SUMMARY REPORT OF A GEOTECHNICAL SITE EXPLORATION

PROPOSED SOUTHERN WRECKER AND RECOVERY
ALACHUA, ALACHUA COUNTY, FLORIDA

GSE PROJECT No. 14197

Prepared For:

SOUTHERN WRECKER AND RECOVERY, LLC

SEPTEMBER 2019

Certificate of Authorization No. 27430

GSE Engineering & Consulting, Inc.

September 18, 2019

Greg Gaylord
Southern Wrecker and Recovery, LLC
6831 W Beaver St,
Jacksonville. FL 32254

Subject: Summary Report of a Geotechnical Site Exploration
Proposed Southern Wrecker and Recovery
Alachua, Alachua County, Florida
GSE Project No. 14197

Dear Mr. Gaylord:

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, pavement, 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.

This item has been digitally signed and sealed by
Jason E Gowland
2019.09.18 11:03:12 -04'00'
on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Kelly M. Carmona, EI
Staff Engineer

JASON E. GOWLAND
LICENSE
No.66467

Jason E. Gowland, P.E.
Senior Geotechnical Engineer
Florida Registration No. 66467

KMC/JEG:maj
Z:Projects\14197 Southern Wrecker and Recovery/14197.doc

Distribution: Addressee (1 - Electronic)
File (1)

GSE Engineering & Consulting, Inc.
5590 SW 64th Street, Suite B
Gainesville, Florida 32608
(352) 377-3233 Phone ◆ (352) 377-0335 Fax
www.gseengineering.com
Certificate of Authorization No. 27430

TABLE OF CONTENTS

LIST OF FIGURES ii

1.0 INTRODUCTION 1-1
  1.1 General 1-1
  1.2 Project Description 1-1
  1.3 Purpose 1-1

2.0 FIELD AND LABORATORY TESTS 2-1
  2.1 General Description 2-1
  2.2 Auger Borings 2-1
  2.3 Standard Penetration Test Borings 2-1
  2.4 Soil Laboratory Tests 2-1

3.0 FINDINGS 3-1
  3.1 Surface Conditions 3-1
  3.2 Subsurface Conditions 3-1
  3.3 Review of Published Data 3-2
  3.4 Laboratory Soil Analysis 3-4

4.0 EVALUATION AND RECOMMENDATIONS 4-1
  4.1 General 4-1
  4.2 Groundwater 4-1
  4.3 Building Foundations 4-1
  4.4 Flexible Pavement 4-2
  4.5 Rigid Pavement 4-3
  4.6 Temporary Limerock Base Design Recommendations 4-4
  4.7 Site Preparation 4-4
  4.8 Quality Control and Construction Materials Testing 4-6
  4.9 Stormwater Management 4-6
  4.10 Fill Suitability 4-7
  4.11 Surface Water Control and Landscaping 4-8

5.0 FIELD DATA 5-1
  5.1 Auger Boring Logs 5-2
  5.2 Standard Penetration Test Soil Boring Logs 5-3
  5.3 Laboratory Results 5-4
  5.4 Key to Soil Classification 5-5

6.0 LIMITATIONS 6-1
  6.1 Warranty 6-1
  6.2 Auger and SPT Borings 6-1
  6.3 Site Figures 6-1
  6.4 Unanticipated Soil Conditions 6-1
  6.5 Misinterpretation of Soil Engineering Report 6-1

LIST OF FIGURES

Figure

1. Project Site Location Map
2. Aerial Photograph Showing Approximate Locations of Field Tests

1.0 INTRODUCTION

1.1 General

GSE Engineering & Consulting, Inc. (GSE) has completed this geotechnical exploration for the proposed Southern Wrecker and Recovery located in Alachua, Alachua County, Florida. This exploration was performed in accordance with GSE Proposal No. 2019-460 dated August 5, 2019. Mr. Greg Gaylord, President, of Southern Wrecker, LLC authorized our services on August 6, 2019.

1.2 Project Description

This project will consist of a wrecker and vehicle storage facility. The site is located on the south side of US Highway 441 approximately half a mile west of the NW 173rd Street intersection. The project will consist of a building, a parking lot and driveway, a vehicle storage lot with temporary limerock base surface, and two stormwater management facilities.

You provided information about the project. The 6,500 square feet building will be located on the eastern end of the site with stormwater facilities to the north and west of the proposed building. The vehicle storage lot will be located to the south.

The structure is expected to be single-story, concrete masonry construction. Structural loads have not been provided, but are expected to be on the order of 1 to 2 kips per foot for bearing walls, and less than 50 kips for columns. The finished floor grade of the building is anticipated to be constructed near the existing site grades.

