REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

HOLLY SPRINGS TOWN CENTER - TOWNHOMES
PALM STREET & PALM STREET EXTENSION
HOLLY SPRINGS, GEORGIA

Oasis Project No. 194525

Prepared For:
City of Holly Springs
3237 Holly Springs Parkway
Holly Springs, Georgia 30115

Prepared By:
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45 Woodstock Street
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January 24, 2020

January 24, 2020

City of Holly Springs
3237 Holly Springs Parkway
Holly Springs, Georgia, 30115

Attention: Mr. Steven Miller

Subject: **Report of Subsurface Exploration and Geotechnical Engineering Evaluation**
Holly Springs Town Center - Townhomes
Palm Street and Palm Street Extension
Holly Springs, Georgia
Oasis Project No. 194525

Dear Mr. Miller:

Oasis Consulting Services (Oasis) is pleased to provide this report of our subsurface exploration and geotechnical engineering evaluation for the referenced project. The field study and this report were accomplished in general accordance with Oasis Proposal No. P19128 (Revised), dated September 30, 2019.

The following report presents a brief summary of our pertinent findings and recommendations followed by our understanding of the proposed construction, methods of exploration employed, site and subsurface conditions encountered, and conclusions and recommendations regarding the geotechnical aspects of the project. We request that we be provided with a copy of the approved plans for review to verify that the design recommendations are incorporated into the design. We will also be able to make supplemental recommendations to address conditions that were not known at the time this report was prepared.

Should you have any questions regarding items discussed in this report, please do not hesitate to contact the undersigned.

Sincerely,
Oasis Consulting Services

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TABLE OF CONTENTS

APPENDICES

APPENDIX A
Figure 1: Site Vicinity Map
Figure 2-A: Boring Location Plan
Figure 2-B: Boring Location Plan

APPENDIX B
Field Test Procedures

APPENDIX C
Key to Symbols and Classifications
Boring Logs (5)
Hand Auger Boring Summary

1.0 SUMMARY

A brief summary of pertinent findings, conclusions and recommendations are presented below. This information should not be utilized in design without first referring to the more detailed expansion of these ideas presented in the text of this report.

1.1. The general subsurface conditions encountered in the soil test borings consist of topsoil layer, underlain by previously placed fill and residual (virgin) soils extending to the boring termination depths of 15 feet and 20 feet below existing grade. Groundwater was not encountered in any of the soil test borings to the depths drilled.

1.2. The hand auger borings generally encountered a topsoil layer, underlain by previously placed fill and residual soils. Groundwater was not encountered in any of the hand auger borings.

1.3. **A potential issue that could impact site grading is related to the presence of micaceous soils across the site. This issue is relatively minor but could represent a major issue if site grading takes place during periods of inclement weather, since soils with high mica content are moisture sensitive.**

An Oasis geotechnical engineer should carefully evaluate all subgrade conditions prior to fill placement or at-grade construction. In the event that soft soils or materials containing deleterious materials are encountered in other areas at the time of construction, typical recommendations would include undercutting and replacing with structural fill or stabilizing in place.

1.4 Excessive topsoil and organics were encountered in the area of the proposed site retaining wall located east of the development (HA-1 and HA-2 from Figure 2-B). The topsoil and organics extended to a depth of approximately 7 feet below the existing ground surface. This material will require removal and replacement with suitable new structural fill prior to wall construction. We recommend this area be further evaluated at the time of construction in order to define the limits of the topsoil and organics.

Organics and wood chips were encountered within the fill located on the west side of the development (B-2 and B-3). This organic laden fill appears to be isolated to the upper 3 feet of the existing ground surface. The area where the organic laden fill appears to be in a proposed cut area, requiring cuts in excess of 3 feet. Therefore, we anticipate most of the organic laden fill encountered on the west side of the development will be excavated during the grading process. This material is not suitable for structural support and will require wasting in non-structural areas of the development or hauled off-site.

1.4. The on-site soils appear visually suitable for reuse as structural fill. Moisture conditioning may be required prior to placement as fill depending upon weather conditions at the time of construction.

New fill should be compacted to 95 percent of the standard Proctor (ASTM D 698) maximum dry density. Compaction of the subgrade immediately beneath grade slabs and pavements should be increased to 98 percent. **Since a significant amount of the on-site soils encountered contain a moderate to heavy amount of mica, they are typically more moisture sensitive and may be more problematic to work with should earthwork operations take place during periods of wet weather.**

1.5. Excavations to the planned depths can be accomplished using conventional heavy earthmoving equipment. No difficult excavation is expected above the boring termination depths.

1.6. Once the proposed site preparation measures, earthwork, and any necessary remediation measures are successfully completed, the townhomes may be supported by conventional shallow foundations bearing on residual soil or new structural fill. We recommend that the townhome foundations be designed using a maximum net allowable bearing pressure of 2,500 psf.

1.7. No groundwater was encountered to the depths drilled. As such, groundwater related issues are not anticipated for the planned development.

1.8. Additional recommendations relative to earth pressures, slopes, site preparation, and foundation construction are discussed in the report.

2.0 PROPOSED CONSTRUCTION

We understand the City of Holly Springs is planning to redevelop the area near the intersection of Palm Street and the proposed Palm Street Extension as part of the Holly Springs Town Center development. Based on the provided Grading & Drainage plan (C1.1.5), we understand the proposed development to consist of 30 townhomes with associated drives and utilities. We also understand proposed detention ponds will be constructed as part of the development. Based on the proposed grades throughout the townhome development, we anticipate mass cuts and fills up to 14 feet and 10 feet, respectively. This includes excavation of the proposed detention pond located at the southwest corner of the site. Although no structural loading information has been provided, we assume that structural loads are relatively light and that maximum wall loads will be 3 kips per linear foot.

Proposed site retaining walls are located on the east half of the development. We have also been provided a Grading & Drainage plan (C1.1.6) which identifies a site retaining wall at the back of Lots 11, 12, 13, and 14. The wall appears to be approximately 165 feet in length and 8 feet in height. The bottom of wall appears to be similar in elevation to the existing ground surface. A second wall is associated with Pond B1 and is approximately 450 feet in length and 8 feet in height. Both walls appear to identify the bottom of wall at an elevation similar to the existing ground surface. At the time of our field work, the cast-in-place wall located at Pond B2 was constructed. No other details concerning the project were available at the time this report was prepared.

3.0 METHODS OF EXPLORATION

To evaluate the subsurface conditions, the property was explored by a combination of a visual site reconnaissance and drilling a total of five (5) soil test borings performed to depths of 15 to 20 feet below existing grade. Fifteen (15) hand auger borings were also performed within the proposed townhome building pads and along the proposed site retaining wall located on the east side of the development. The borings were located in the field with a handheld GPS device along with measuring distances and estimating directions from identifiable site features. Therefore, their locations as shown on the Boring Location Plan in the Appendix should be considered approximate.

The borings were advanced using a power rotary drill and twisting continuous hollow stem auger flights into the ground. At selected intervals, Standard Penetration Tests (SPT) were performed in general accordance with ASTM standard D-1586 by driving a standard 1-$^{3}/_{8}$" I.D. (2" O.D.) split spoon sampler with an automatic 140-pound hammer falling 30 inches. The number of hammer blows needed to drive the sampler 18 inches, in 6-inch increments, was recorded. The Standard Penetration Test value or "N" value is the summation of the last two 6-inch increments and is shown on the boring logs adjacent to their corresponding depths. In very dense soils or partially weathered rock, the sampler is driven a few inches instead of the 6-inch increment and the number of blows needed versus the penetration depth is recorded. The results of the penetration tests, when properly evaluated, provide an indication of the relative consistency of the soil being sampled, the potential for difficult excavation, and the soil's ability to support loads.

