GSE Engineering & Consulting, Inc.

SUMMARY REPORT OF A GEOTECHNICAL SITE EXPLORATION

PROPOSED UF HEALTH SANTA FE
GAINESVILLE, ALACHUA COUNTY, FLORIDA

GSE PROJECT NO. 16019

Prepared For:

CHW PROFESSIONAL CONSULTANTS, INC.

JUNE 2023

GSE Engineering & Consulting, Inc.

June 15, 2023

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Subject: Summary Report of a Geotechnical Site Exploration
Proposed UF Health Santa Fe
Gainesville, Alachua County, Florida
GSE Project No. 16019

GSE Engineering & Consulting, Inc. (GSE) is pleased to submit this geotechnical site exploration report for the above referenced project.

Presented herein are the findings and conclusions of our exploration, including the geotechnical parameters and recommendations to assist with building foundation and stormwater management designs.

GSE appreciates this opportunity to have assisted you on this project. If you have any questions or comments concerning this report, please contact us.

Sincerely,

GSE Engineering & Consulting, Inc.

JASON E. GOWLAND LICENSE No.66467 STATE OF FLORIDA PROFESSIONAL ENGINEER

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1.0 INTRODUCTION

1.1 General

GSE Engineering & Consulting, Inc. (GSE) has completed this geotechnical exploration for the proposed UF Health Santa Fe located in Gainesville, Alachua County, Florida. This exploration was performed in accordance with GSE Proposal No. 2023-078 dated February 9, 2023. Mr. Robert J. Walpole, P.E., President, of CHW Professional Consultants, Inc. authorized our services on March 21, 2023.

1.2 Project Description

This project will consist of a multi-family residence building and improvements to an existing storm water basin. The site is located at the north end of the Santa Fe Health Park off NW 39th Avenue in Gainesville, Alachua County, Florida.

Mr. Robert J. Walpole, P.E. with CHW Professional Consultants, Inc. (CHW) provided information about the project and a site plan illustrating the locations of the proposed improvements. The project will consist of a three-story, L-Shaped building. This site is just north of an existing two-story building. We anticipate the structure will be either a concrete masonry unit or a combination of steel frame and concrete construction. Structural loads have not been provided but are expected to be on the order of 3 to 6 kips per foot for load bearing walls, and less than 250 kips for columns. The finished floor of the structure is anticipated to be constructed on a few feet of fill that will raise and level site grades.

An existing stormwater basin located south of the existing building will be utilized. This basin is a natural depressional feature that appears to remain dry throughout the year.

Mr. Kenneth L. Hill, P.E. with GSE visited the site to evaluate site access and conditions. The site is mostly open mowed yard areas. The west end of the proposed building area is wooded but is open under the tree canopy. The existing stormwater basin is open with a few trees. There appears to be an abandoned piezometer in the bottom of the existing stormwater basin.

A recent aerial photograph of the site was obtained. The site plan and aerial photograph were used in preparation of this exploration and report.

1.3 Purpose

The purpose of this geotechnical exploration was to determine the general subsurface conditions, evaluate these conditions with respect to the proposed construction, and prepare geotechnical parameters and recommendations to assist with building foundation and stormwater management designs.

2.0 FIELD AND LABORATORY TESTS

2.1 General Description

The procedures used for field sampling and testing are in general accordance with industry standards of care and established geotechnical engineering practices for this geographic region. This exploration consisted of performing six (6) Standard Penetration Test (SPT) borings to depths of 30 feet below land surface (bls) within the proposed building area and four (4) auger borings to depths of 15 and 30 feet bls within the existing stormwater management facility.

The soil borings were performed at the approximate locations as shown on Figure 2. The borings were located at the site using the provided site plan and obvious site features as reference. The boring locations should be considered approximate. The soil borings were performed from April 5 through 6, 2023.

2.2 Auger Borings

The auger borings were performed in accordance with ASTM D1452. The borings were performed with flight auger equipment that was rotated into the ground in a manner that reduces soil disturbance. After penetrating to the required depth, the auger was retracted, and the soils collected on the auger flights were field classified and placed in sealed containers. Representative samples of each stratum were retained from the auger boring. Results from the auger borings are provided in Section 5.1.

2.3 Standard Penetration Test Borings

The soil borings were performed with a drill rig employing flight auger drilling techniques and Standard Penetration Testing (SPT) in accordance with ASTM D1586. The SPTs were performed continuously to 10 feet and at 5-foot intervals thereafter. Soil samples were obtained at the depths where the SPTs were performed. The soil samples were classified in the field, placed in sealed containers, and returned to our laboratory for further evaluation.

After drilling to the sampling depth, the standard two-inch O.D. split-barrel sampler was seated by driving it 6 inches into the undisturbed soil. Then the sampler was driven an additional 12 inches by blows of a 140-pound hammer falling 30 inches. The number of blows required to produce the next 12 inches of penetration were recorded as the penetration resistance (N-value). These values and the complete SPT boring logs are provided in Section 5.2.

Upon completion of the sampling, the boreholes were abandoned in accordance with Water Management District guidelines.

2.4 Soil Laboratory Tests

The soil samples recovered from the soil borings were returned to our laboratory, and examined to confirm the field descriptions. Representative samples were then selected for laboratory testing. The laboratory tests consisted of six (6) percent soil fines passing the No. 200 sieve determinations, six (6) natural moisture content determinations, one (1) Atterberg Limits test, and three (3) constant head hydraulic conductivity tests. These tests were performed in order to aid in classifying the soils and to further evaluate their engineering properties. The laboratory tests are provided in Section 5.3.

3.0 FINDINGS

3.1 Surface Conditions

Mr. Kevin P. Fisher, E.I. with GSE visited the site on March 28, 2023 to observe the site conditions and mark the boring locations.

The site is mostly open mowed yard areas. The west end of the proposed building area is wooded but is open under the tree canopy. The existing stormwater basin is open with a few trees. There appears to be an abandoned piezometer in the bottom of the existing stormwater basin. The site is bordered by NW 90 Boulevard to the west. Existing buildings, roads, and parking lots are present surrounding the site.

The topography at the site is gently to moderately sloping down toward the south from the north. Regional topography is gently rolling hills. The Alachua County Growth Management website[1] indicates the ground surface elevations at the existing SMF are near an elevation of 148 feet in the bottom of the existing SMF to 162 feet at the top of the existing SMF. The area of the proposed building ranges in elevations of 156 to 162 feet.

3.2 Potential Geological Feature

The Alachua County Soils Survey maps a depression/sinkhole in the existing stormwater management facility. This area is an existing depressional area that appears to currently be utilized as stormwater management facility. No limestone or chimneys were observed within the depression.

Section 406.89 of the Alachua County Code of Ordinances defines ***significant geologic features***. The following is from the code of ordinances. *Significant geologic features include but are not limited to: point source features such as sinkholes, caves, and limestone outcrops; lineal features such as lineaments, ridges, escarpments, and springs; and areal features such as steep slopes and springsheds.*

3.3 Subsurface Conditions

The locations of the auger and SPT borings are provided on Figure 2. Complete logs for the borings are provided in Sections 5.1 and 5.2. Descriptions for the soils encountered are accompanied by the Unified Soil Classification System symbol (SM, SP-SM, etc.) and are based on visual examination of the recovered soil samples and the laboratory tests performed. Stratification boundaries between the soil types should be considered approximate, as the actual transition between soil types may be gradual.

The auger borings located in the existing stormwater management facility indicate the soils across these areas are relatively variable.

Auger boring P-1 encountered 17 feet of sand with silt, silty sand, and silty sand with clay (SP-SM, SM, SM-SC) overlying clay with sand (CL/CH) to a depth of 21 feet bls. This was underlain by silt with sand and silty clayey sand (ML, SM/SC) to the explored depth of 30 feet bls.

[1] Alachua County Growth Management website, http://mapgenius.alachuacounty.us/.

Auger boring P-2 encountered 7 feet of clayey sand (SC) overlying silty sand and silty sand with clay (SM, SM-SC) to the explored depth of 15 feet bls.