You provided a Conceptual Plan showing the location of the proposed building, stormwater facilities, parking and driveway, and vehicle storage lot. A recent aerial photograph was also obtained and reviewed. The Conceptual Plan and aerial photograph were used in the 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, stormwater management, and pavement 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 four (4) Standard Penetration Test (SPT) borings to depths of 20 feet below land surface (bls) in the area of the proposed building, four (4) auger borings to depths of 5 feet bls in the area of the proposed pavement area and vehicle storage area, and four (4) auger borings to depths of 15 feet bls in the area of the proposed stormwater management facilities.

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, Global Positioning System (GPS) coordinates, and obvious site features as reference. The boring locations should be considered approximate. The soil borings were performed on September 4, 2019.

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, and four (4) 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. Jason Gowland, P.E. with GSE visited the site on August 28, 2019 to observe the site conditions and mark the boring locations.

The site is mostly open and undeveloped. The site is bordered by US Highway 441 to the north approximately half a mile west of the intersection of US Highway 441 and NW 173 St/CR 235A. A commercial building is located just east of the site.

The topography at the site is gently to moderately sloping down toward the north from the southeast. The southeast portion of the site contains steep slopes with elevation changes of up to 26 feet. This appears to be material stockpiles at the time of the topographic date was obtained. Regional topography is gently sloping towards the northwest from the southeast. The Alachua County Growth Management Topographic Map indicates the ground surface elevations at the site are near elevations 92 to 100 feet[1] with stockpile height of 138 and 140 feet.

3.2 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 proposed stormwater management facilities indicate the soils across these areas are relatively consistent. The auger borings initially penetrated 5 to 10 feet of a near-surface sandy stratum consisting of sand with silt (SP-SM). This was underlain by silty sand and clayey sand (SM, SC) with some interbedded strata of sand with clay (SP-SC) to the explored depths of 15 feet bls.

The auger borings located in the proposed parking and driveway area and vehicle storage lot encountered a near-surface sandy stratum consisting of poorly graded sand and sand with silt (SP, SP-SM) to the boring termination depths of 5 feet bls.

The SPT borings within the area of the proposed building initially penetrated a 2 to 6 feet thick stratum of sand with silt (SP-SM) followed by 6 to 8 feet thick stratum of silty sand and sand with clay (SM, SP-SC). This was underlain by clayey sand (SC) to depths of 8 to 20 feet bls. SPT borings B-2 encountered clay-rich soil consisting of sandy clay (CL/CH) beginning at depths of 17 feet bls.

The surficial layer of sand with silt, silty sand, and sand with clay (SP-SM, SM, SP-SC) is generally in a very loose to loose condition with N-values ranging from 2 to 10 blows per foot. The underlying clayey sand (SC) is generally in a loose to medium dense condition with N-values ranging from 8 to 29 blows per foot. The clay-rich soil (CL/CH) encountered in SPT boring B-2 is in a firm condition with an N-value of 8 blows per foot.

---

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

The groundwater table was not encountered in the auger and SPT borings at the time of our investigation.

3.3 Review of Published 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 north tip and northeastern portion of the site is mapped as Arredondo fine sand, while the remainder of the site is mapped as Fort Meade fine sand. The southwestern portion of the site outside the construction area is mapped as Gainesville sand, 5 to 8 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.

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.

Fort Meade fine sand, 0 to 5 percent slopes. This nearly level to gently sloping, well drained soil is in both small and large areas on the gently rolling uplands. The areas are mostly irregular in shape and range from about 10 to 400 acres.

---

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

Typically, the surface layer is fine sand about 14 inches thick. The upper 10 inches is very dark brown, and the lower 4 inches is very dark grayish brown. The underlying layer is fine sand to a depth of 80 inches or more. In sequence from the top, the upper 20 inches is dark brown; the next 9 inches is dark yellowish brown; the next 28 inches is yellowish brown; and the lower 14 inches is dark brown.

Included with this soil in mapping are small areas of Arredondo, Gainesville, Kendrick, and Millhopper soils. Also included are small areas of soils which are similar to the Fort Meade soil but which have only 6 to 10 inches of a very dark gray or very dark grayish brown surface layer over a fine sand or loamy sand underlying layer. Total included areas are less than 15 percent.

In this Fort Meade soil, the available water capacity is low to medium. The permeability is rapid. The natural fertility is low. Organic matter content of the surface layer is moderately low to high. Surface runoff is slow. The water table is more than 72 inches below the surface.

Gainesville sand, 5 to 8 percent slopes. This sloping, well drained soil has sandy texture to a depth of 80 inches or more. It is an irregularly shaped areas on small, sharp breaking slopes and in relatively small elongated areas along long slopes of uplands. The size of the areas vary from about 8 to 40 acres.

Typically, the surface layer is dark grayish brown sand about 5 inches thick. The underlying layer is sand to a depth of 80 inches or more. The upper 37 inches is yellowish brown, the lower 38 inches is strong brown.

Included with this soil in mapping are a few small areas of Arredondo, Kendrick, and Lake soils. A few areas of this soil include small spots of Gainesville soils that have 0 to 5 percent slopes. Total included areas are about 15 percent.