At the conclusion of the subsurface drilling, all of the borings were backfilled with the soil cuttings prior to demobilizing from the site. Soil samples recovered during the drilling process were returned to Oasis' lab where they were visually classified in general accordance with the Unified Soil Classification System (USCS). Detailed descriptions of the materials encountered at each boring location, along with a graphical representation of the Standard Penetration Test results, are shown on the Boring Logs in the Appendix.

Elevations on the Boring Logs were interpolated from the topographic contours on the plan provided to us and should be considered approximate. If encountered, groundwater depth was measured at the time of drilling.

The hand auger borings were advanced by manually twisting a sharpened steel auger bucket into the ground. The soils encountered during the auguring process were classified in general accordance with the Unified Soil Classification System (USCS) and the cuttings evaluated for the presence of deleterious materials. Dynamic Cone Penetrometer (DCP) tests were performed at selected intervals and the number of blows per 1 ¾ inch increment recorded to determine the consistency of the in-place soils.

4.0 SITE DESCRIPTION, GEOLOGY AND SUBSURFACE CONDITIONS

4.1 SITE DESCRIPTION

The property is located at the intersection of Palm Street and the proposed Palm Street Extension as part of the Holly Springs Town Center development. At the time of our site reconnaissance, the majority of the property had been cleared for development. Existing roadways and utilities traverse the area. Residential structures have been razed. The general topography of the property consists of high point of 1100 feet gradually decreasing to an elevation of 1058 feet at the southeast corner of the site.

4.2 GEOLOGY

The site is located in the Piedmont Physiographic Province of Georgia, an area underlain by ancient igneous and metamorphic rocks. The residual soils in the Piedmont are the result of the chemical and physical weathering of the underlying parent rock. The weathering profile usually results in fine-grained clayey silts and silty clays near the surface, where weathering is more advanced. With depth, sandy silts and silty sands are found, often containing mica. Below the residual soils, partially weathered rock is often found as a transition above relatively unweathered rock. In local practice, partially weathered rock is arbitrarily defined as residual soils with Standard Penetration Resistances in excess of 100 blows per foot (50 blows per 6 inches), and which can be penetrated by a power auger. The upper surface of bedrock is generally very erratic and the depth at which bedrock is encountered can vary greatly. Typically, bedrock is encountered at shallow to moderate depths. This typical profile can be altered by the process of erosion and deposition and recent development.

4.3 SUBSURFACE CONDITIONS

The general subsurface conditions encountered by the borings during this study are generally typical of those described in the previous geology section of this report. Topsoil, previously placed fill and residual soils were encountered in the borings. The following briefly describes the subsurface conditions encountered.

4.3.1 TOPSOIL

Borings B-1 and B-5 initially encountered about 0.5 to 1 inch of topsoil. Topsoil is a dark-colored surficial material with a high organic content and is generally unsuitable for structural support. Some variation in topsoil thickness should be anticipated during site stripping operations.

4.3.2 PREVIOUSLY PLACED FILL

Fill is any material that has been transported and deposited by man. Borings B-2, B-3 and B-4 encountered previously placed fill to depths extending to 5.5 feet below the existing grades. The fill was classified as crushed aggregate and clayey SAND (SC) and silty SAND (SM). Standard Penetration Test (SPT) results ranged from 9 to 13 blows per foot (bpf). Based on SPT results, the previously placed fill would be considered slightly under compacted to moderately compacted.

Organic laden fill was encountered in borings B-2 and B-3 within the upper 3 feet. This material is not suitable for structural support, nor is it suitable to use as structural fill material. It should be wasted in non-structural areas or hauled off-site.

4.3.3 RESIDUUM

Residuum is a term used to define soils formed in-place by the chemical and physical weathering process of the underlying rocks. Residual soils were encountered in all of the borings below the previously fill and extended to the proposed boring termination depths of 15 to 20 feet below existing grades. The residuum was generally classified as clayey SAND (SC) and silty SAND (SM) with moderate to high amounts of mica. Standard Penetration Test results ranged from 9 to 27 bpf. Based on SPT results, the residuum would be considered low to moderate consistency.

4.3.4 HAND AUGER BORINGS

The hand auger borings typically encountered surficial topsoil and associated root zone underlain by previously placed fill and residual soils. Excessive topsoil and organics were encountered in hand auger borings HA-1 and HA-2 and extended to residual soils at a depth of approximately 7 feet below the existing ground surface.

Fill was also encountered in borings HA-2, HA-3, HA-6, HA-8, HA-9, HA-10, HA-12, and HA-15 from the surficial topsoil up to a depth of approximately 5 feet below the existing ground surface. The fill was generally classified as silty SAND (SM) with various amount of mica. The Dynamic Cone Penetrometer (DCP) results for the fill typically ranged from 7 to 12 blows per 1¾ inch increment. Based on the DCP results, the residual soils would generally be considered moderate in consistency.

Residual soils were initially encountered below the surficial topsoil or below the layer of fill in all hand auger borings and extended to the boring termination or hand auger refusal depths of 3 to 9 feet below the existing ground surface. The residuum was generally classified as silty sands with varying amounts of mica. The Dynamic Cone Penetrometer (DCP) results for the residuum typically ranged from 12 to in excess of 25 blows per 1¾ inch increment. Based on the DCP results, the residual soils would generally be considered high in consistency.

4.3.5 GROUNDWATER

Groundwater was not encountered in any of the soil test borings or hand auger borings at the time of drilling. However, fluctuations in measured groundwater elevations of 5 feet or more are common in this geology due to seasonal fluctuations and groundwater could be encountered at higher elevations in the future.

The conditions described in the preceding paragraphs, and those shown in the Appendix, have been based on interpolation of the results of the previously described data using generally accepted principles and practices of geotechnical engineering. However, conditions in this geology may vary intermediate of the tested locations and even more so on previously filled property.

Although individual soil test borings are representative of the subsurface conditions at the precise boring locations on the day drilled, they are not necessarily indicative of the subsurface conditions at other locations or other times. The nature and extent of variation between the borings may not become evident until the course of construction. If such variations are then noted, it will be necessary to reevaluate the recommendations of this report after on-site observation of the conditions.

5.0 CONCLUSIONS AND RECOMMMENDATIONS

The following conclusions and recommendations are based on the data gathered during this exploration, our understanding of the proposed construction, our experience with similar site and subsurface conditions and generally accepted principles and practices of geotechnical engineering. Should the proposed construction change significantly from that described in this report, we request that we be advised so that we may amend these recommendations accordingly. This report, and the conclusions and recommendations provided herein, are provided exclusively for the use of the City of Holly Springs and their design team and is intended solely for design of the referenced project.

5.1 GENERAL

The on-site soils appear suitable for reuse as structural fill, and we anticipate that planned excavations can largely be accomplished using conventional heavy earthmoving equipment. We recommend that the townhomes be supported on conventional shallow foundations, utilizing a net allowable bearing pressure of 2,500 psf.

We anticipate a major potential issue that could impact site grading is related to the presence of micaceous soils over the site. This issue is relatively minor but could represent a major issue if site grading takes place during periods of inclement weather, since soils with high mica content are moisture sensitive.

Excessive topsoil and organics were encountered in the area of the proposed site retaining wall located east of the development (HA-1 and HA-2 from Figure 2-B). The topsoil and organics extended to a depth of approximately 7 feet below the existing ground surface. This material will require removal and replacement with suitable new structural fill prior to wall construction. We recommend this area be further evaluated at the time of construction in order to define the limits of the topsoil and organics.