Auger boring P-3 encountered 10.5 feet of sand with silt (SP-SM) overlying silty clayey sand (SM/SC) to the explored depth of 15 feet bls.

Auger boring P-4 encountered 5 feet of silty sand with clay (SM-SC) overlying elastic silt (MH) to a depth of 11.5 feet bls. This was underlain by silty sand (SM) to the explored depth of 15 feet bls.

The SPT borings within the proposed building area initially penetrated a 6 to 12 feet thick stratum of poorly graded sand and sand with silt (SP, SP-SM). This was underlain by interbedded strata of clayey to very clayey sand and sand with clay (SC, SC/CL, SP-SC) or clay-rich soils consisting of sandy clay, clay with sand, and clay (CL/CH) to the explored depths of 30 feet bls.

The surficial layer of poorly graded sand and sand with silt (SP, SP-SM) is generally in a very loose to medium dense condition with N-values ranging from 1 to 18 blows per foot. The underlying clayey to very clayey sand and sand with clay (SC, SC/CL, SP-SC) is generally in a loose to medium dense condition with N-values ranging from 5 to 26 blows per foot. The clay-rich soils (CL/CH) are generally in a firm to very stiff condition with N-values ranging from 5 to 26 blows per foot.

Weight-of-hammer strength materials were encountered in SPT borings B-3, B-4, and B-6 within the surficial sandy soils. These isolated events are consistent with native, very loose near-surface sand deposits common in this area of Alachua County.

The groundwater table was encountered in the auger and SPT borings at depths ranging from 10.5 to 24 feet bls at the time of our investigation.

3.4 Review of Published Soil Data

The majority of the site is mapped as three soil series by the Soil Conservation Service (SCS) Soil Survey for Alachua County[2]. The building area is mapped as Millhopper sand, 0 to 5 percent slopes. The existing stormwater management facility is mapped as Arredondo fine sand, 5 to 8 percent slopes. The remainder of the site is mapped as Arredondo fine sand, 0 to 5 percent slopes. The following soil descriptions are from the Soil Survey.

Arredondo fine sand, 0 to 5 percent slopes - This nearly level to gently sloping, well-drained soil is in both small and large areas of uplands. Slopes are smooth to convex. The areas are irregular in shape and range from about 10 to 160 acres in size.

Typically, the surface layer is dark grayish brown fine sand about 8 inches thick. The subsurface layer is fine sand to a depth of 49 inches. The upper 23 inches is yellowish brown, and the lower 18 inches is brownish yellow. The subsoil extends to a depth of 86 inches or more. The upper 5 inches is yellowish brown loamy sand; the next 10 inches is yellowish brown sandy clay loam, and the lower 22 inches is dark yellowish brown sandy clay and sandy clay loam.

[2] Soil Survey of Alachua County, Florida. Soil Conservation Service, U.S. Department of Agriculture.

Included with this soil in mapping are small depressional areas of soils that have a very dark gray or black surface layer 8 to 24 inches thick. This layer overlies gray sandy material. These areas are shown by wet spot symbols. Also included are small areas of Fort Meade, Gainesville, Kendrick, and Millhopper soils. A few areas of this soil include Arredondo soils that have 5 to 8 percent slopes. Some areas of this soil in the western part of the county have small spots of strongly acid to medium acid soil material 40 to 70 inches deep to calcareous limestone. Limestone boulders, fragments of limestone, and sinkholes are in some areas of this soil, mainly in the limestone plain sections of the western part of the county. Most of these boulders are siliceous. The sinkholes and the boulders are shown by appropriate map symbols. Total included areas are about 15 percent.

In this Arredondo soil, the available water capacity is low in the sandy surface and subsurface layers and low to medium in the loamy subsoil. Permeability is rapid in the surface and subsurface layers and moderately slow to moderate in the loamy subsoil. Natural fertility is low in the sandy surface and subsurface layers and medium in the finer textured subsoil. Organic matter content is low. The water table in this soil is at a depth of more than 72 inches. Surface runoff is slow.

Millhopper sand, 0 to 5 percent slopes - This nearly level to gently sloping, moderately well drained soil is in small and large irregularly shaped areas on uplands and on slightly rolling knolls in the broad flatwoods. Slopes are mostly nearly smooth or convex. The areas are variable in size. They range from about 10 to 250 acres.

Typically, the surface layer is dark grayish brown sand about 9 inches thick. The subsurface layer is sand or fine sand about 49 inches thick. The upper 17 inches is yellowish brown, the next 22 inches is light yellowish brown, and the lower 10 inches is very pale brown. The subsoil extends to a depth of 89 inches. The upper 6 inches is yellowish brown loamy sand that has grayish and brownish mottles; the next 22 inches is light gray, mottled sandy clay loam; and the lower 3 inches is light gray, mottled sandy loam.

Included with this soil in mapping are small areas of Arredondo, Bonneau, Fort Meade, Gainesville, Kanapaha, Lochloosa, and Sparr soils. Siliceous limestone boulders and small sinks are within some delineations. Small areas of Millhopper soils that have 5 to 8 percent slopes are also included. About 25 acres mapped as this Millhopper soil along the Santa Fe River is occasionally flooded. Total included areas are about 20 percent or less.

This Millhopper soil has a water table that is at a depth of 40 to 60 inches for 1 to 4 months and at a depth of 60 to 72 inches for 2 to 4 months during most years. The available water capacity is low in the surface and subsurface layers and is low to medium in the subsoil. Permeability is rapid in the surface and subsurface layers, moderately rapid in the upper 6 inches of the subsoil, and slow to moderately slow below this depth. Natural fertility is low. Organic matter content is low to moderately low.

Arredondo fine sand, 5 to 8 percent slopes - This nearly level to sloping, well drained soil forms in thick beds of sandy and loamy marine materials. These soils are in broad rolling areas of the upland. Slopes range from 0 to 8 percent. The water table is more than 72 inches below the surface. These soils are loamy siliceous, hyperthermic Grossarenic Paleudults.

Arredondo soils are geographically associated with Apopka, Bonneau, Candler, Fort Meade, Gainesville, Jonesville, Kanapaha, Kendrick, Lake Millhopper, and Norfolk soils. Apopka soils have less than 5 percent silt and clay in the A2 horizon, and many of the sand grains are uncoated. Bonneau soils are moderately well drained and have an A horizon 20 to 40 inches thick. Candler soils are sandy to a depth of 80 inches or more and have less than 5 percent silt and clay in their 10- to 40-inch control section. Fort Meade and Gainesville soils are sandy to a depth of more than 80 inches. They have 10 to 15 percent silt and clay in their 10- to 40-inch control section. Fort Meade soils also have a thick, dark colored A1 horizon. Jonesville soils have underlying limestone at a depth of less than 60 inches. Lake soils are sandy to 80 inches or more. Kanapaha soils are poorly drained, and Millhopper soils are moderately well drained. Norfolk soils have an A horizon less than 20 inches thick.

3.5 Review of Published Regional Geology

The site is located in central Alachua County. This area of Alachua County maps as the Coosawhatchie Formation. The following description is from the Geological Survey.

Coosawhatchie Formation – The Coosawhatchie Formation[3] is sediments of the Miocene Series that is exposed or lies beneath a thin overburden on the eastern flank of the Ocala Platform from southern Columbia County to southern Marion County. Within the outcrop region, the Coosawhatchie Formation varies from a light gray to olive gray, poorly consolidated, variable clayey and phosphatic sand with few fossils, to an olive gray, poorly to moderately consolidated, slightly sandy, silty clay with few to no fossils. Occasionally, the sands will contain a dolomite component and, rarely, the dominant lithology will be dolostone or limestone. Silicified nodules are often present in the Coosawhatchie Formation sediments in the outcrop region. The sediment may contain 20 percent or more phosphate (Scott, 1988). Permeability of the Coosawhatchie Formation is generally low, forming part of the intermediate confining unit/ aquifer system.