This Gainesville soil has low available water capacity and rapid permeability. Organic matter content is low to moderately low, and natural fertility is low. Surface runoff is slow. The water table is at a depth of more than 72 inches.

Natural vegetation consists of slash and longleaf pines; live and water oaks; and magnolia, hickory, and dogwood trees. The understory is briers, bluestem, pineland threeawn, panicum, and sedges. Most areas are cleared and are in improved pasture.

This soil has very severe limitations for cultivated crops. Droughtiness, rapid leaching of plant nutrients, and a moderate hazard of erosion are the principal limitations. The surface of this soil is also susceptible to wind erosion. Corn, peanuts, tomatoes, cucumbers, and watermelons are some of the better adapted crops and produce moderately good yields with high level management. Special soil improving and erosion control measures are needed. Management practices are a crop rotation system that includes close growing, soil improving cover crops; returning all crop residue to the soil, and proper fertilization and liming. Irrigation is needed during dry periods and can be practical for high value crops.

This soil is moderately well suited to improved pasture of deep-rooted grasses and legumes. Good pasture management is necessary for good quality pasture. This Includes proper establishment of plants, fertilization, and controlled grazing. This soil is not suited to improved pasture of shallow-rooted legumes and grasses.

The potential productivity of this soil for longleaf and slash pine is moderately high. The soil has only slight limitations for normal woodland equipment use. Mortality of young seedlings is slight. Competition of other plants with young pine seedlings is moderate.

This soil has slight limitations as sites for dwellings, local roads and streets, and septic tank absorption fields. Where homes or other facilities that use septic tanks are concentrated, ground water contamination is a hazard. The soil has moderate limitations as sites for small commercial buildings because of the slope. It has severe limitations as sites for sewage lagoons because of the possibility of contamination of ground water by seepage. To prevent this, the sidewalls and floor of the pits need to be lined and sealed. The sandy surface presents some problems in trafficability in areas where the soil is used for trench landfills. Areas cleared of vegetation are subject to wind erosion.

This soil has fair potential for use as openland and woodland wildlife habitat. It has very poor potential for use as wetland wildlife habitat.

This soil has severe limitations for recreational uses because the sandy surface is a problem for trafficability. During dry periods, wind erosion is a hazard. The maintenance of a good vegetative cover, windbreaks, or some other form of protection is needed.

This Gainesville soil is in capability subclass IVs and has a woodland ordination symbol of 3s.

3.4 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, and hydraulic conductivity. Samples selected for laboratory testing were collected at depths ranging from 2 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.

The laboratory tests indicate the tested soils consist of sand with silt, silty sand and clayey sand. The tested sands with silt (SP-SM) contain between 8.7 to 10 percent soil fines passing the No. 200 sieve with natural moisture contents of 4.4 to 5.1 percent. The tested silty sand (SM) contains approximately 13 percent soil fines passing the No. 200 sieve with a natural moisture content of about 8.7 percent. The tested very clayey sand (SC) contains approximately 37 percent soil fines passing the No. 200 sieve with a natural moisture content of about 23 percent.

Although not tested, the sandy clay is expected to have a high potential for expansive behavior. It is our experience that clay-rich soils in this area of Alachua County having more than about 40 percent soil fines passing the No. 200 sieve have a high potential for expansive behavior.

The constant head hydraulic conductivity test results indicate the near-surface sand with silt has hydraulic conductivity values of 4.7 to 7.8 feet per day. Tests were not conducted on the deeper clayey sand due to the limitations of the test method on soils having moderate to high fines content, but these soils are expected to have permeability values at least one order of magnitude lower than the sandy soils.

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, stormwater management, and pavement designs as well as our general site preparation guidelines.

4.2 Groundwater

The groundwater table was not encountered in the borings at the time of our exploration. However, you should expect water to perch on top of the very clayey sand and sandy clays after periods of heavy and seasonal rainfall.

4.3 Building Foundations

The soil borings within the area of the proposed building indicate the soils are relatively consistent. The borings initially penetrated a 2 to 6 feet thick stratum of sand with silt (SP-SM) followed by 6 to 8 feet thick stratum of silty sand and sand with clay (SM, SP-SC). This was underlain by clayey sand (SC) to depths of 8 to 20 feet bls. SPT borings B-2 encountered clay-rich soil consisting of sandy clay (CL/CH) beginning at a depth of 17 feet bls.

Based upon the soil conditions encountered and our limited understanding of the structural loads and site grading, 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 2,000 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 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. 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 Flexible Pavement

Overall soil conditions encountered by our borings at this site are suitable for supporting conventional limerock base and asphalt wearing surface pavements. We have not been provided the anticipated traffic loading conditions; therefore, the following pavement component recommendations should be used only as guidelines. The below recommendations are intended to be minimums. Increasing base course and asphalt thicknesses would increase the design life of the pavement.