Organics and wood chips were encountered within the fill located on the west side of the development (B-2 and B-3). This organic laden fill appears to be isolated to the upper 3 feet of the existing ground surface. The area where the organic laden fill appears to be in a proposed cut area, requiring cuts in excess of 3 feet. Therefore, we anticipate most of the organic laden fill encountered on the west side of the development will be excavated during the grading process. This material is not suitable for structural support and will require wasting in non-structural areas of the development or hauled off-site.

5.2 SITE PREPARATION

As an initial step in site preparation, all asphalt should be removed in all areas of at-grade construction or areas to receive fill. Existing utilities should be rerouted around the proposed building location or removed so as not to negatively impact the new development. Any excavations created to demolish existing utilities should be properly backfilled according to the earthwork recommendations contained in this report.

The subgrade should be evaluated by an Oasis geotechnical engineer prior to at-grade construction or fill placement. The evaluation process should include proofrolling the subgrade with a fully loaded tandem axle dump truck (20 tons) during a period of dry weather and under the observation of the geotechnical engineer. Any areas which "pump" or "rut" excessively under the weight of the proofrolling vehicle should be further evaluated. After evaluation by Oasis, remedial options could include recompaction, undercutting and replacing with soil and/or rock, partial over-excavation with geogrid placement, or drying and recompaction. Proofrolling can occasionally detect pits where stumps or other debris may have been buried, or other areas where weak surface conditions exist. If encountered, weak soils should be evaluated by Oasis and remedial options could include replacing with structural fill or compacted crushed stone. As needed, backhoe test pits or hand augers with Dynamic Cone Penetrometer (DCP) testing can be used to delineate any unsuitable material found during proofrolling.

5.3 EARTHWORK

The previously placed fill and residual soils on the property appear suitable for reuse as structural fill based on visual examination if they are free from deleterious materials, such as organics and debris. **Moisture control may be necessary, primarily depending on the weather conditions at the time of construction. A significant amount of the on-site soils contain mica; therefore, these soils can be problematic to work with during cooler/rainy seasons.** If importing of soils is required, the proposed borrow source should be evaluated and approved by an Oasis geotechnical engineer.

Positive drainage should be maintained at all times to prevent saturation of exposed soils. During the grading operations, the contractor should take precautions to prevent water from ponding on the subgrade soils. If adequate drainage is not provided, these soils will become wet and unstable. As a result, additional drying or remedial measures may be required during the site grading.

Where fill is placed against slopes steeper than 5H:1V, it will be necessary to "bench" the new fill into the existing soils to insure an adequate bonding of the fill with the existing material. Inadequate benching may create a predefined plane of weakness and adversely affect slope stability.

All structural fill should be compacted to at least 95 percent of the soil's standard Proctor maximum dry density, as determined by ASTM standard D-698. The upper one foot of fill which will support structures, pavements or slabs-on-grade should be compacted to at least 98 percent of the soil's standard Proctor maximum dry density for improved support. Further, the fill material should have a maximum dry density of 90 pcf or above. In areas which are at or above the finished grade, and which will support pavements or slabs, the upper 8 inches immediately below these systems should be scarified and recompacted to the 98 percent criteria. Structural fill should be free of topsoil, organic materials or highly plastic silts and clays, have a liquid limit (LL) less than 40 and a plasticity index (PI) less than 20 and contain rock sizes no larger than 4 inches. Unacceptable materials removed during grading operations should be either stockpiled for later use in landscaped areas, or placed in approved disposal areas either on site or off site.

Fill operations should be observed on a full-time basis by an Oasis soils technician and density testing should be performed to determine the degree of compaction and to verify compliance with the project specifications. Fill materials should be placed in loose lifts not exceeding 8 inches and moisture conditioned to within 3 percent of the optimum moisture content to facilitate proper compaction. For underfloor areas, at least one field density test should be made per 2,500 square feet of fill area for each two-foot lift. Testing frequency should be increased in confined areas. Areas which do not meet the compaction specifications should be recompacted to achieve compliance. In confined areas, such as utility trenches, the use of portable compaction equipment and thin lifts of 3 to 4 inches may be required to achieve compaction.

5.4 DIFFICULT EXCAVATION

Excavations to the planned depths can be accomplished using conventional heavy earthmoving equipment. No difficult excavation is expected above the boring termination depths.

5.5 GROUNDWATER CONTROL

We do not anticipate that groundwater will be encountered during site grading. However, groundwater may be encountered during seasonal high rainfall. Drainage trenches and/or pumping from shallow sumps may be required in local areas for temporary dewatering.

5.6 FOUNDATIONS

We recommend that the townhomes be supported on conventional shallow foundations bearing on approved existing soils or new structural fill. A maximum net allowable design bearing pressure of 2,500 psf is recommended. The recommended bearing pressure is based on correlations with the

Standard Penetration Test results and the maximum assumed building loads discussed in Section 2.0. These correlations imply that a maximum total settlement of one inch is possible and a maximum differential settlement of half the total settlement is possible.

We recommend minimum foundation widths of 24 inches for individual column footings and 18 inches for strip footings to reduce the risk of the possibility of localized soil bearing failures due to local shear or “punching” actions. Exterior foundations should bear at least 18 inches below finished grades to prevent frost damage.

As with any construction, all foundation excavations should be evaluated by an Oasis geotechnical engineer, who will verify that the design bearing pressure is available intermediate of boring locations, and that foundations are not immediately underlain by worse conditions. If the engineer finds localized conditions of weak or organic soil below an individual footing, it should be undercut or a lower bearing pressure used, depending upon the actual conditions found.

Foundation excavations should be concreted as soon as practical after they are excavated and water should not be allowed to pond in any excavation. If an excavation is to be left open for an extending period of time, a thin mat of lean concrete should be placed over the bottom of the excavation to minimize damage to the bearing surface from weather or construction activities. Foundation concrete should not be placed on saturated or frozen subgrades.

5.7 SLAB-ON-GRADE SUPPORT

After successful completion of the site preparation measures, the proposed building slabs may be soil supported on the existing residual soils or new structural fill placed as recommended. We recommend a modulus of subgrade reaction of 100 pci for use in the slab design. Crushed stone is not needed to support the slab loads and is considered optional. We recommend that a vapor barrier be placed beneath the slab to prevent the infiltration of soil moisture into finished areas. The structural engineer may require a layer of crushed stone or free draining material beneath the slab to address slab performance issues. We suggest that the floor slab design include at least a six-inch layer of Graded Aggregate Base (GAB) compacted to 98% of the modified Proctor in conjunction with a vapor barrier. Our experience indicates that often subgrade areas require some minor repair due to the construction activities described above and the application of this stone layer can aid in this regard. Therefore, immediately prior to slab construction, we recommend the entire area be re-evaluated by an Oasis geotechnical engineer. If deficient conditions are encountered, these conditions can be identified and repaired or replaced as needed prior to further construction. The stone also will provide more uniform support and protection of the prepared subgrade from minor rainfall events immediately prior to slab construction.

5.8 LATERAL EARTH PRESSURES

Lateral earth pressures imposed on a retaining wall are a function of the soil properties, the inclination of the backfill behind the retaining wall, any surcharge loads applied behind the wall, and the amount of deflection the wall system can undergo. Lateral earth pressures developed from the "active" condition are applicable for design of temporary or permanent free-standing retaining walls, if adequate wall movement can occur to fully mobilize the shear strength of the retained soil. Permanent laterally restrained walls, such as basement walls, should be designed for pressures using the full "at-rest" case. The following equivalent fluid pressures are based on our experience and correlations with our field testing. Site specific laboratory soil strength testing was not performed for this project. However, based on the conditions found, the following equivalent fluid pressures are recommended using a horizontal backfill configuration with no surcharge loads and providing "typical" Piedmont soils (silty sand and sandy silt) are used for backfill. We assume the soils have a moist unit weight of 120 pounds per cubic foot (pcf), an angle of internal friction (ϕ) of 28 degrees and a sliding coefficient of friction of .45 x N where N is the vertical force component of the foundation system per linear foot. For concrete on soil, a sliding coefficient of friction of 0.53 may be used in the *ultimate design value* of the retaining wall.