The Miocene sediments consist of siliciclastics, carbonates and mixed siliciclastics-carbonate lithologies with numerous lateral and vertical facies changes. The importance of the Miocene sediments in Florida is twofold - first, these sediments contain valuable mineral resources, primarily phosphate and absorptive clays; and second, the Miocene sediments comprise the intermediate confining unit and aquifer system. Whereas the principal geological hazard associated with Paleogene carbonates is karst development, the hazards associated with the Miocene sediments are radon gas and swelling clays.

3.6 Review of Published Hydrological Data

The Floridan Aquifer in the vicinity of the site has an elevation on the order of 50 feet[4] NGVD.

3.7 Laboratory Soil Analysis

Selected soil samples recovered from the soil borings were analyzed for the percent soil fines passing the No. 200 sieve, natural moisture content, Atterberg Limits, and hydraulic conductivity. Samples selected for laboratory testing were collected at depths ranging from 1 to 10 feet bls. These tests were performed to confirm visual soil classification and evaluate their engineering properties. The complete laboratory report is provided in Section 5.3.

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[3] Scott, Thomas N., Geologic Map of the State of Florida – Northern Peninsula. Florida Geological Survey, Open-File Report No. 80, 2001.

[4] Potentiometric Surface of the Floridan Aquifer, September 2019, U.S. Geological Survey.

The laboratory tests indicate the tested soils consist of sand with silt, silty sand with clay, clayey sand, and very clayey sand. The tested sand with silt (SP-SM) contains approximately 5.8 to 11 percent soil fines passing the No. 200 sieve with natural moisture contents of about 4.8 to 12 percent. The tested silty sand with clay (SM-SC) contains approximately 22 percent soil fines passing the No. 200 sieve with a natural moisture content of about 15 percent. The tested clayey sand (SC) contains approximately 22 percent soil fines passing the No. 200 sieve with a natural moisture content of about 12 percent. The tested very clayey sand (SC/CL) contains approximately 40 percent soil fines passing the No. 200 sieve with a natural moisture content of about 26 percent.

Atterberg Limits tests indicate the tested very clayey sand (SC) is non-plastic. This corresponds to a material with low potential (LL < 50 and PI < 25) for expansive behavior[5].

The constant head hydraulic conductivity test results indicate the near-surface sand with silt (SP-SM) has hydraulic conductivity values of 2.4 to 4.5 feet per day. The tested clayey sand (SC) has a hydraulic conductivity value of 3.4 feet per day.

[5] U.S. Department of the Army USA, 1983, Foundations in Expansive Soils, TM 5-818-7, p. 4-1.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General

The following recommendations are made based upon our understanding of the proposed construction, a review of the attached soil borings and laboratory test data, and experience with similar projects and subsurface conditions. If plans or the location of proposed construction changes from those discussed previously, GSE requests the opportunity to review and possibly amend our recommendations with respect to those changes.

The final design of a foundation system is dependent upon adequate integration of geotechnical and structural engineering considerations. Consequently, GSE must review the final foundation design in order to evaluate the effectiveness and applicability of our initial analyses, and to determine if additional recommendations may be warranted. Without such a review, the recommendations presented herein could be misinterpreted or misapplied resulting in potentially unacceptable performance of the foundation system.

The performance of site improvements may be sensitive to their post-construction relationship to site groundwater levels, seepage zones, or soil/rock characteristics exposed at final site grades. GSE recommends that use of boring information for final design of all site improvements be predicated on proper horizontal and vertical control of borings.

In this section of the report, we present our geotechnical parameters and recommendations to assist with building foundation and stormwater management designs as well as our general site preparation guidelines.

4.2 Groundwater

The groundwater table was encountered in the borings at depths ranging from 10.5 to 24 feet bls at the time of our exploration. However, you should expect water to be at a depth of approximately 6 feet bls in the area of the proposed building and temporarily perched on the clay with sand in auger boring P-1 and the elastic silt in auger boring P-4 after periods of heavy and seasonal rainfall.

4.3 Building Foundations

The soil borings within the proposed building footprint indicate the soils at the site are relatively consistent. The borings initially penetrated a 6 to 12 feet thick stratum of poorly graded sand and sand with silt (SP, SP-SM). This was underlain by interbedded strata of clayey to very clayey sand and sand with clay (SC, SC/CL, SP-SC) or clay-rich soils consisting of sandy clay, clay with sand, and clay (CL/CH) to the explored depths of 30 feet bls.

Weight-of-hammer strength materials were encountered in SPT borings B-3, B-4, and B-6 within the surficial sandy soils. These isolated events are consistent with native, very loose near-surface sand deposits common in this area of Alachua County. **These very loose native sands should be compacted as specified in Section 4.4.4.**

Based upon the soil conditions encountered and our limited understanding of the structural loads and site grading, and compaction of the very loose near surface soils, we recommend the building be supported by conventional, shallow strip and/or spread foundations. We recommend the shallow foundations be designed for a maximum allowable gross bearing pressure of 2,500 psf. The gross bearing pressure is defined as the soil contact pressure that can be imposed from the maximum structural loads, weight of the concrete foundations, and weight of the soil above the foundations. The foundations should be designed based upon the maximum load that could be imposed by all loading conditions.

The foundations should be embedded a minimum of 18 inches below the lowest adjacent grade. Interior foundations or thickened sections should be embedded a minimum of 12 inches. The foundations should have minimum widths of 18 inches for strip footings, and 24 inches for columns, even though the maximum soil bearing pressure may not be fully developed.

Due to the mostly sandy nature of the majority of the near-surface soils, we expect settlement to be mostly elastic in nature. The majority of the settlement will occur on application of the loads, during and immediately following construction. Using the recommended maximum bearing pressure, the assumed maximum structural loads, and the field and laboratory test data which we have correlated into the strength and compressibility characteristics of the subsurface soils, we estimate the total settlements of the structure to be 1 inch or less, with approximately half of it occurring upon load application (during construction).

Differential settlement results from differences in applied bearing pressures and the variations in the compressibility characteristics of the subsurface soils. For the building pad prepared as recommended, we anticipate differential settlement of less than 1/2 inch.

Post-construction settlement of the structures will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics of the bearing soils; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundation; (3) site preparation and earthwork construction techniques used by the contractor, and (4) external factors, including but not limited to vibration from off-site sources and groundwater fluctuations beyond those normally anticipated for the naturally-occurring site and soil conditions which are present.

Our settlement estimates for the structure are based upon our limited understanding of the structural loads and site grading and the use of successful adherence to the site preparation recommendations presented later in this report. Any deviation from our project understanding and/or our site preparation recommendations could result in an increase in the estimated post-construction settlement of the structure.

4.4 Site Preparation

The soils at this site should be suitable for supporting the proposed construction using normal, good practice site preparation procedures. **GSE recommends the very loose surficial sands be compacted to reduce the potential for settlements.** The following recommendations are our general guidelines for site preparation.

4.4.1 Stripping

Strip the construction limits and 10 feet beyond the perimeter of all grass, roots, topsoil, pavement, and other deleterious materials. You should expect to strip to depths of 12 or more inches. Deeper stripping will likely be necessary due to major root systems present at the site.

4.4.2 Dewatering

Temporary dewatering is not expected to be necessary for this project. However, if needed, we anticipate dewatering can be accomplished with sumps placed near the construction area, or with underdrains connected to a vacuum pump.

In any case, the site should always be graded to promote runoff and limit the amount of ponding. Localized ponding of stormwater is expected without proper grading during construction, and could render previously acceptable surfaces unacceptable.

4.4.3 Proof-Rolling

Proof-roll the subgrade with heavy rubber-tired equipment, such as a loaded front-end loader or dump truck, to identify any loose or soft zones not found by the soil borings. The proof-rolling should be monitored by a geotechnical engineer or qualified technician. Undercut or otherwise treat these zones as recommended by the geotechnical engineer in this report.

