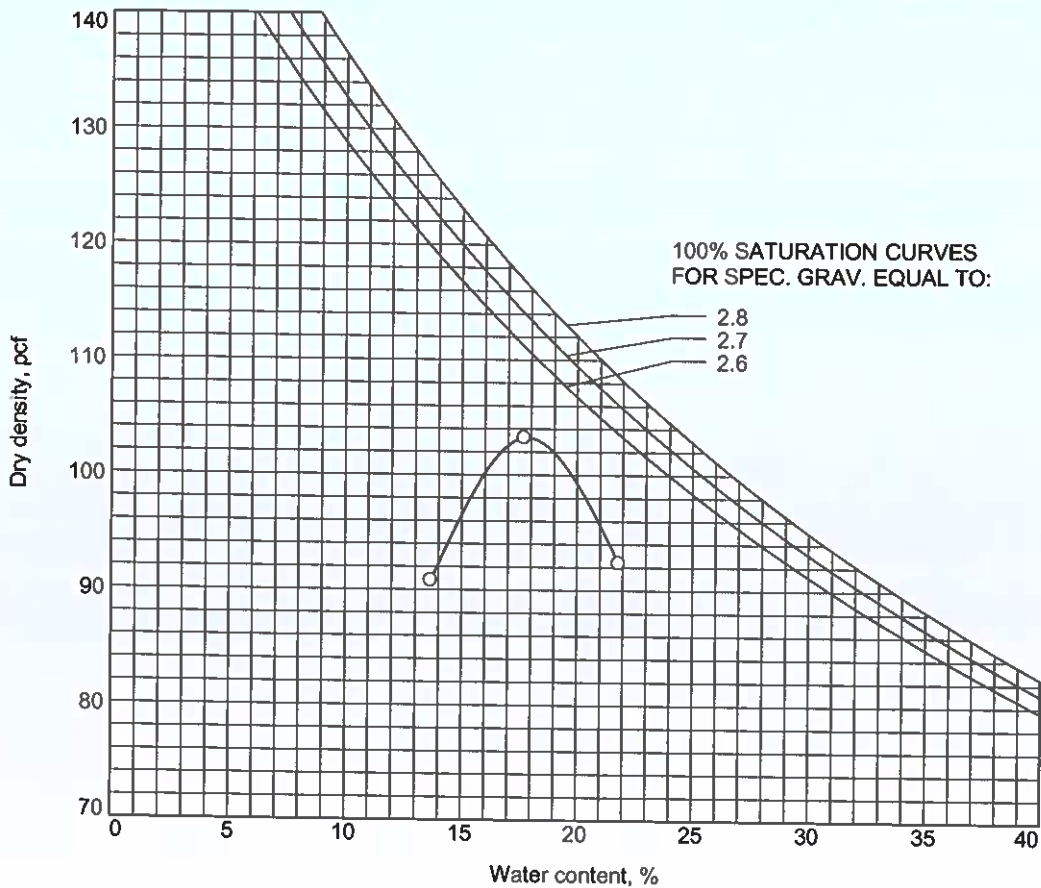
Date: 12/14/17

MATERIAL DESCRIPTION

Description: Gray with Brown, Lean CLAY with Sand

Classifications -	USCS: CL	AASHTO: A-7-6(19)
Nat. Moist. = 47.7 %		Sp.G. =
Liquid Limit = 49		Plasticity Index = 23
		% < No.200 = 80.2 %

TEST RESULTS
Maximum dry density = 103.3 pcf
Optimum moisture = 17.8 %



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

Geo-Technology Associates, Inc.

Figure

Tested By: J.Ayala

Checked By: J.Andrews

**COMPACTION TEST REPORT
ASTM D 1557-12 Method B Modified**

Project No.: 171358
Project: Patuxent Greens Golf Club
Client: ADC Builders, Inc.
Location: SB-10
Sample Number: S-2 **Depth:** 2.5-4.0
Remarks:

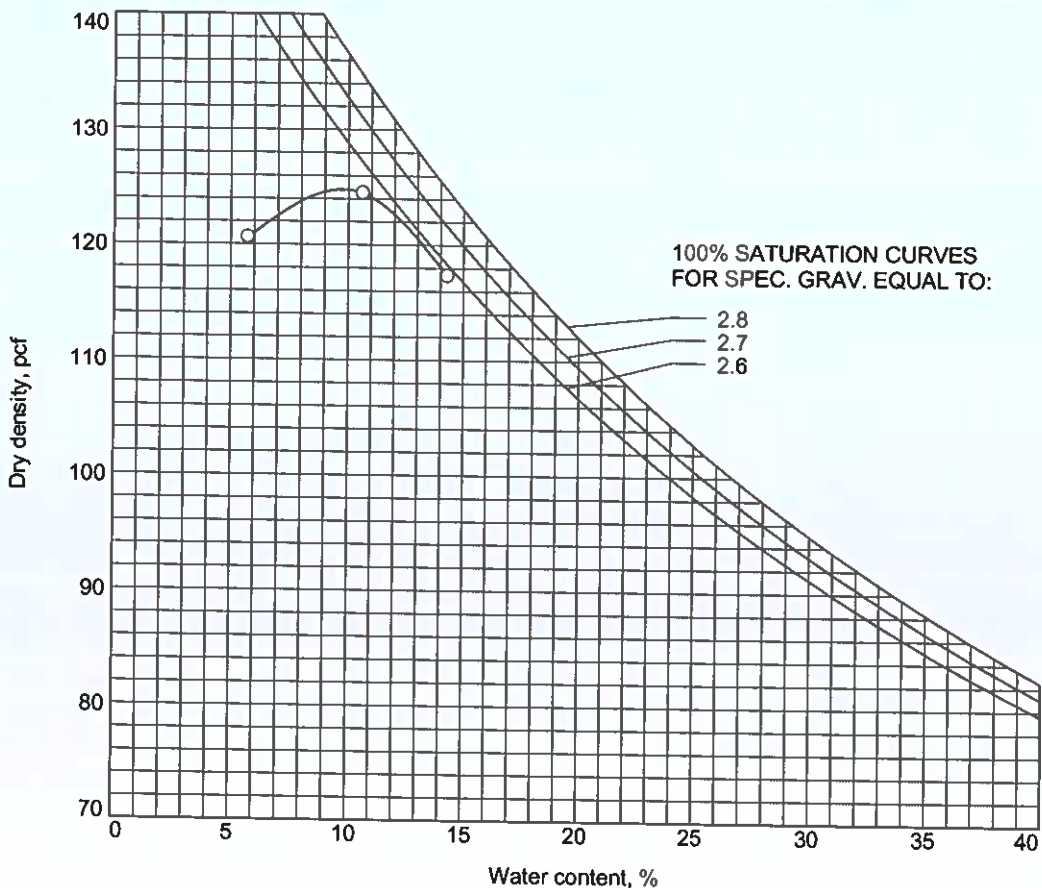
Date: 12/14/17

MATERIAL DESCRIPTION

Description: Light Gray with Orange, Silty SAND

Classifications -	USCS: SM	AASHTO: A-4(0)
Nat. Moist. = 21.7 %		Sp.G. =
Liquid Limit = NP		Plasticity Index = NP
		% < No.200 = 37.0 %

TEST RESULTS
Maximum dry density = 124.8 pcf
Optimum moisture = 9.8 %



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

Geo-Technology Associates, Inc.

Figure

Tested By: J.Ayala

Checked By: J.Andrews

GEO-TECHNOLOGY ASSOCIATES, INC.
Natural Moisture Content Summary

Patuxent Greens
December 12, 2017
171358

Test Method: ASTM D 2216

BORING No.	SAMPLE No.	DEPTH (FT)	NATURAL MOISTURE CONTENT %
RD-4	S-1	0.0-1.5	11.5
	S-2	2.5-4.0	20.9
	S-3	5.0-6.5	25.1
	S-4	8.5-10.0	27.5
RD-8	S-1	0.0-1.5	27.7
	S-2	2.5-4.0	31.2
	S-3	5.0-6.5	21.8
	S-4	8.5-10.0	11.1
SB-2	S-1	0.0-1.5	34.1
	S-2	2.5-4.0	42.5
	S-3	5.0-6.5	36.8
	S-4	8.5-10.0	38.1
	S-5	13.5-15.0	27.5
	S-6	18.5-20.0	11.7
SB-4	S-1	0.0-1.5	42.6
	S-2	2.5-4.0	34.2
	S-4	8.5-10.0	12.6
	S-5	13.5-15.0	12.1
SB-5	S-1	0.0-1.5	43.5
	S-2	2.5-4.0	43.9
	S-3	5.0-6.5	60.8
	S-4	8.5-10.0	43.2
	S-5	13.5-15.0	18.7
	S-6	18.5-20.0	32.6
SB-6	S-1	0.0-1.5	40.0
	S-2	2.5-4.0	55.0
	S-3	5.0-6.5	22.1
	S-4	8.5-10.0	7.5
	S-5	13.5-15.0	27.8
SB-8	S-1	0.0-1.5	40.8
	S-2	2.5-4.0	49.9
	S-3	5.0-6.5	31.9
	S-4	8.5-10.0	42.0
	S-5	13.5-15.0	10.4
	S-6	18.5-20.0	17.7
SB-9	S-1	0.0-1.5	27.9
	S-2	2.5-4.0	47.7
	S-3	5.0-6.5	65.3
	S-4	8.5-10.0	27.8
	S-5	13.5-15.0	71.4
	S-6	18.5-20.0	11.1

GEO-TECHNOLOGY ASSOCIATES, INC.
Natural Moisture Content Summary

Patuxent Greens
December 12, 2017
171358

Test Method: ASTM D 2216

BORING No.	SAMPLE No.	DEPTH (FT)	NATURAL MOISTURE CONTENT %
SB-10	S-1	0.0-1.5	19.3
	S-2	2.5-4.0	21.1
	S-3	5.0-6.5	10.8
	S-4	8.5-10.0	9.7
	S-5	13.5-15.0	18.6
	S-6	18.5-20.0	18.1
SB-11	S-1	0.0-1.5	29.9
	S-3	5.0-6.5	52.8
	S-4	8.5-10.0	64.8
	S-5	13.5-15.0	13.3
	S-6	18.5-20.0	18.6
SB-12	S-1	0.0-1.5	32.4
	S-3	5.0-6.5	31.0
	S-4	8.5-10.0	24.6
	S-5	13.5-15.0	10.3
	S-6	18.5-20.0	17.5