Earth Pressure Condition	Earth Pressure Value	Recommended Equivalent Fluid Pressure (psf/f) Above Groundwater	Recommended Equivalent Fluid Pressure (psf/f) Below Groundwater
Active (K_A)	0.36	45	85
At-Rest (K_O)	0.53	60	90
Passive (Kp)	2.77	160*	160*

*safety factor of at least 2 for material properties and service criterion

Heavy compaction equipment should not be used to compact backfill immediately behind any retaining wall, unless the wall is designed for the increased pressure. Retaining wall backfill should be compacted to at least 95% of the soil's standard Proctor maximum dry density; therefore, hand operated compaction equipment will be necessary in these areas. Areas exposed to groundwater or surface infiltration of water should include a properly filtered footing and wall drain. The drain should include a perforated schedule 40 PVC pipe, placed in clean crushed stone, encapsulated in a 4-ounce needle-punched nonwoven filter fabric.

For structures supported on shallow foundations, lateral loads can be resisted by passive pressures against the face of the foundation or sliding resistance on the base of the footing. Because significant wall movements are required to develop the passive pressure, the recommended passive equivalent fluid pressure (160 psf/f) is one-half of the total calculated passive pressure, a safety factor of at least 2. Additional resistance to movement can be gained by developing sliding friction on the base of the footing and an allowable friction factor of 0.35 may be used. This includes a factor of safety of about

1.5. If the structural engineer is designing according to the International Building Code (IBC) 2012, the structural engineer can increase the values for passive pressure and sliding friction factor to 250 psf and 0.4, respectively. These values have a factor of safety for material properties but no service criterion factor of safety since the service criterion factor of safety is accounted for in the structural calculations per the IBC code.

6.0 QUALIFICATIONS OF RECOMMENDATIONS

This evaluation of the geotechnical aspects of the proposed design and construction has been based on our understanding of the project and the data obtained during this study. The general subsurface conditions used in our evaluation were based on interpolation of the subsurface data between the borings. Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions will differ between boring locations, that conditions are not as anticipated by the designers, or that the construction process has modified the soil conditions. Therefore, experienced Oasis soil engineers and technicians should evaluate earthwork and foundation construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications or recommendations.

The recommendations contained in this report have been developed on the basis of the previously described project characteristics and subsurface conditions. If project criteria change, we should be permitted to determine if the recommendations should be modified. The findings of such a review will be presented in a supplemental report. Even after completion of a subsurface study, the nature and extent of variation between borings may not become evident until the course of construction. If such variations then become evident, it will be necessary to reevaluate the recommendations of this report after on-site observations of the conditions.

These professional services have been performed, the findings derived, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all warranties either expressed or implied. This company is not responsible for the conclusions, opinions or recommendation of others based on these data.

APPENDIX A

SITE VICINITY MAP AND BORING LOCATION PLAN

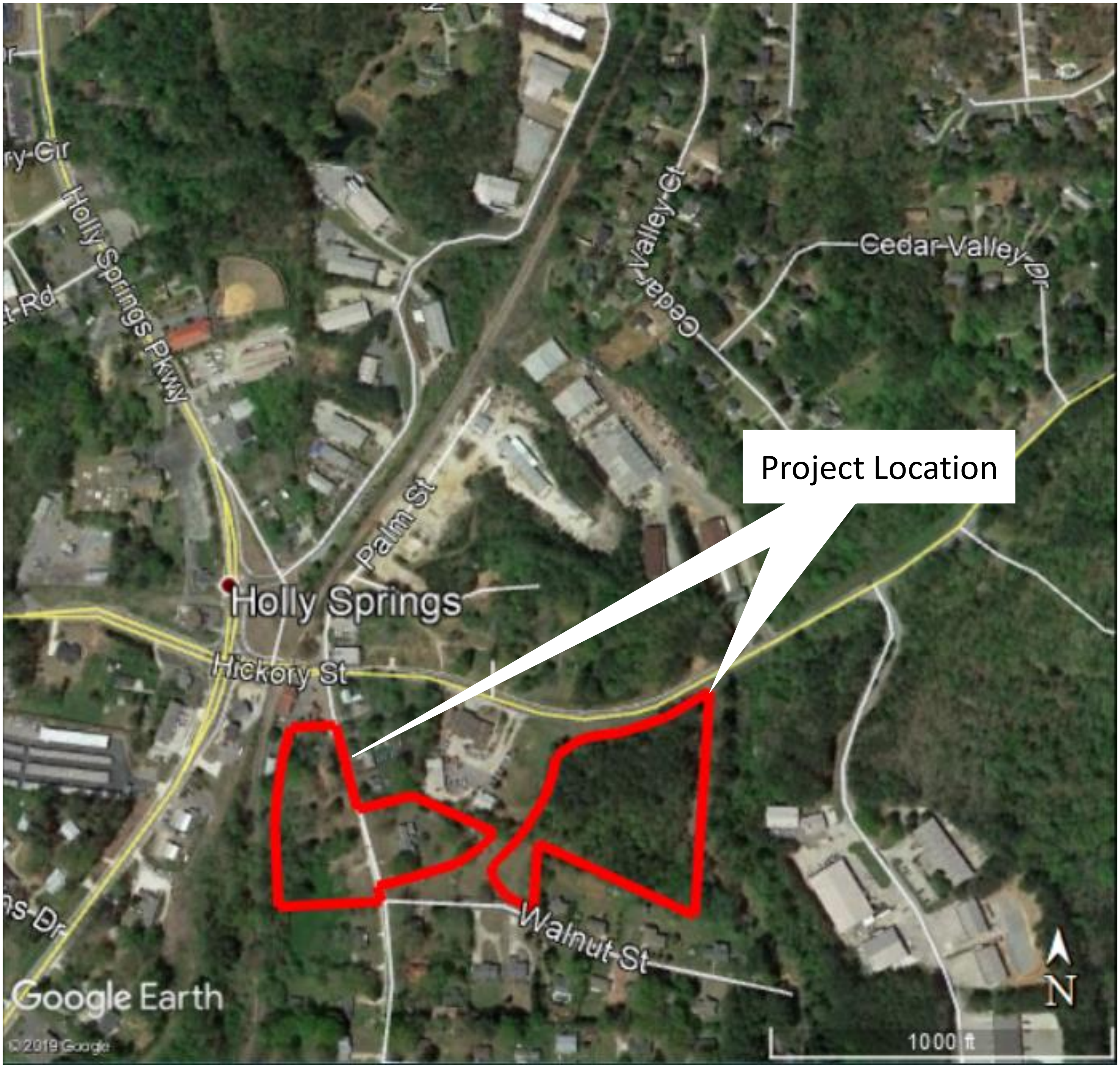
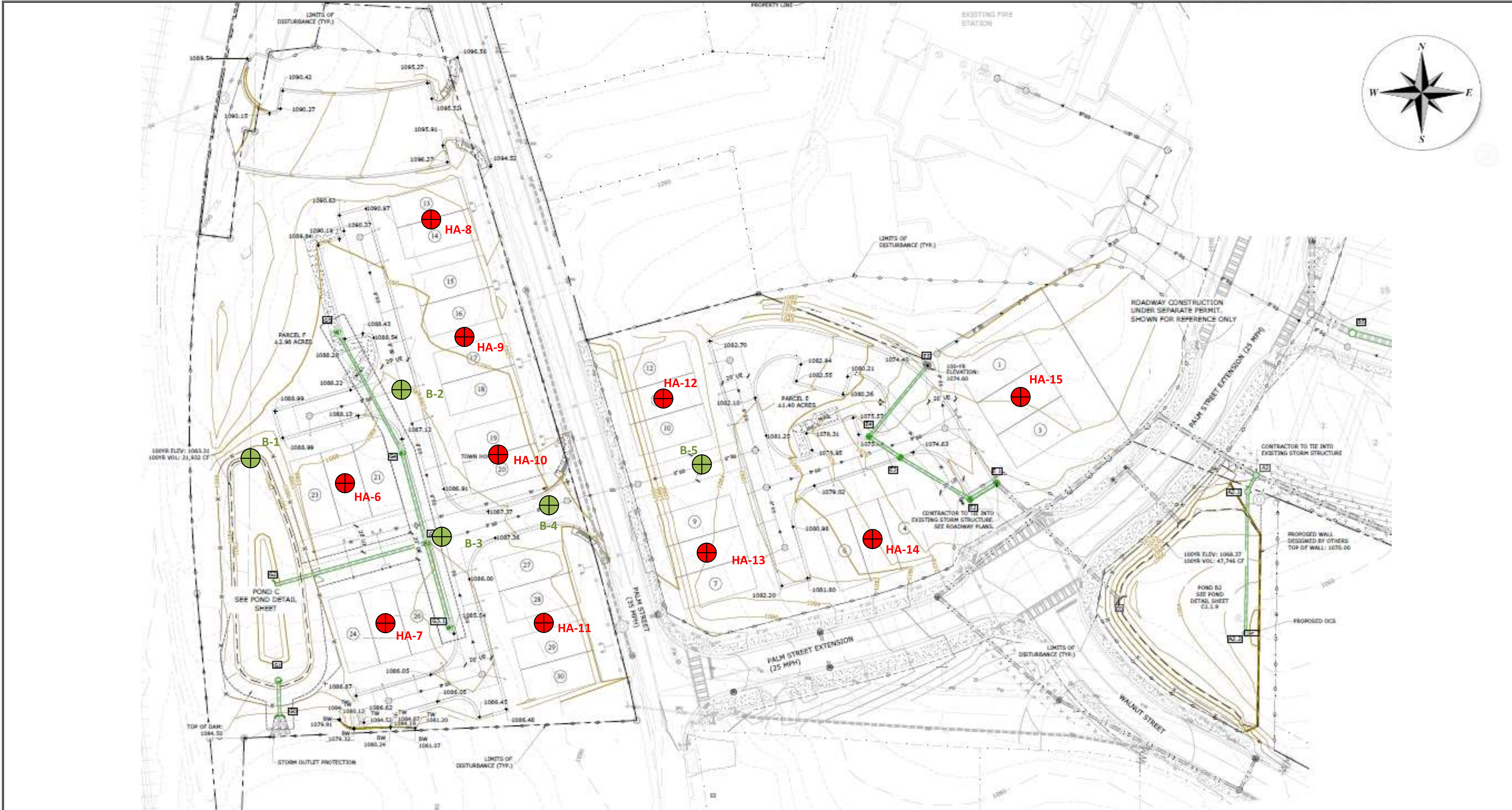