4.4.4 Proof Compaction

Weight-of-hammer strength materials were encountered in SPT borings B-3, B-4, and B-6 within the surficial sandy soils. These isolated events are consistent with native, very loose near-surface sand deposits common in this area of Alachua County. These very loose native sands should be compacted as specified below.

Compact the subgrade to a density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557). The specified compaction should be obtained with a heavy vibratory roller (<u>in static mode if within 100 feet of existing structures</u>) to a depth of 5 feet below the finished building pad grade prior to placing fill. If compaction cannot be achieved from ground surface, over-excavate the entire building pad and 5 feet beyond the perimeter to approximately 4 feet below the pad grade and compact the bottom of the excavation to a depth of 1 foot. Backfill and compact the over-excavated soils in 12-inch lifts to 95 percent Modified Proctor maximum dry density. All of the excavated soils should be suitable for reuse as structural fill.

Where existing structures are present within 100 feet of construction, compaction should be performed <u>in static mode</u>. Where over-excavating is required within a 1.5 horizontal to 1 vertical slope down from the bottom of the existing foundations, the existing foundations should be shored. The design and installation of shoring the existing foundations shall be the responsibility of the Contractor.

Should clayey sand be encountered at the bearing surface, this material should be probed and visually confirmed to be unyielding in the upper 12 inches in lieu of density testing. If the foundation excavations penetrate the clayey sand, the excavation should be performed in a manner that reduces soil disturbance. Clayey sand soils (with fines content in excess of 15 percent) that are removed and replaced or appreciably disturbed need to be re-compacted to 98 percent of the Standard Proctor maximum dry density (ASTM D698).

4.4.5 Fill Placement

Imported fill placed to raise the site grades should consist of clean sand having less than 10 percent passing the No. 200 sieve. On-site soils meeting the requirements of Section 4.8 may also be used as structural fill. The fill should be placed in maximum 12-inch loose lifts that are compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557). If lighter "walk-behind" compaction equipment is used, this may require lifts of 4 inches or less to achieve the required degree of compaction.

4.5 Quality Control and Construction Materials Testing

It should be noted that the geotechnical engineering design does not end with the advertisement of the construction documents. As the geotechnical engineer of record, GSE is the most qualified to perform the construction materials testing that will be required for this project. The benefits of having the geotechnical engineer of record also perform the construction materials testing are numerous. If GSE continues to be involved with the project through construction, we will be able to constantly re-evaluate and possibly alter our geotechnical recommendations in a timely and cost effective manner once final design and construction techniques are developed. This often results in cost savings for the project.

We recommend performing compaction testing beneath the concrete floor slab and the building foundations. We recommend one test be performed every 50 linear feet of continuous footing and every other column footing, per foot depth of fill or native material. We recommend a compaction test be performed for each 2,500 square feet of floor area per foot of fill or native material, or a minimum of three tests each, whichever is greater. Test all footing excavations to a depth of **48 inches** at the frequencies stated above.

4.6 Stormwater Management

The auger borings located in the existing stormwater management facility indicate the soils across these areas are relatively variable.

Auger boring P-1 encountered 17 feet of sand with silt, silty sand, and silty sand with clay (SP-SM, SM, SM-SC) overlying clay with sand (CL/CH) to a depth of 21 feet bls. This was underlain by silt with sand and silty clayey sand (ML, SM/SC) to the explored depth of 30 feet bls.

Auger boring P-2 encountered 7 feet of clayey sand (SC) overlying silty sand and silty sand with clay (SM, SM-SC) to the explored depth of 15 feet bls.

Auger boring P-3 encountered 10.5 feet of sand with silt (SP-SM) overlying silty clayey sand (SM/SC) to the explored depth of 15 feet bls.

Auger boring P-4 encountered 5 feet of silty sand with clay (SM-SC) overlying elastic silt (MH) to a depth of 11.5 feet bls. This was underlain by silty sand (SM) to the explored depth of 15 feet bls.

The water table was only encountered in auger boring P-1 at a depth of 22 feet bls at the time of our exploration. We anticipate the seasonal high groundwater table to be perched on the clay with sand in soil boring P-1, perched on the elastic silt in soil boring P-4, and deeper than 15 feet bls in the remainder of the borings.

The laboratory permeability tests indicate the sand with silt and clayey sand has hydraulic conductivity values of 2.4 to 4.5 feet per day. The underlying clay with sand and elastic silt are expected to be confining soils.

Based upon our findings and test results, our recommended soil parameters for the stormwater management design in the explored areas are presented below. The recommended parameters consider the results of the permeability tests, wash 200 determinations, and our experience with these types of soils. The parameters below do not consider a factor of safety.

Existing Stormwater Management Facility

1. Base elevation of effective or mobilized aquifer (average depth of confining layer) equal to 14 feet bls.
2. Unsaturated vertical infiltration rate of 3.5 feet per day.
3. Horizontal hydraulic conductivity equal to 5.0 feet per day.
4. Specific yield (fillable porosity) of 20 percent.
5. Average seasonal high groundwater table depth equal to 13.5 feet bls.

4.7 Evaluation of Significant Geological Feature

One (1) depressional area was observed to determine if it should be considered a significant geological feature as defined by the Alachua County Code of Ordinances. The location of the area observed was explored with auger borings P-1 through P-4 as shown on Figure 2.

The depressional area is located south of the existing building as well as the proposed building as shown on the plan provided. The feature, at the time of our site visit, was somewhat oval in shape and very broad in size as shown in Picture 1. No exposed limestone was observed in the feature or in the general area of the feature. Based on the topographic survey, the feature appears to be a closed depressional area and appears to be currently utilized as a stormwater management facility. Some of the darker materials encountered in the borings are low permeability high fines which are common deposits found in relic sinkholes. It is GSE's opinion that this area is a relic sinkhole. The growth of large trees within the depressional area indicates this is a relic sinkhole that has been inactive for some time. GSE does not consider this feature to be significant and it does not merit conservation.

Picture 1. Overview of the Depressional Area

It is GSE's opinion that the depressional area observed at the site should **not** be considered a significant geologic feature as outlined by Article XVI of the Alachua County, Florida, Code of Ordinances.

4.8 Fill Suitability

The soils encountered at this site within the explored depths range from sands (SP) to clays (CL/CH). A discussion of the suitability for reuse as structural fill for each soil classification according to the Unified Soil Classification System (USCS) designation is provided below.

SP, SP-SM – Sands (SP) and sand with silt (SP-SM) have less than 5 percent and 12 percent soil fines passing the No. 200 sieve, respectively, and are typically well draining soils that are suitable for reuse as structural fill. The sands with silt may require moisture conditioning (drying) to make the material more workable. These soils will require stockpiling and drying before they are reused if they are excavated from below the water table.

SM – Silty sands (SM) can have between 12 percent and 50 percent soil fines passing the No. 200 sieve. Silty sands are typically non-plastic or have low plasticity, and can be reused as structural fill with precautions. Silty sands can be moisture sensitive and difficult to work and compact and can rut if the moisture content is near or above the optimum moisture content. We recommend these soils be moisture conditioned (dried) so that the moisture content during use is at or below the optimum moisture content. Aerating and exposure to the sun are typically the most effective methods of drying these soils. It may not be practical to reuse these materials during the wet season, as frequent rain showers may not allow these soils to dry to a workable moisture content. Suitable silty sands are limited to soil having less than 30 percent soil fines passing the No. 200 sieve. Silty sands with more than 30 percent soil fines are especially moisture sensitive, and are not recommended for reuse as structural fill. These soils will behave more as sandy silt, and for this reason, very silty sands having more than 30 percent soil fines passing the No. 200 sieve have been assigned a dual classification of SM/ML. Silty sand soils that are excavated from below the water table are not recommended for reuse as structural fill due to the amount of time that will be required to dry these soils to a workable condition.