We recommend a minimum separation of 24 inches be present between the bottom of the base course and the top of the clay-rich soils containing greater than about 25 percent soil fines. Review of the boring logs suggests this separation will be present along the majority of the alignment. A roadway grading plan is not available at this time and the presence of shallow clay-rich soils is not expected.

In areas where the minimum 24 inch separation is not able to be achieved through grading design, we recommend these soils be undercut. The undercut should extend a minimum of 24 inches beneath the bottom of the base course. The undercut should extend laterally until the clay-rich soils are no longer encountered and free-draining sandy soils have been penetrated. The undercut should be backfilled with either on-site or imported sandy free-draining soils containing less than 10 percent soil fines. The backfill should be placed in maximum 24-inch loose lifts that are compacted to a minimum 95 percent of the Modified Proctor maximum dry density (ASTM D1557).

4.4.1 Stabilized Subgrade

The stabilized subgrade should have a minimum Limerock Bearing Ratio (LBR) of 40, with a minimum thickness of 12 inches. The stabilized subgrade can be imported material or a mixture of imported and on-site material. If a mix is proposed, a mix design should be performed to determine the optimum mix proportions. The stabilized subgrade should be compacted to a minimum of 98 percent of the Modified Proctor maximum dry density (ASTM D1557) for soils with less than 15 percent fines content. Soils with 15 percent or greater fines content should be compacted to 100 percent of the Standard Proctor maximum dry density (ASTM D698).

4.4.2 Base Course

The base course should consist of crushed limerock having a LBR of at least 100. Limerock should be obtained from a FDOT approved source, and should meet FDOT gradation requirements. The base course thickness should be a minimum of 6 inches in automobile parking areas and 8 inches in driveways. The base course should be compacted to at least 98 percent of the Modified Proctor maximum dry density (ASTM D1557).

The constructability of differing base course thicknesses may be difficult, and having a uniform 8-inch thick base course may be more practical.

4.4.3 Wearing Surface

The asphalt-wearing surface should consist of an FDOT Type SP Hot Mix Asphalt mixture. For automobile parking areas, the thickness should be a minimum of 1.5 inches. For driveway areas, the thickness should be a minimum of 2 inches. The asphalt-wearing surface should consist of an SP-12.5 mix. The asphalt should be compacted to at least 95 percent of the mix design density.

The constructability of differing asphalt thicknesses may be difficult, and having a uniform 2-inch thick asphalt wearing surface may be more practical.

4.5 Rigid Pavement

Concrete pavement is a rigid pavement that results in smaller load transfers to the subgrade soils than flexible pavement. For concrete pavement subgrade, we recommend using the existing surficial sands or recommended clean sand (SP) fill, compacted to at least 98 percent of the Modified Proctor maximum dry density without additional stabilization with the following stipulations:

1. Subgrade soils must be compacted to at least 98 percent of Modified Proctor maximum dry density to a depth of at least 2 feet prior to placement of concrete.
2. The surface of the subgrade soils must be smooth and any disturbances or wheel rutting corrected prior to placement of the concrete.

3. The subgrade soils must be moistened prior to placement of concrete.
4. Concrete pavement thickness should be uniform throughout, with the exception of thickened edges (curb or footing).
5. The bottom of the pavement should be separated from the estimated seasonal high groundwater level by at least 18 inches.
6. Limerock or any other impermeable base is not suitable unless it meets the minimum recommended permeability of 10 ft./day.
7. The upper 12 inches of subgrade underlying the base course must also be "free-draining" and water that enters the base and subgrade must be allowed to seep out by gravity or if this is not possible, underdrains must be incorporated into the subgrade. A "bathtub" condition within the base/subgrade must be avoided.

Our recommendations for slab thickness for heavy-duty concrete pavements is based on a.) subgrade soils are compacted to 98 percent of the Modified Proctor maximum dry density, b.) modulus of subgrade reaction (k) of 200 pounds per cubic inch, c.) a 20-year design life, and d.) previously stated design parameters. For an anticipated heavy-duty traffic group, a minimum pavement thickness of 8 inches is recommended, using Table 3.4 from the FDOT *Rigid Pavement Design Manual*, January 2019.

We recommend using concrete with a minimum 28-day compressive strength of 4,000 pounds per square inch and a minimum 28-day flexural strength (modulus of rupture) of at least 600 pounds per square inch based on the third point loading of concrete beam test samples. Minimum control joint spacing of 15 by 15 feet is suggested. Layout of sawcut control joints should form square panels, and the depth of sawcut joint should be at least 1/4 of the concrete slab thickness (a minimum 2-inch sawcut control joint depth for the recommended 8-inch slab thickness). The joints should be sawed within six hours of concrete placement or as soon as the concrete has developed sufficient strength to support workers and equipment.

For further details on concrete pavement construction, refer to "Guide to Jointing Non-reinforced Concrete Pavements" published by the Florida Concrete and Products Associates, Inc. and "Building Quality Concrete Parking Areas", published by the Portland Cement Association.