Figure No.:	SITE VICINITY MAP			
1	Source: Google Earth	Proposed Townhome Development Holly Springs Town Center Mixed-Use LDP Holly Springs, Cherokee County, Georgia		OASIS CONSULTING SERVICES
	Oasis Project No.: 194525	Scale: Map Scale	**Oasis Consulting Services** **45 Woodstock Street** **Roswell, Georgia 30075**	
	Date drawn: 11/2019	Drawn By: AG		



SOURCE: Grading & Drainage plan (C1.1.5), dated 08/05/19
SCALE: NTS
LEGEND:

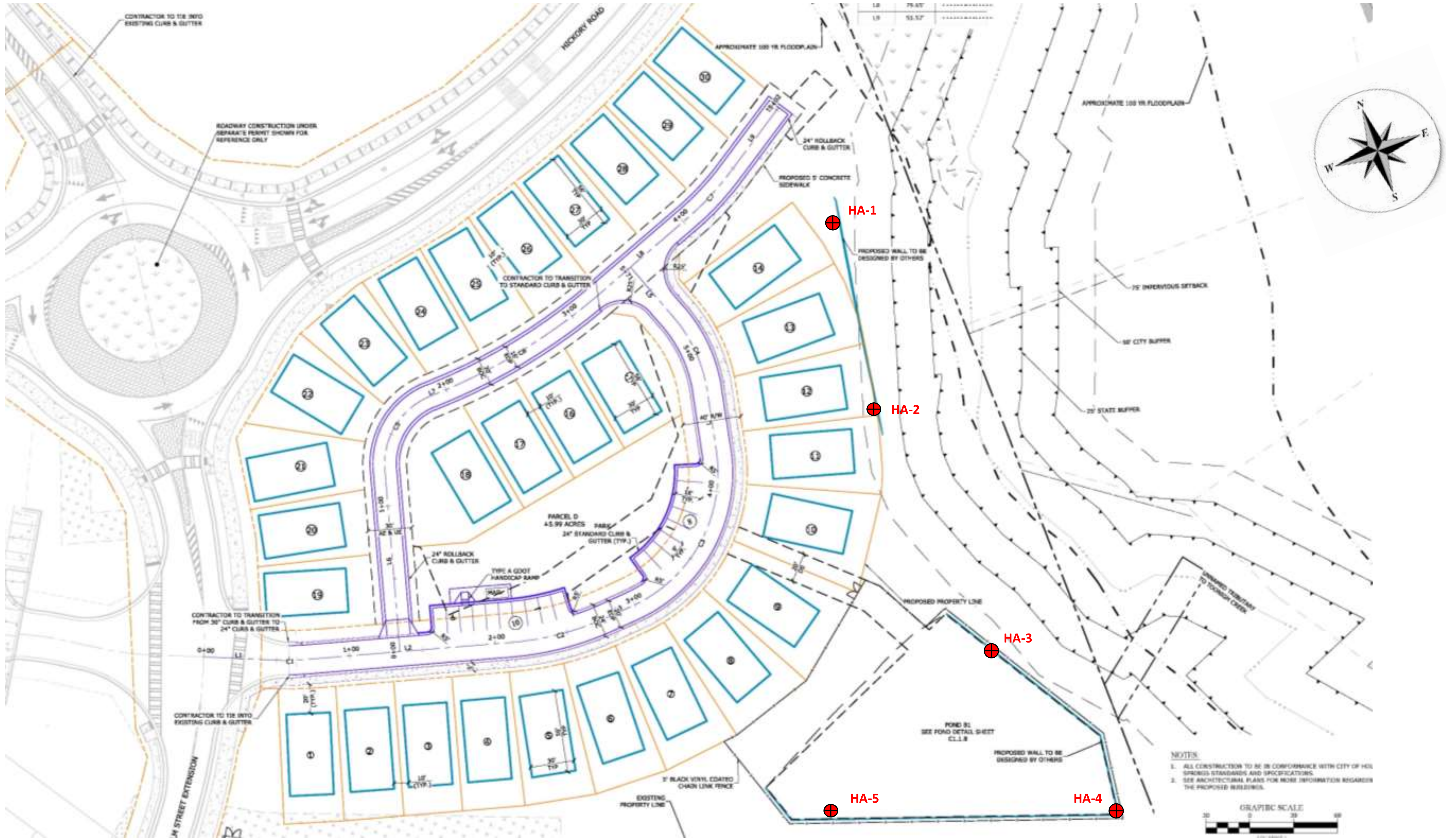
- Hand Auger Boring Locations
- Soil Test Boring Locations