SC – Clayey sand (SC) soils can have between 12 percent and 50 percent soil fines passing the No. 200 sieve. Clayey sands can have a high range of plasticity, varying from a PI of 7 or greater and plotting above the A-line to highly plastic. Friable clayey sands are typically suitable for use as structural fill with precautions. Clayey sands will be moisture sensitive and difficult to work and compact and can rut during placement if the moisture content is near or above the natural moisture content. We recommend these soils be moisture conditioned (dried) so that the moisture content during use is at or below the optimum moisture content. Aerating and exposure to the sun are typically the most effective methods of drying these soils. It may not be practical to reuse these materials during the wet season, as frequent rain showers may not allow these soils to dry to a workable moisture content. Suitable clayey sands are limited to soil having less than 30 percent soil fines passing the No. 200 sieve. Clayey sands with more than 30 percent soil fines passing the No. 200 sieve are especially moisture sensitive and are typically highly plastic, and are not recommended for reuse as structural fill. These soils will behave more as sandy clay, and for this reason, very clayey sands having more than 30 percent soil fines passing the No. 200 sieve have been assigned a dual classification of SC/CH or SC/CL. Clayey sand soils that are excavated from below the water table are not recommended for reuse as structural fill due to the amount of time that will be required to dry these soils to a workable condition.

ML, MH, CL, CH – Silts and clays are not suitable materials for reuse as structural fill.

When using on-site soils as fill materials, we recommend the silty and clayey sand soils (SM, SC) be used in the lower depths of the fill. Sand and sand with silt (SP, SP-SM) should be used in the upper portions of the fill. We recommend a minimum of 2 feet of sand (SP, SP-SM) cover the silty and clayey sand fill materials to reduce the potential for soggy surface conditions due to the low permeability characteristics of the silty and clayey sand materials.

4.9 Surface Water Control and Landscaping

Roof gutters should be considered to divert runoff away from the building. The gutter downspouts should discharge a minimum of 10 feet from the structure to reduce the amount of water collecting around the foundations. Where possible, the gutter downspouts should discharge directly into the storm sewer system or onto the asphalt paved areas in order to reduce the amount of water collecting around the foundations. Grading of the site should be such that water is diverted away from the building on all sides to reduce the potential for erosion and water infiltration along the foundation.

With respect to landscaping, it is recommended that existing and planted trees and large "tree-like" shrubbery with potential for developing large root systems be planted a minimum distance of half their mature height, and preferably their expected final height, away from the structure. The purpose of this is to reduce the potential for foundation or slab movements from the growth of root systems as the landscaping matures. Consideration should also be given to using landscaping that has a low water demand, so that excessive irrigation is not conducted around the structures.

5.0 FIELD DATA

5.1 Auger Boring Logs

GSE Engineering & Consulting, Inc.
5590 SW 64th Street, Suite B
Gainesville, Florida 32608
Telephone: (352) 377-3233
Fax: (352) 377-0335

CLIENT CHW Professional Consultants, Inc. **PROJECT NAME** Proposed UF Health Santa Fe

PROJECT NUMBER 16019 **PROJECT LOCATION** Gainesville, Alachua County, Florida

BORING NUMBER P-1

DATE PERFORMED 4/6/2023
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS: LOGGED BY WDI
▼ AT TIME OF DRILLING 22.0 ft CHECKED BY KPF
▽ ESTIMATED SEASONAL HIGH 16.5 ft, perched
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		
	AU 1	(SM) Dark brown silty SAND
2.5		
	AU 2	(SP-SM) Brown SAND with silt
5		
6.0		
	AU 3 PS	(SP-SM) Dark brown SAND with silt *%PASS-200 = 11* *MC = 12* *k_h = 2.4 ft/day*
10		
11.0		
	AU 4	(SM-SC) Brown and gray silty SAND with clay
15		
▽ 17.0		
	AU 5	(CL/CH) Gray and brown CLAY with sand
20		
21.0		
	AU 6	(ML) Gray SILT with sand ▼
25		
27.0		
	AU 7	(SM/SC) Gray silty clayey SAND
30		
30.0		Bottom of borehole at 30.0 feet.

BORING NUMBER P-2

DATE PERFORMED 4/6/2023
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS: LOGGED BY WDI
▼ AT TIME OF DRILLING NE CHECKED BY KPF
▽ ESTIMATED SEASONAL HIGH > 15 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		
		(SC) Brown clayey SAND
	AU 1 PS	*%PASS-200 = 22* *MC = 12* *k_h = 3.4 ft/day*
5		
7.0		
	AU 2	(SM-SC) Dark gray silty SAND with clay
10		
11.0		
	AU 3	(SM) Dark gray silty SAND
15		
15.0		Bottom of borehole at 15.0 feet.

(Continued Next Page)

GSE Engineering & Consulting, Inc.
5590 SW 64th Street, Suite B
Gainesville, Florida 32608
Telephone: (352) 377-3233
Fax: (352) 377-0335

CLIENT CHW Professional Consultants, Inc. **PROJECT NAME** Proposed UF Health Santa Fe

PROJECT NUMBER 16019 **PROJECT LOCATION** Gainesville, Alachua County, Florida

BORING NUMBER P-3

DATE PERFORMED 4/6/2023
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
AT TIME OF DRILLING NE
ESTIMATED SEASONAL HIGH > 15 ft
LOGGED BY WDI
CHECKED BY KPF
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0			(SP-SM) Brown SAND with silt
		AU 1 PS	*%PASS-200 = 5.9* *MC = 4.8* *k_h = 4.5 ft/day*
5			
			8.5
		AU 2	(SP-SM) Gray SAND with silt
10			10.5
		AU 3	(SM/SC) Dark brown silty clayey SAND
15			15.0
			Bottom of borehole at 15.0 feet.

BORING NUMBER P-4

DATE PERFORMED 4/6/2023
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
AT TIME OF DRILLING NE
ESTIMATED SEASONAL HIGH 4.5 ft, perched
LOGGED BY WDI
CHECKED BY KPF
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0			(SM-SC) Brown and gray silty SAND with clay
		AU 1	*%PASS-200 = 22* *MC = 15*
5			5.0
		AU 2	(MH) Dark gray elastic SILT
10			11.5
		AU 3	(SM) Dark gray silty SAND
15			15.0
			Bottom of borehole at 15.0 feet.

5.2 Standard Penetration Test Soil Boring Logs

GSE Engineering & Consulting, Inc.
GSE Engineering
5590 SW 64th St
Gainesville, FL 32608
Telephone: 3523773233

BORING NUMBER B-1

CLIENT CHW Professional Consultants, Inc.
PROJECT NAME Proposed UF Health Santa Fe
PROJECT NUMBER 16019
PROJECT LOCATION Gainesville, Alachua County, Florida
DATE STARTED 4/5/23 **COMPLETED** 4/5/23
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
▼ **AT TIME OF DRILLING** 21.0 ft
LOGGED BY WDI **CHECKED BY** KPF
▽ **ESTIMATED SEASONAL HIGH** 6.0 ft
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %	▲ SPT N VALUE ▲
0		(SP-SM) Very loose to loose gray and brown SAND with silt		SPT 1	2-3-3 (6)						20 40 60 80
			3.5	SPT 2	2-2-1 (3)						
5		(SP) Very loose to loose brown SAND		SPT 3	1-1-2 (3)						
		▽	6	SPT 4	2-2-3 (5)						
		(SP) Loose gray SAND with sandstone	7	SPT 5	2-3-5 (8)						
		(CL/CH) Firm to very stiff gray and green CLAY with sand	9	SPT 6	10-9-10 (19)						
10		(CL/CH) Very stiff green and orange CLAY with sand	12								
		(SC/CL) Medium dense gray, green, and orange very clayey SAND		SPT 7	5-6-9 (15)						
15											
			19.5	SPT 8	3-4-8 (12)						
20		(CL/CH) Stiff green CLAY with sand									
		▼	22								
		(SC) Loose gray clayey SAND		SPT 9	2-5-3 (8)						
25											
			28.5								
		(CL/CH) Stiff green and orange CLAY	30	SPT 10	3-5-5 (10)						
30		Bottom of borehole at 30.0 feet.									