4.6 Temporary Limerock Base Design Recommendations

We understand you are considering a temporary limerock base area for the back portion of the site. Limerock roads and parking areas have been utilized for many years in this area with great success. We anticipate either a 6-inch or 8-inch thick limerock base will be utilized for the area. The material should be placed in accordance with Section 4.4.2 of this report. We recommend proper drainage be provided to prevent deterioration of the surface. A maintenance program should be prepared and implemented to extend the useful life of the area. GSE recommends you consider incorporating the recommendations of *Gravel Roads-A construction and Maintenance Guide* (August 2015) prepared by the FHWA and a *Guideline for Maintenance and Service of Unpaved Roads* (February 2000) as appropriate for the limerock base area.

4.7 Site Preparation

The soils at this site should be suitable for supporting the proposed construction using normal, good practice site preparation procedures. The following recommendations are our general guidelines for site preparation.

4.7.1 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.

4.7.2 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.

4.7.3 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.

4.7.4 Proof Compaction

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 to a depth of 1 foot below the foundation bottoms and the existing grade prior to placing fill. Vibratory roller equipment should not be used within approximately 100 feet of existing structures. Lighter “walk-behind” compaction equipment may be used to achieve the degree of compaction.

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).

4.7.5 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 4.10 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.

4.8 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 or 10,000 square feet of pavement 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 12 inches at the frequencies stated above.

4.9 Stormwater Management

The soil conditions at the stormwater management facility are relatively consistent initially penetrating sand with silt overlaying silty sand and clayey sand with some interbedded strata of sand with clay.

The water table was not encountered in the auger borings at the time of our exploration. We anticipate the seasonal high groundwater table to be perched on the very clayey sands and sandy clays where encountered.

The laboratory permeability tests indicate the surficial layer of sand with silt has hydraulic conductivity values of 4.7 to 7.8 feet per day. The deeper clayey sand encountered below the surficial sandy material is friable and will have permeability values at least one order of magnitude lower than the sandy 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.

Proposed Northern Stormwater Management Facility (P-3 and P-4)

1. Base elevation of effective or mobilized aquifer (average depth of confining layer) equal to greater than 15 feet bls.
2. Unsaturated vertical infiltration rate of 5 feet per day.
3. Horizontal hydraulic conductivity equal to 7 feet per day.
4. Specific yield (fillable porosity) of 20 percent.
5. Average seasonal high groundwater table depth equal to greater than 15 feet bls.

Proposed Western Stormwater Management Facility (P-1 and P-2)

1. Base elevation of effective or mobilized aquifer (average depth of confining layer) equal to greater than 15 feet bls.
2. Unsaturated vertical infiltration rate of 3 feet per day.
3. Horizontal hydraulic conductivity equal to 4 feet per day.
4. Specific yield (fillable porosity) of 20 percent.
5. Average seasonal high groundwater table depth equal to greater than 15 feet bls.

In areas where clay-rich soils are present at the basin bottom, we recommend these soils be undercut a minimum of 2 feet and backfilled with the on-site sands and sands with silt (SP, SP-SM) having a maximum of 12 percent soil fines passing the No. 200 sieve. The intent of this undercutting and replacement is to provide a more uniform sand "blanket" at the basin bottom that allows the migration of water to the deeper deposits of sand. This sand blanket will also reduce the potential for clay-fines leaching out of the soils when water is present in the basin that can result in a thin layer of confining type material on the basin bottom that can reduce the effectiveness of the basin.

4.10 Fill Suitability

The soils encountered at this site within the explored depths range from poorly graded sands 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 is 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 is 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.

4.11 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 Southern Wrecker and Recovery, LLC
PROJECT NAME Proposed Southern Wrecker and Recovery
PROJECT NUMBER 14197
PROJECT LOCATION Alachua, Alachua County, FL

BORING NUMBER L-1

DATE PERFORMED 9/4/2019
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS:
LOGGED BY KMC
CHECKED BY JEG
▼ AT TIME OF DRILLING N.E
▽ ESTIMATED SEASONAL HIGH N/A
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		AU 1	(SP) Brown SAND
1			
2			
			2.5
		AU 2	(SM) Orange silty SAND
3			
4			
5			5.0
			Bottom of borehole at 5.0 feet.

BORING NUMBER L-2

DATE PERFORMED 9/4/2019
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS:
LOGGED BY KMC
CHECKED BY JEG
▼ AT TIME OF DRILLING N.E
▽ ESTIMATED SEASONAL HIGH N/A
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		AU 1	(SP) Brown SAND
1			
2			
3			3.0
		AU 2	(SP) Orange SAND
4			
5			5.0
			Bottom of borehole at 5.0 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 Southern Wrecker and Recovery, LLC

PROJECT NAME Proposed Southern Wrecker and Recovery

PROJECT NUMBER 14197

PROJECT LOCATION Alachua, Alachua County, FL

DATE PERFORMED 9/4/2019 **BORING NUMBER R-1**
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS:
LOGGED BY KMC
AT TIME OF DRILLING N.E.
CHECKED BY JEG
ESTIMATED SEASONAL HIGH N/A
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		AU 1	(SP) Brown SAND
1			
2		AU 2	2.0 (SP) Pale brown SAND
3			
4			
5			5.0 Bottom of borehole at 5.0 feet.