FIGURE 2-A: BORING LOCATION PLAN

Date drawn: 1/20 Drawn By: BT

OASIS CONSULTING SERVICES

Proposed Townhomes
Holly Springs Town Center Mixed-Use LDP
Palm Street and Palm Street Extension
Holly Springs, Georgia
Oasis Proposal No. 194525



SOURCE: Site Plan (C1.0.6), dated 08/05/19
SCALE: NTS
LEGEND:
⊕ Hand Auger Boring Locations

FIGURE 2-B: BORING LOCATION PLAN

Date drawn: 01/20 Drawn By: BT

OASIS CONSULTING SERVICES

Proposed Townhomes
Holly Springs Town Center Mixed-Use LDP
Palm Street and Palm Street Extension
Holly Springs, Georgia
Oasis Project No. 194525

APPENDIX B

FIELD TEST PROCEDURES

TEST PROCEDURES

The general field procedures employed by Oasis Consulting Services (OCS) are summarized in the American Society for Testing and Materials (ASTM) Standard D 420 - Investigating and Sampling Soil and Rock. This practice lists recognized methods for determining soil, rock and groundwater conditions. These methods include geophysical and in-situ methods as well as borings.

Standard Drilling Techniques

To obtain subsurface samples, borings are drilled using one of several alternate techniques depending upon the subsurface conditions. Some of these techniques are:

In Soils:

a) Continuous hollow stem augers.
b) Rotary borings using roller cone bits or drag bits and water or drilling mud.
c) Hand augers.

In Rock:

a) Core drilling with diamond-faced, double or triple tube core barrels.
b) Core boring with roller cone bits.

Typical drilling methods used are presented in the following paragraphs.

<u>Hollow Stem Augering</u>: A hollow stem augers consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Sampling and Testing in Boreholes

Several techniques are used to obtain samples and data in soils in the field; however the most common methods in this area are:

a) Standard Penetrating Testing
b) Undisturbed Sampling
c) Dynamic Cone Penetrometer Testing
d) Water Level Readings

The procedures utilized for this project are presented below.

<u>Standard Penetration Testing:</u> At regular intervals, soil samples are obtained with a standard 2-inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings and then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, in blows per foot (bpf). The sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values of standard penetration tests are shown on the Boring Logs. Split tube samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water table readings are normally taken in the borings and are recorded on the Boring Logs. In sandy soils, these readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water table through short term water level readings. Also, fluctuation in the water table should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water levels reported on the Boring Logs are determined by field crews immediately after the drilling tools are removed, and several hours after the borings are completed, if possible. The time lag is intended to permit stabilization of the groundwater table which may have been disrupted by the drilling operation.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone. The cave-in depth is measured and recorded on the Boring Logs.

Boring Logs

The subsurface conditions encountered during drilling are reported on a field boring log prepared by the driller or an OCS representative. The log contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of groundwater. It also contains the field representative's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed, a geotechnical engineer or geologist classifies the soil samples and prepares the final Boring Logs, which are the basis for our evaluations and recommendations.

Soil Classification

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer or geologist. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Boring Logs.

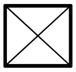
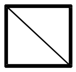
The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary; grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties are presented in this report.

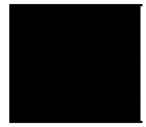
The Key to Symbols and Classifications presents criteria that are typically used in the classification and description of soil and rock samples for preparation of Boring Logs.

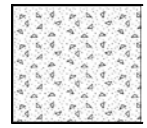
APPENDIX C

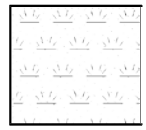
KEYS TO SYMBOLS AND CLASSIFICATIONS AND BORING LOGS

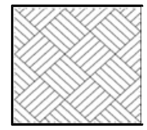
KEY TO SYMBOLS AND CLASSIFICATIONS

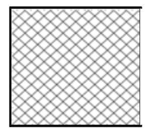
SYMBOL	TYPE OF SAMPLE
	Split Tube Sample (SPT)
	Shelby Tube Sample
	Bulk Sample
	Core Run

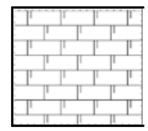

Asphalt


Partially Weathered Rock


Topsoil


Bedrock


Fill


Concrete

PARTICLE SIZE DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 inches
Cobbles	3 to 12 inches
Gravel	3 inches to 4.5 mm (Sieve No.4)
Coarse Gravel	3 inches to 3/4 of an inch
Fine Gravel	3/4 of an inch 4.5
Sand	4.5 mm to 0.074 mm (Sieves No.4 to No.200)
Coarse Sand	4.5 mm to 2.0 mm (Sieves No.4 to No.10)
Medium Sand	2.0 mm to 0.42 mm (Sieves No.10 to No.40)
Fine Sand	0.42 mm to 0.074 mm (Sieves No.40 to No.200)
Silt and Clay	Smaller than 0.074 mm (passing sieve No. 200)

MOISTURE CONTENT

Dry	Absence of moisture, dusty, dry to the touch
Damp	Some perceptible moisture, below optimum
Moist	No visible water, near optimum moisture content
Wet	Visible free water, usually soil is below water table

RELATIVE HARDNESS OF ROCK

Very Soft	Desintegrates or easily compresses to touch
Soft	May be broken with fingers
Moderately Soft	May be scratched with nail, edges may be broken with fingers
Moderately Hard	Light blow of hammer required to break sample
Hard	Hard blow of hammer required to break sample

ROCK CONTINUITY

DESCRIPTION	RQD*
Incompetent	Less than 40%
Competent	40% to 70%
Fairly Continuous	71% to 90%
Continuous	91% to 100%

*RQD=Rock Quality Designation

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOIL			COHESIVE SOILS		
Density	N (blows/ foot)	Approximate Relative Density (%)	Consistency	N (blows/foot)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 to 15	Very Soft	0 to 1	Less than 250
Loose	5 to 10	15 to 35	Soft	2 to 4	250 to 500
Medium Dense	11 to 30	35 to 65	Firm	5 to 8	500 to 1000
Dense	31 to 50	65 to 85	Stiff	9 to 15	1000 to2000
Very Dense	over 50	85 to 100	Very Stiff	16 to 30	2000 to 4000
			Hard	31 to 50	Greater than 4000
			Very Hard	over 50	

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	Clean Gravels (Little or no fines)		GW	Well graded gravels, gravel-sand mixtures, little or no fines
				GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE	Gravels with fines (Appreciable amount of fines)		GM	Silty gravels, gravel-sand-silt mixtures
				GC	Clayey gravels, gravel-sand-clay mixtures
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SANDS AND SANDY SOILS	Clean sands (Little or no fines)		SW	Well graded sands, gravelly sands, little or no fines
				SP	Poorly graded sands, gravelly sands, little or no fines
	MORE THAN 50% OF COARSE FRACTIONPASSING NO.4 SIEVE	Sands with fines (Appreciable amount of fines)		SM	Silty sands, sand-silt mixtures
				SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS	SILTS AND CLAYS	Liquid Limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
				CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
				OL	Organic silts and organic silty clays of low plasticity
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	Liquid Limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic clays of medium high plasticity, organic silts
HIGHLY ORGANIC SOILS				PT	Peat, humus, swamp soils with high organic contents