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GSE Engineering & Consulting, Inc.
GSE Engineering
5590 SW 64th St
Gainesville, FL 32608
Telephone: 3523773233

BORING NUMBER B-2

CLIENT CHW Professional Consultants, Inc.
PROJECT NAME Proposed UF Health Santa Fe
PROJECT NUMBER 16019
PROJECT LOCATION Gainesville, Alachua County, Florida
DATE STARTED 4/6/23 **COMPLETED** 4/6/23
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
▼ **AT TIME OF DRILLING** 19.0 ft
LOGGED BY WDI **CHECKED BY** KPF
▽ **ESTIMATED SEASONAL HIGH** 6.0 ft
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %	▲ SPT N VALUE ▲
0		(SP-SM) Very loose to loose brown SAND with silt		SPT 1	4-2-2 (4)						20 40 60 80
				SPT 2	2-1-1 (2)						
			4.5								
5		(SP) Loose gray SAND with sandstone		SPT 3	2-2-3 (5)						
			6								
		(SP-SC) Loose gray SAND with clay and sandstone		SPT 4	3-4-4 (8)						
			7								
		(CL/CH) Stiff gray and green CLAY with sand		SPT 5	4-6-8 (14)						
			8.5								
		(CL/CH) Firm to very stiff green and orange CLAY with sand		SPT 6	6-8-10 (18)						
10											
				SPT 7	2-3-5 (8)						
15											
				SPT 8	4-4-4 (8)						
20											
			21.5								
		(SP-SC) Loose green and gray SAND with clay									
				SPT 9	3-4-5 (9)						
25											
			29								
		(CL/CH) Stiff green and orange CLAY with sand		SPT 10	3-4-5 (9)						
30			30								
		Bottom of borehole at 30.0 feet.									

GSE Engineering & Consulting, Inc.
GSE Engineering
5590 SW 64th St
Gainesville, FL 32608
Telephone: 3523773233

BORING NUMBER B-3

CLIENT CHW Professional Consultants, Inc.
PROJECT NAME Proposed UF Health Santa Fe
PROJECT NUMBER 16019
PROJECT LOCATION Gainesville, Alachua County, Florida
DATE STARTED 4/6/23 **COMPLETED** 4/6/23
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
▼ **AT TIME OF DRILLING** 10.5 ft
LOGGED BY WDI **CHECKED BY** KPF
▽ **ESTIMATED SEASONAL HIGH** 6.0 ft
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %	▲ SPT N VALUE ▲
0		(SP-SM) Very loose to loose brown SAND with silt									20 40 60 80
		Weight-of-Hammer from 1.5 to 2 ft bls.		SPT 1	1-0-1 (1)				5.8	4.8	
				SPT 2	1-1-1 (2)						
5				SPT 3	2-2-3 (5)						
		▽		SPT 4	3-2-2 (4)						
				SPT 5	3-3-4 (7)						
10		▼		SPT 6	4-3-4 (7)						
			12								
		(CL/CH) Firm brown, gray, and orange CLAY with sand		SPT 7	3-3-5 (8)						
15											
			18								
		(CL/CH) Firm green and orange CLAY		SPT 8	2-2-3 (5)						
20											
			22								
		(CL/CH) Firm gray, green, and orange CLAY with sand		SPT 9	4-4-3 (7)						
25											
			27								
		(CL/CH) Firm brown, gray, and orange sandy CLAY		SPT 10	2-3-4 (7)						
30			30								
		Bottom of borehole at 30.0 feet.									

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GSE Engineering & Consulting, Inc.
GSE Engineering
5590 SW 64th St
Gainesville, FL 32608
Telephone: 3523773233

BORING NUMBER B-4

CLIENT CHW Professional Consultants, Inc.
PROJECT NAME Proposed UF Health Santa Fe
PROJECT NUMBER 16019
PROJECT LOCATION Gainesville, Alachua County, Florida
DATE STARTED 4/5/23 **COMPLETED** 4/5/23
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
AT TIME OF DRILLING 22.0 ft
LOGGED BY WDI **CHECKED BY** KPF
ESTIMATED SEASONAL HIGH 6.0 ft
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %	▲ SPT N VALUE ▲
0	(SP-SM) Very loose gray and brown SAND with silt		SPT 1	2-1-1 (2)	NP	NP	NP	40	26	20 40 60 80
	Weight-of-Hammer from 3 to 3.5 ft bls.	3	SPT 2	1-0-1 (1)						
	(SP) Very loose to loose brown SAND	4.5	SPT 3	2-2-4 (6)						
5	(SP) Loose to medium dense gray SAND with sandstone	6	SPT 4	4-6-12 (18)						
	(SC/CL) Medium dense green and orange very clayey SAND	7.5	SPT 5	15-13-13 (26)						
	(CL/CH) Very stiff gray and green sandy CLAY		SPT 6	6-8-9 (17)						
10		11.5								
	(SC) Medium dense gray and orange clayey SAND		SPT 7	4-6-12 (18)						
15		18.5								
	(CL/CH) Stiff green and orange CLAY with sand		SPT 8	4-6-6 (12)						
20		22								
	(SP-SC) Loose gray and orange SAND with clay		SPT 9	2-4-6 (10)						
25		28.5								
	(CL/CH) Stiff green and orange CLAY		SPT 10	3-5-7 (12)						
30		30								
	Bottom of borehole at 30.0 feet.									

GSE Engineering & Consulting, Inc.
GSE Engineering
5590 SW 64th St
Gainesville, FL 32608
Telephone: 3523773233

BORING NUMBER B-5

CLIENT CHW Professional Consultants, Inc.
PROJECT NAME Proposed UF Health Santa Fe
PROJECT NUMBER 16019
PROJECT LOCATION Gainesville, Alachua County, Florida
DATE STARTED 4/5/23 **COMPLETED** 4/5/23
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
AT TIME OF DRILLING 21.0 ft
LOGGED BY WDI **CHECKED BY** KPF
ESTIMATED SEASONAL HIGH 6.0 ft
NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %	▲ SPT N VALUE ▲
0		(SP-SM) Very loose brown SAND with silt		SPT 1	2-1-1 (2)						20 40 60 80
			4	SPT 2	1-1-1 (2)						
5		(SP) Very loose to loose gray SAND with sandstone		SPT 3	1-2-1 (3)						
			6	SPT 4	2-3-4 (7)						
		(SC) Loose gray and orange clayey SAND	7								
		(CL/CH) Stiff gray sandy CLAY with sandstone		SPT 5	4-6-6 (12)						
			8.5	SPT 6	8-9-9 (18)						
10		(CL/CH) Very stiff gray, green, and orange CLAY									
			12								
		(SC/CL) Loose gray very clayey SAND		SPT 7	3-4-4 (8)						
15			16								
		(CL/CH) Stiff green CLAY with lense gray sand									
				SPT 8	3-4-6 (10)						
20											
				SPT 9	3-4-5 (9)						
25			26								
		(CL/CH) Stiff orange and green CLAY									
			30	SPT 10	2-6-7 (13)						
30		Bottom of borehole at 30.0 feet.									

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GSE Engineering & Consulting, Inc.
GSE Engineering
5590 SW 64th St
Gainesville, FL 32608
Telephone: 3523773233

BORING NUMBER B-6

CLIENT CHW Professional Consultants, Inc.
PROJECT NAME Proposed UF Health Santa Fe
PROJECT NUMBER 16019
PROJECT LOCATION Gainesville, Alachua County, Florida
DATE STARTED 4/5/23 **COMPLETED** 4/5/23
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
▼ **AT TIME OF DRILLING** 24.0 ft
LOGGED BY WDI **CHECKED BY** KPF
▽ **ESTIMATED SEASONAL HIGH** 6.0 ft
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)
0	(SP-SM) Very loose to loose brown SAND with silt		SPT 1	1-2-1 (3)
			SPT 2	1-1-1 (2)
5	*Weight-of-Hammer from 4.5 to 5 ft bls.*		SPT 3	1-0-1 (1)
		6.5	SPT 4	3-3-4 (7)
	(SP) Loose brown and orange cemented SAND	7		
	(SC) Loose to medium dense brown, gray, and orange cemented clayey SAND		SPT 5	3-4-5 (9)
		9	SPT 6	6-9-12 (21)
10	(CL/CH) Very stiff brown, gray, and orange CLAY with sand			
		11.5		
	(SC/CL) Loose to medium dense gray and orange very clayey SAND		SPT 7	3-3-5 (8)
15				
			SPT 8	4-6-6 (12)
20				
			SPT 9	2-2-3 (5)
25				
		27		
	(CL/CH) Stiff brown and gray CLAY			
			SPT 10	4-6-8 (14)
30		30		
	Bottom of borehole at 30.0 feet.			

LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %

▲ SPT N VALUE ▲
20 40 60 80

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5.3 Laboratory Results

GSE Engineering & Consulting, Inc.

SUMMARY REPORT OF LABORATORY TEST RESULTS

Project Number: 16019

Project Name: Proposed UF Health Santa Fe

Boring Number	Depth (ft)	Soil Description	Natural Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Percent Passing No. 200 Sieve	Organic Content (%)	Hydraulic Conductivity (ft/day)	Unified Soil Classification
P-1	8-10	Dark brown SAND with silt	12				11		2.4	SP-SM
P-2	3-5	Brown clayey SAND	12				22		3.4	SC
P-3	3-5	Brown SAND with silt	4.8				5.9		4.5	SP-SM
P-4	3-3.5	Brown and gray silty SAND with clay	15				22			SM-SC
B-3	1-2.5	Very loose to loose brown SAND with silt	4.8				5.8			SP-SM
B-4	5.5-7	Medium dense green and orange very clayey SAND	26	NP	NP	NP	40			SC/CL

5.4 Key to Soil Classification

KEY TO SOIL CLASSIFICATION CHART

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests				SYMBOLS		GROUP NAME
				GRAPHIC	LETTER	
COARSE-GRAINED SOILS	Gravels	Clean Gravels	$Cu \geq 4$ and $1 \leq Cc \leq 3$		GW	Well graded GRAVEL
More than 50% retained on No. 200 sieve	More than 50% of coarse fraction retained on No. 4 sieve	Less than 5% fines	$Cu < 4$ and/or $1 > Cc > 3$		GP	Poorly graded GRAVEL
		Gravels with fines	Fines classify as ML or MH		GM	Silty GRAVEL
		More than 12% fines	Fines classify as CL or CH		GC	Clayey GRAVEL
	Sands	Clean Sands	$Cu \geq 6$ and $1 \leq Cc \leq 3$		SW	Well graded SAND
	50% or more of coarse fraction passes No. 4 sieve	Less than 5% fines	$Cu < 6$ and/or $1 > Cc > 3$		SP	Poorly graded SAND
		Sand with fines	Fines classify as ML or MH		SP-SM	SAND with silt
		5% ≤ fines < 12%	Fines classify as CL or CH		SP-SC	SAND with clay
		Sand with fines	Fines classify as ML or MH		SM	Silty SAND
		12% ≤ fines < 30%	Fines classify as CL or CH		SC	Clayey SAND
		Sand with fines	Fines classify as ML or MH		SM	Very silty SAND
		30% fines or more	Fines classify as CL or CH		SC	Very clayey SAND
FINE-GRAINED SOILS	Clays	inorganic	50% ≤ fines < 70%		CL/CH	Sandy CLAY
50% or more passes the No. 200 sieve			70% ≤ fines < 85%		CL/CH	CLAY with sand
			fines ≥ 85%		CL/CH	CLAY
	Silts and Clays	inorganic	PI > 7 and plots on/above "A" line		CL	Lean CLAY
	Liquid Limit less than 50		PI < 4 or plots below "A" line		ML	SILT
		organic	Liquid Limit - oven dried / Liquid Limit - not dried < 0.75		OL	Organic clay / Organic silt
	Silts and Clays	inorganic	PI plots on or above "A" line		CH	Fat CLAY
	Liquid Limit 50 or more		PI plots below "A" line		MH	Elastic SILT
		organic	Liquid Limit - oven dried / Liquid Limit - not dried < 0.75		OH	Organic clay / Organic silt
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor				PT	PEAT

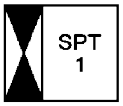
CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

	No. OF BLOWS, N	RELATIVE DENSITY
	0 - 4	Very Loose
	5 - 10	Loose
SANDS:	11 - 30	Medium dense
	31 - 50	Dense
	OVER 50	Very Dense

	No. OF BLOWS, N	RELATIVE DENSITY
	0 - 8	Very Soft
	9 - 18	Soft
LIMESTONE:	19 - 32	Moderately Hard
	33 - 50	Hard
	OVER 50	Very Hard

	No. OF BLOWS, N	CONSISTENCY
	0 - 2	Very Soft
SILTS	3 - 4	Soft
&	5 - 8	Firm
CLAYS:	9 - 15	Stiff
	16 - 30	Very Stiff
	31 - 50	Hard
	OVER 50	Very Hard

SAMPLE GRAPHIC TYPE LEGEND



Location of SPT Sample

Location of Auger Sample

PARTICLE SIZE IDENTIFICATION

BOULDERS:		Greater than 300 mm
COBBLES:		75 mm to 300 mm
GRAVEL:	Coarse -	19.0 mm to 75 mm
	Fine -	4.75 mm to 19.0 mm
SANDS:	Coarse -	2.00 mm to 4.75 mm
	Medium -	0.425 mm to 2.00 mm
	Fine -	0.075 mm to 0.425 mm
SILTS & CLAYS:		Less than 0.075 mm

LABORATORY TEST LEGEND

LL	=	Liquid Limit, %
PL	=	Plastic Limit, %
PI	=	Plasticity Index, %
% PASS - 200	=	Percent Passing the No. 200 Sieve
MC	=	Moisture Content, %
ORG	=	Organic Content, %
k_h	=	Horizontal Hydraulic Conductivity, ft/day

6.0 LIMITATIONS

6.1 Warranty

This report has been prepared for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

6.2 Auger and SPT Borings

The determination of soil type and conditions was performed from the ground surface to the maximum depth of the borings, only. Any changes in subsurface conditions that occur between or below the borings would not have been detected or reflected in this report.

Soil classifications that were made in the field are based upon identifiable textural changes, color changes, changes in composition or changes in resistance to penetration in the intervals from which the samples were collected. Abrupt changes in soil type, as reflected in boring logs and/or cross sections may not actually occur, but instead, be transitional.

Depth to the water table is based upon observations made during the performance of the auger and SPT borings. This depth is an estimate and does not reflect the annual variations that would be expected in this area due to fluctuations in rainfall and rates of evapotranspiration.

6.3 Site Figures

The measurements used for the preparation of the figures in this report were made using the provided site plan and by estimating distances from existing structures and site features. Figures in this report were not prepared by a licensed land surveyor and should not be interpreted as such.