DATE PERFORMED 9/4/2019 **BORING NUMBER R-2**
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS:
LOGGED BY KMC
AT TIME OF DRILLING N.E.
CHECKED BY JEG
ESTIMATED SEASONAL HIGH N/A
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		AU 1	(SP-SM) Brown SAND with silt
1			
2		AU 2	2.0 (SP) Pale brown SAND
3			
4			
5			5.0 Bottom of borehole at 5.0 feet.

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

CLIENT Southern Wrecker and Recovery, LLC
PROJECT NAME Proposed Southern Wrecker and Recovery
PROJECT NUMBER 14197
PROJECT LOCATION Alachua, Alachua County, FL

DATE PERFORMED 9/4/2019 **BORING NUMBER P-1**
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS: LOGGED BY KMC
▼ AT TIME OF DRILLING N.E. CHECKED BY JEG
▽ ESTIMATED SEASONAL HIGH >15 Feet
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0.0		AU 1	(SP) Brown SAND
2.5		AU 2	
			%PASS-200 = 9.2 *MC = 4.4* *k_h = 4.7 ft/day*
5.0			
			6.0
		AU 3	(SP-SM) Orange SAND with silt
7.5			
10.0			10.0
		AU 4	(SC) Pale gray clayey SAND
12.5			
15.0			15.0
			Bottom of borehole at 15.0 feet.

DATE PERFORMED 9/4/2019 **BORING NUMBER P-2**
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS: LOGGED BY KMC
▼ AT TIME OF DRILLING N.E CHECKED BY JEG
▽ ESTIMATED SEASONAL HIGH >15 Feet
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0.0		AU 1	(SP) Brown to pale brown SAND
2.5			
		AU 2	
			%PASS-200 = 10 *MC = 5.1* *k_h = 5.6 ft/day*
5.0			
			6.0
		AU 3	(SM) Orange silty SAND
7.5			
			8.0
		AU 4	(SC) Orange clayey SAND
			9.0
			(SP-SC) Orange and pale gray SAND with clay
10.0		AU 5	
			12.0
12.5		AU 6	(SP-SC) Pale gray SAND with clay
15.0			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 Southern Wrecker and Recovery, LLC

PROJECT NAME Proposed Southern Wrecker and Recovery

PROJECT NUMBER 14197

PROJECT LOCATION Alachua, Alachua County, FL

DATE PERFORMED 9/4/2019 **BORING NUMBER P-3**

DRILLING CONTRACTOR Standard Drilling Services, LLC.

GROUND WATER LEVELS: LOGGED BY KMC

▼ AT TIME OF DRILLING N.E. CHECKED BY JEG

▽ ESTIMATED SEASONAL HIGH >15 Feet

NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	
0.0		AU 1	(SP-SM) Dark brown SAND with silt	1.0
		AU 2	(SP-SM) Brown SAND with silt *%PASS-200 = 9.9* *MC = 5.0* k_h = *7.8 ft/day*	5.0
5.0		AU 3	(SP-SM) Orange SAND with silt	10.0
10.0		AU 4 AU 5	(SP-SC) Orange and pale gray SAND with clay	15.0
15.0			Bottom of borehole at 15.0 feet.	

DATE PERFORMED 9/4/2019 **BORING NUMBER P-4**

DRILLING CONTRACTOR Standard Drilling Services, LLC.

GROUND WATER LEVELS: LOGGED BY KMC

▼ AT TIME OF DRILLING N.E. CHECKED BY JEG

▽ ESTIMATED SEASONAL HIGH >15 Feet

NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	
0.0		AU 1	(SP-SM) Dark brown SAND with silt	1.0
		AU 2 AU 3	(SP-SM) Brown SAND with silt *%PASS-200 = 8.7* *MC = 4.8* k_h = *7.0 ft/day*	5.0
5.0		AU 4	(SM) Orange silty SAND	10.0
10.0		AU 5	(SM) Pale orange silty SAND	15.0
15.0			Bottom of borehole at 15.0 feet.	

5.2 Standard Penetration Test Soil Boring Logs

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

BORING NUMBER B-1

CLIENT Southern Wrecker and Recovery, LLC

PROJECT NAME Proposed Southern Wrecker and Recovery

PROJECT NUMBER 14197

PROJECT LOCATION Alachua, Alachua County, FL

DATE STARTED 9/4/19 **COMPLETED** 9/4/19

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR Standard Drilling Services, LLC.