Note: Dual symbols are used to indicate borderline soil classifications

BORING NUMBER B-1

Oasis Consulting Services

CLIENT City of Holly Springs
PROJECT NAME Holly Springs Town Center - Townhomes
PROJECT NUMBER 194525
PROJECT LOCATION Holly Springs, GA
DATE STARTED 11/18/19 **COMPLETED** 11/18/19
GROUND ELEVATION 1095 ft **HOLE SIZE** 3.25
DRILLING CONTRACTOR Gable Drilling Co., Inc.
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING ---
LOGGED BY Gable **CHECKED BY** RN
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0	TOPSOIL: 1 inch		1095	
	(SC) RESIDUUM: Medium dense brown orange clayey coarse to fine SAND	SS		5-8-9 (17)
5		SS	1090	7-11-16 (27)
	(SM) Medium dense brown orange silty medium to fine SAND	SS		8-8-15 (23)
10		SS	1085	7-10-14 (24)
	(SM) Medium dense red orange black silty medium to fine SAND, micaceous			
15		SS	1080	8-12-15 (27)
	(SM) Medium dense red brown black silty medium to fine SAND			
20		SS	1075	6-8-11 (19)

▲ SPT N VALUE ▲ (20 40 60 80)
PL MC LL (20 40 60 80)
☐ FINES CONTENT (%) ☐ (20 40 60 80)

Borehole terminated at 20.0 feet.

BORING NUMBER B-2

Oasis Consulting Services

CLIENT City of Holly Springs
PROJECT NAME Holly Springs Town Center - Townhomes
PROJECT NUMBER 194525
PROJECT LOCATION Holly Springs, GA
DATE STARTED 11/18/19 **COMPLETED** 11/18/19
GROUND ELEVATION 1100 ft **HOLE SIZE** 3.25
DRILLING CONTRACTOR Gable Drilling Co., Inc.
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING ---
LOGGED BY Gable **CHECKED BY** RN
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0	CRUSHED AGGREGATE: 4 inches		1100	
	(SC) FILL: Medium dense brown black clayey coarse to fine SAND, rock fragments, organics	SS		4-5-7 (12)
	(SM) RESIDUUM: Medium dense red orange white silty medium to fine SAND, micaceous	SS		4-6-8 (14)
5			1095	
		SS		5-7-9 (16)
10		SS	1090	10-10-11 (21)
15		SS	1085	8-10-12 (22)
	(SM) Medium dense red tan silty medium to fine SAND, micaceous, rock fragments	SS		7-11-13 (24)
20			1080	

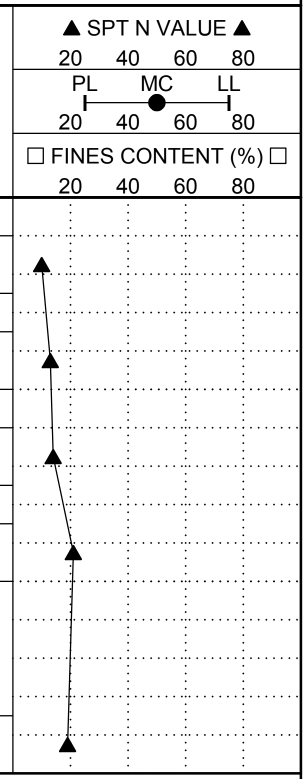
Borehole terminated at 20.0 feet.

Oasis Consulting Services

BORING NUMBER B-3

CLIENT City of Holly Springs
PROJECT NAME Holly Springs Town Center - Townhomes
PROJECT NUMBER 194525
PROJECT LOCATION Holly Springs, GA
DATE STARTED 11/18/19 **COMPLETED** 11/18/19
GROUND ELEVATION 1093 ft **HOLE SIZE** 3.25
DRILLING CONTRACTOR Gable Drilling Co., Inc.
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING ---
LOGGED BY Gable **CHECKED BY** RN
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0		(SC) FILL: Loose brown orange red clayey coarse to fine SAND, rock fragments, wood chips	SS		4-5-5 (10)
				1090	
3		(SM) Medium dense orange brown silty coarse to fine SAND	SS		4-6-7 (13)
5.5		(SM) RESIDUUM: Medium dense red orange black silty medium to fine SAND, micaceous	SS		5-7-7 (14)
				1085	
			SS		6-9-12 (21)
10					
				1080	
15			SS		8-8-11 (19)



Borehole terminated at 15.0 feet.

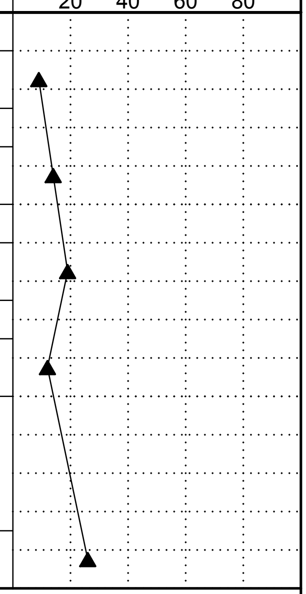
Oasis Consulting Services

BORING NUMBER B-4

CLIENT City of Holly Springs
PROJECT NAME Holly Springs Town Center - Townhomes
PROJECT NUMBER 194525
PROJECT LOCATION Holly Springs, GA
DATE STARTED 11/18/19 **COMPLETED** 11/18/19
GROUND ELEVATION 1093 ft **HOLE SIZE** 3.25
DRILLING CONTRACTOR Gable Drilling Co., Inc.
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING ---
LOGGED BY Gable **CHECKED BY** RN
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0		(SC) FILL: Loose red brown clayey coarse to fine SAND			
			SS		3-4-5 (9)
		(SM) RESIDUUM: Medium dense red tan orange silty medium to fine SAND		1090	
5			SS		4-5-9 (14)
			SS		5-8-11 (19)
				1085	
10			SS		4-5-7 (12)
				1080	
15			SS		8-12-14 (26)

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80



Borehole terminated at 15.0 feet.

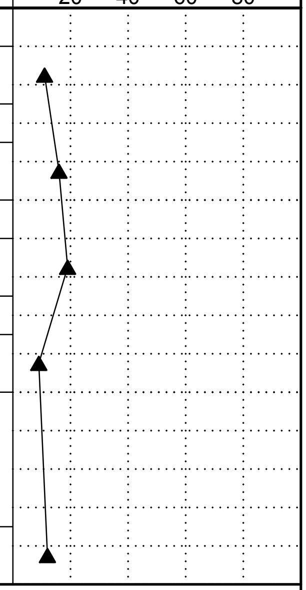
BORING NUMBER B-5

Oasis Consulting Services

CLIENT City of Holly Springs
PROJECT NAME Holly Springs Town Center - Townhomes
PROJECT NUMBER 194525
PROJECT LOCATION Holly Springs, GA
DATE STARTED 11/18/19 **COMPLETED** 11/18/19
GROUND ELEVATION 1083 ft **HOLE SIZE** 3.25
DRILLING CONTRACTOR Gable Drilling Co., Inc.
GROUND WATER LEVELS:
DRILLING METHOD HSA-Auto Hammer
AT TIME OF DRILLING ---
LOGGED BY Gable **CHECKED BY** RN
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	ELEVATION (ft)	BLOW COUNTS (N VALUE)
0		Topsoil: 0.5 inches			
		(SM) RESIDUUM: Medium dense red tan orange silty coarse to fine SAND	SS		3-5-6 (11)
				1080	
5			SS		5-7-9 (16)
			SS		4-8-11 (19)
				1075	
		(SM) Loose to medium dense orange tan white silty coarse to fine SAND, micaceous	SS		4-4-5 (9)
10					
				1070	
15			SS		4-6-6 (12)

▲ SPT N VALUE ▲ (20, 40, 60, 80); PL — MC ● — LL (20, 40, 60, 80); ☐ FINES CONTENT (%) ☐ (20, 40, 60, 80)



Borehole terminated at 15.0 feet.