6.4 Unanticipated Soil Conditions

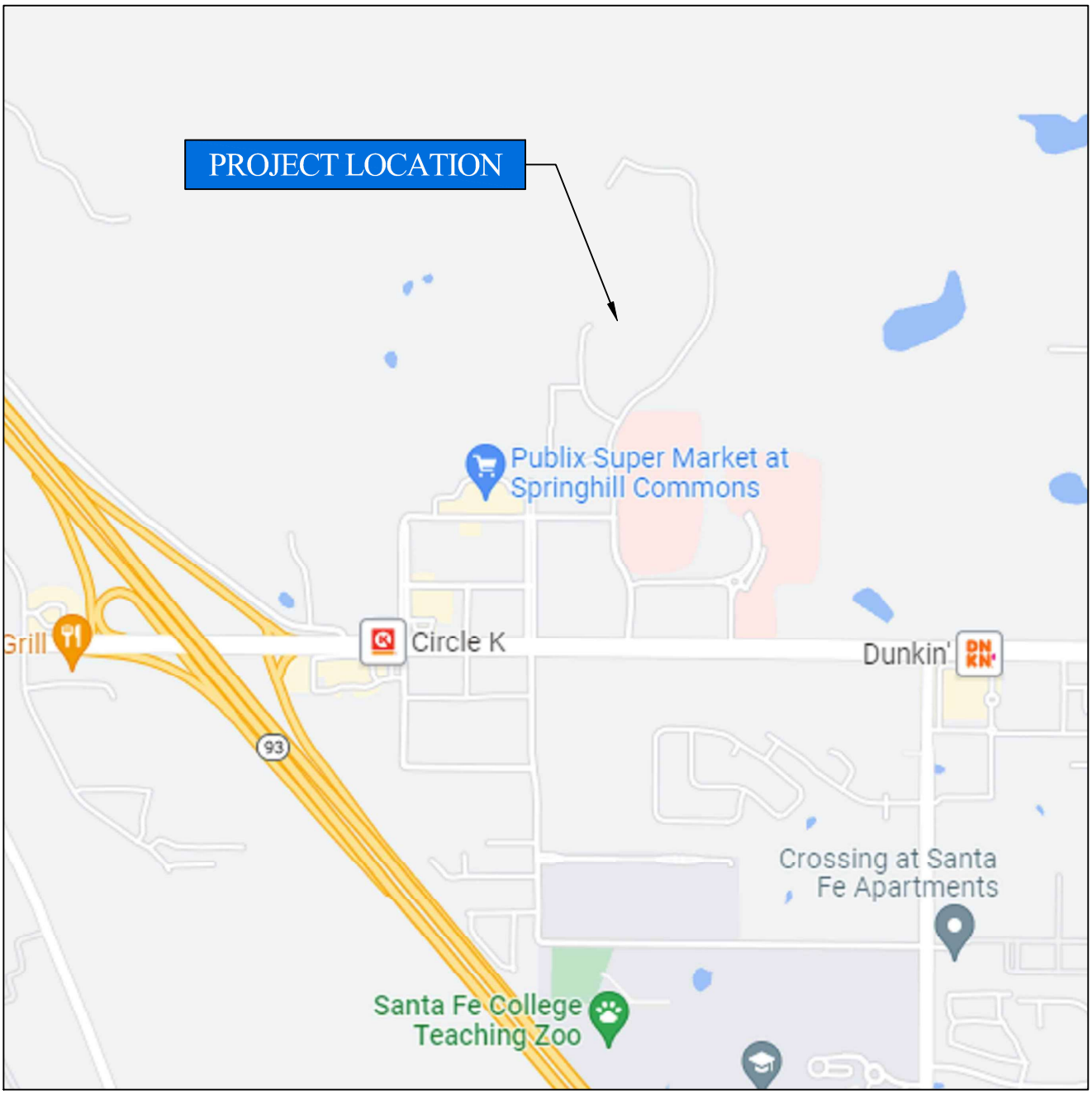
The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on Figure 2. This report does not reflect any variations that may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

6.5 Misinterpretation of Soil Engineering Report

GSE Engineering & Consulting, Inc. is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If others make the conclusions or recommendations based upon the data presented, those conclusions or recommendations are not the responsibility of GSE.

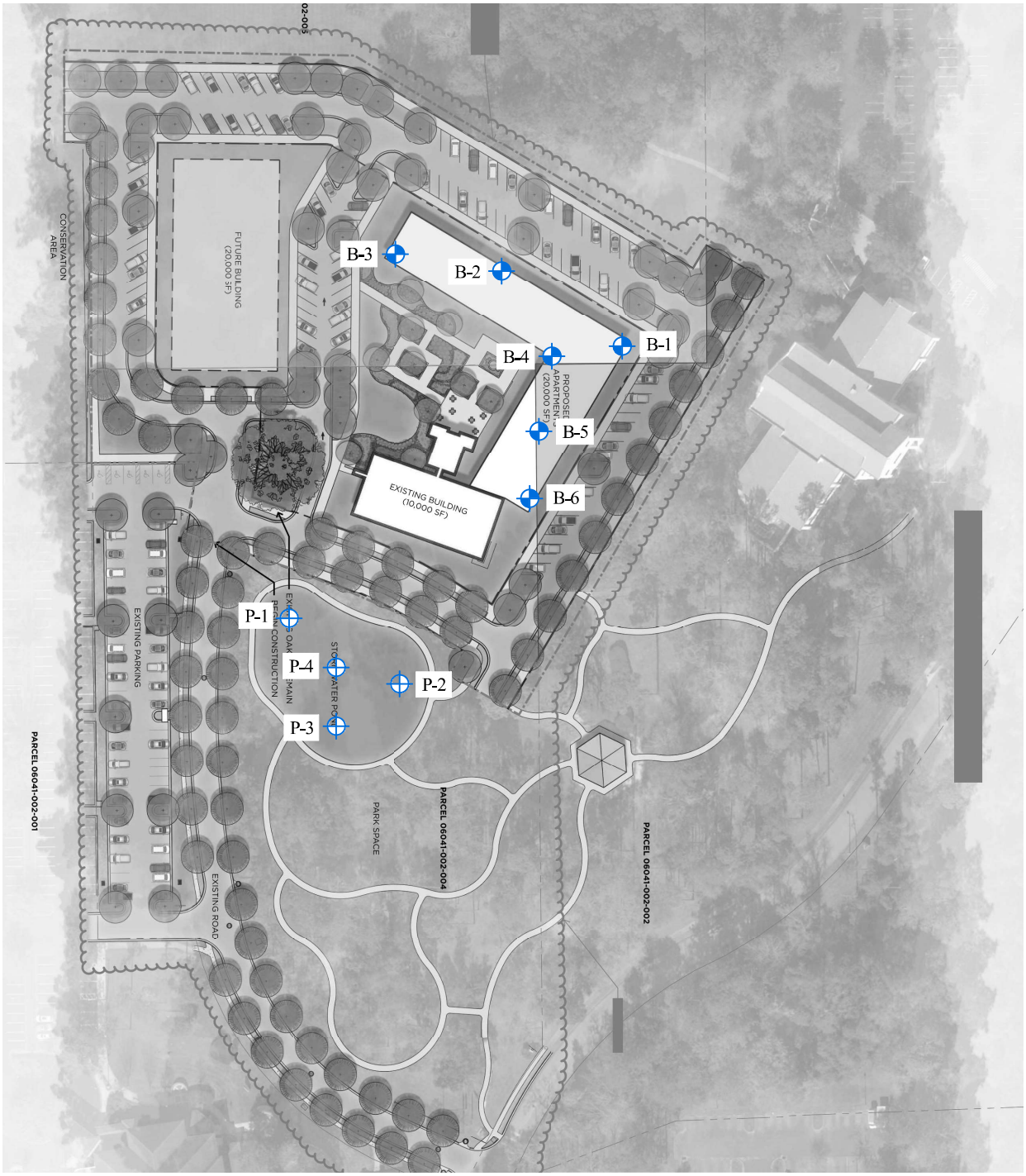
FIGURES



NORTH

NOT TO SCALE

PROPOSED UF HEALTH SANTA FE GAINESVILLE, ALACHUA COUNTY, FLORIDA GSE PROJECT NO. 16019	PROJECT SITE LOCATION MAP		
	DESIGNED BY: KPF CHECKED BY : KLH DRAWN BY : JNM	GSE Engineering & Consulting, Inc.	FIGURE 1



LEGEND:

- SPT BORING
- AUGER BORING

SITE PLAN SHOWING APPROXIMATE LOCATIONS OF FIELD TESTS

PROPOSED UF HEALTH SANTA FE
GAINESVILLE, ALACHUA COUNTY, FLORIDA
GSE PROJECT NO. 16019

DESIGNED BY: KPF
CHECKED BY : KLH
DRAWN BY : JNM

GSE Engineering & Consulting, Inc.

FIGURE 2