GROUND WATER LEVELS:

DRILLING METHOD Flight Auger

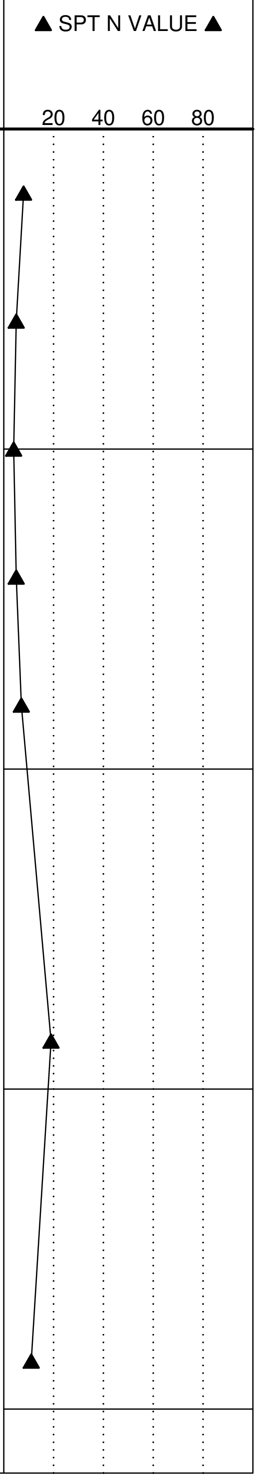
AT TIME OF DRILLING N.E.

LOGGED BY KMC **CHECKED BY** JEG

ESTIMATED SEASONAL HIGH >20 Feet

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, %
0		(SP-SM) Very loose to loose brown SAND with silt		SPT 1	3-4-4-6 (8)					
				SPT 2	2-3-2-2 (5)					
5			6	SPT 3	2-2-2-2 (4)					
		(SM) Loose brown silty SAND	8	SPT 4	2-2-3-4 (5)					
10		(SP-SC) Loose pale brown SAND with clay	12	SPT 5	3-2-5-5 (7)					
15		(SC) Medium dense tan clayey SAND	17	SPT 6	5-9-10 (19)					
20		(SC) Medium dense pale gray clayey SAND	20	SPT 7	3-4-7 (11)					
		Bottom of borehole at 20.0 feet.								

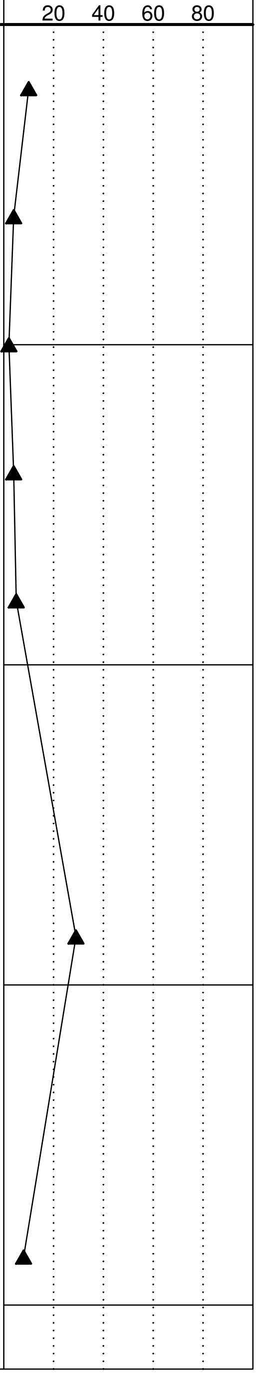


GSE Engineering & Consulting, Inc.
5590 SW 64th Street, Suite B
Gainesville, Florida 32608
Telephone: (352) 377-3233
Fax: (352) 377-0335

BORING NUMBER B-2

CLIENT Southern Wrecker and Recovery, LLC
PROJECT NAME Proposed Southern Wrecker and Recovery
PROJECT NUMBER 14197
PROJECT LOCATION Alachua, Alachua County, FL
DATE STARTED 9/4/19 **COMPLETED** 9/4/19
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
▼ **AT TIME OF DRILLING** N.E.
LOGGED BY KMC **CHECKED BY** JEG
▽ **ESTIMATED SEASONAL HIGH** 16.0 Feet
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 dark brown to orange SAND with silt		SPT 1	3-5-5-3 (10)						
				SPT 2	2-2-2-2 (4)						
5			6	SPT 3	1-1-1-2 (2)						
		(SM) Very loose to loose orange silty SAND		SPT 4	2-2-2-2 (4)						
10				SPT 5	2-2-3-5 (5)						
			12								
15		(SC) Medium dense pale gray clayey SAND ▽	17	SPT 6	4-13-16 (29)						
20		(CL/CH) Firm orange and green sandy CLAY	20	SPT 7	3-3-5 (8)						
		Bottom of borehole at 20.0 feet.									