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-1 DCP: 2' – 4/7 7' – 5/8 9' – 15/17	**(0 – 7') TOPSOIL AND ORGANICS: 7 FEET** **(7' – 9') RESIDUUM:** Orange tan silty medium to fine SAND (SM) Groundwater not encountered. Hand Auger Boring terminated at 9 feet.

Hand Auger Boring	Description
HA-2 DCP: 2' – 2/4 4' – 4/5 7.5' – 18/20	**(0 – 3') FILL:** Orange tan silty medium to fine SAND (SM) **(3' – 7') TOPSOIL AND ORGANICS: 4 FEET** **(7 – 7.5') RESIDUUM:** Tan gray silty medium to fine SAND (SM) Groundwater not encountered. Hand Auger Boring terminated at 7.5 feet.

OASIS CONSULTING SERVICES

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-3 DCP: 2' – 18/25 4' – 17/21 6' – 18/24	**(0 – 1') FILL:** Orange tan silty medium to fine SAND (SM), minor topsoil **(1' – 5'):** Red orange clayey silty medium to fine SAND (SM) **(5' – 8') RESIDUUM:** Red orange clayey silty medium to fine SAND (SM) Groundwater not encountered. Hand Auger Boring terminated at 8 feet.

Hand Auger Boring	Description
HA-4 DCP: 2' – 25/25+ 4' – 25/25+	**(0 – 1') TOPSOIL:** Topsoil and associated root zone. **(1' – 2') RESIDUUM:** Tan brown silty medium to fine SAND (SM) **(2' – 4'):** Tan brown silty fine SAND (SM), rock fragments. Groundwater not encountered. Hand Auger Boring refusal at 4 feet.

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-5 DCP: 2' – 15/18	**(0 – 1') TOPSOIL:** Topsoil and associated root zone. **(1' – 2') RESIDUUM:** Brown silty medium to fine SAND (SM) **(2' – 3')** Tan brown silty medium to fine SAND (SM), micaceous Groundwater not encountered. Hand Auger Boring refusal at 3 feet.

Hand Auger Boring	Description
HA-6 DCP: 2' – 8/10 4' – 20/25 6' – 16/25+	**(0 – 6") TOPSOIL:** Topsoil and associated root zone. **(6" – 2') FILL:** Orange brown silty medium to fine SAND (SM) **(2' – 4') RESIDUUM:** Orange red silty medium to fine SAND (SM), micaceous. **(4' – 6'):** Red brown silty medium to fine SAND (SM) **(6' – 8'):** Tan brown silty medium to fine SAND (SM) Groundwater not encountered. Hand Auger Boring refusal at 8 feet.

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-7 DCP: 2' – 20/20 4' – 25/25+	**(0 – 3") TOPSOIL:** Topsoil and associated root zone. **(3" – 2') RESIDUUM:** Brown orange silty medium to fine SAND (SM) **(2' – 4.5'):** Orange Red clayey silty medium to fine SAND (SM), rock fragments. Groundwater not encountered. Hand Auger Boring refusal at 4.5 feet.

Hand Auger Boring	Description
HA-8 DCP: 2' – 10/7 4' – 20/19 6' – 25+	**(0 – 6") TOPSOIL:** Topsoil and associated root zone. **(6" – 1') FILL**: Brown red clayey silty medium to fine SAND (SM), roots and organics **(1' – 5'):** Red brown clayey silty medium to fine SAND (SM), micaceous **(5' – 6') RESIDUUM:** Brown silty medium to fine SAND (SM), micaceous Groundwater not encountered. Hand Auger Boring refusal at 6 feet.

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-9 DCP: 2' – 10/10 4' – 21/22 6' – 20/25+	**(0 – 6") TOPSOIL:** Topsoil and associated root zone. **(6" – 4') FILL:** Brown orange silty medium to fine SAND (SM), micaceous **(4' – 8') RESIDUUM:** Brown tan to red brown silty medium to fine SAND (SM), very micaceous Groundwater not encountered. Hand Auger Boring refusal at 8 feet.

Hand Auger Boring	Description
HA-10 DCP: 2' – 10/12 4' – 25+ 6' – 20/25+	**(0 – 6") FILL:** Brown orange silty medium to fine SAND (SM), minor topsoil, micaceous, organics and rock fragments. **(6" – 4'):** Orange brown clayey silty medium to fine SAND (SM), micaceous **(4' – 5') RESIDUUM:** Brown orange clayey silty medium to fine SAND (SM), micaceous **(5' – 7'):** Red brown silty medium to fine SAND (SM), highly micaceous **(7' – 8'):** Tan brown silty medium to fine SAND (SM), micaceous Groundwater not encountered. Hand Auger Boring refusal at 8 feet.

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-11 DCP: 2' – 13/21 4' – 20/25+ 6' – 31/25+ 9' – 15/25+	**(0 – 6") TOPSOIL AND CRUSHED AGGREGATE** **(6" – 1') TOPSOIL**: **6 INCHES** **(1' – 2') RESIDUUM:** Red brown clayey silty medium to fine SAND (SM), micaceous **(2' – 6'):** Orange red brown silty medium to fine SAND (SM), micaceous **(6' – 9')** Brown orange red silty medium to fine SAND (SM), micaceous Groundwater not encountered. Hand Auger Boring terminated at 9 feet.

Hand Auger Boring	Description
HA-12 DCP: 2' – 6/10 4' – 10/15 6' – 15/25+	**(0 – 4") TOPSOIL:** Topsoil and associated root zone. **(4" – 4') FILL:** Orange brown to orange clayey silty medium to fine SAND (SM), rock fragments. **(4' – 6') RESIDUUM:** Red orange clayey silty medium to fine SAND (SM), very micaceous **(6' – 7.5'):** Red orange to tan brown black silty medium to fine SAND (SM), very micaceous Groundwater not encountered. Hand Auger Boring refusal at 7.5 feet.

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-13 DCP: 2' – 14/12 4' – 17/25+ 5' – 25+	**(0 – 3") TOPSOIL:** Topsoil and associated root zone. **(3" – 4.5') RESIDUUM:** Red orange white clayey silty medium to fine SAND (SM) **(4.5' – 5'):** Tan white silty medium to fine SAND (SM), rock fragments Groundwater not encountered. Hand Auger Boring refusal at 5 feet.

Hand Auger Boring	Description
HA-14 DCP: 2' – 6/7 4' – 7/10 6' – 20/25+	**(0 – 6") TOPSOIL:** Topsoil and associated root zone. **(6" – 6') RESIDUUM:** Orange brown clayey silty medium to fine SAND (SM), micaceous to very micaceous **(6' – 8'):** Brown silty medium to fine SAND (SM), very micaceous Groundwater not encountered. Hand Auger Boring refusal at 8 feet.

Hand Auger Boring Summary

Holly Springs Town Center - Townhomes

Palm Street & Palm Street Extension, Holly Springs, Georgia

Oasis Project No. P194525

Hand Auger Boring	Description
HA-15 DCP: 2' – 17/15 4' – 25+	**(0 – 6") TOPSOIL:** Topsoil and associated root zone **(6" – 3') FILL:** Red brown clayey silty medium to fine SAND (SM), very micaceous **(3' – 4') RESIDUUM:** Brown silty medium to fine SAND (SM), very micaceous Groundwater not encountered. Hand Auger Boring refusal at 4 feet.