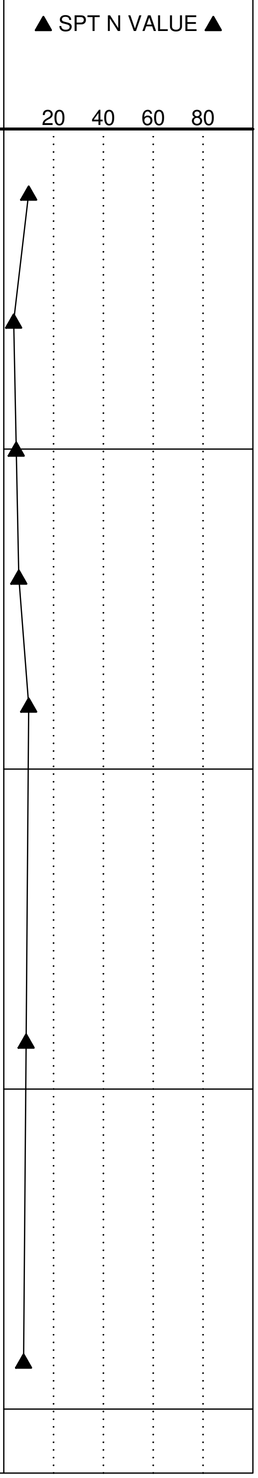


GSE Engineering & Consulting, Inc.
5590 SW 64th Street, Suite B
Gainesville, Florida 32608
Telephone: (352) 377-3233
Fax: (352) 377-0335

BORING NUMBER B-3

CLIENT Southern Wrecker and Recovery, LLC
PROJECT NAME Proposed Southern Wrecker and Recovery
PROJECT NUMBER 14197
PROJECT LOCATION Alachua, Alachua County, FL
DATE STARTED 9/4/19 **COMPLETED** 9/4/19
GROUND ELEVATION **HOLE SIZE**
DRILLING CONTRACTOR Standard Drilling Services, LLC.
GROUND WATER LEVELS:
DRILLING METHOD Flight Auger
▼ **AT TIME OF DRILLING** N.E.
LOGGED BY KMC **CHECKED BY** JEG
▽ **ESTIMATED SEASONAL HIGH** 8.0 Feet
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 ▲ 20 40 60 80
0		(SP-SM) Loose brown SAND with silt	2	SPT 1	3-4-6-4 (10)						
		(SM) Very loose dark brown silty SAND	4	SPT 2	2-2-2-2 (4)						
5		(SP-SM) Loose orange SAND with silt		SPT 3	2-2-3-3 (5)						
	▽		8	SPT 4	1-3-3-4 (6)						
10		(SC) Loose pale gray very clayey SAND		SPT 5	4-5-5-8 (10)				37	23	
15				SPT 6	3-4-5 (9)						
20			20	SPT 7	2-3-5 (8)						
		Bottom of borehole at 20.0 feet.									



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

BORING NUMBER B-4

CLIENT Southern Wrecker and Recovery, LLC

PROJECT NAME Proposed Southern Wrecker and Recovery

PROJECT NUMBER 14197

PROJECT LOCATION Alachua, Alachua County, FL

DATE STARTED 9/4/19 **COMPLETED** 9/4/19

GROUND ELEVATION **HOLE SIZE**

DRILLING CONTRACTOR Standard Drilling Services, LLC.

GROUND WATER LEVELS:

DRILLING METHOD Flight Auger

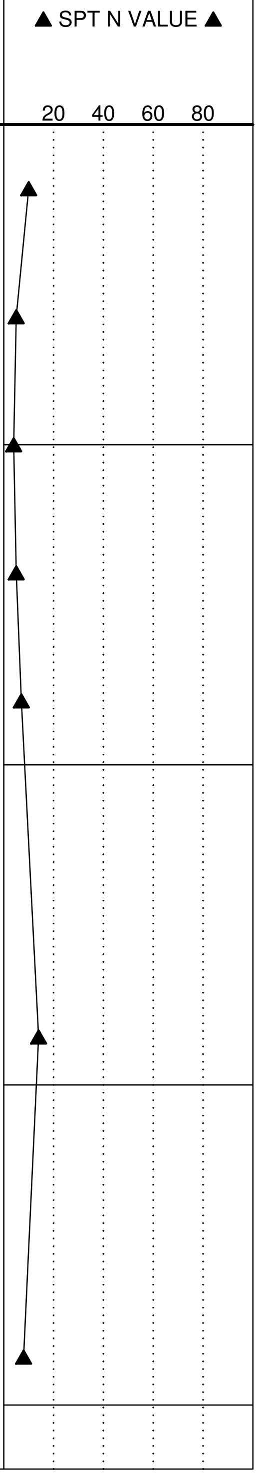
▼ **AT TIME OF DRILLING** N.E.

LOGGED BY KMC **CHECKED BY** JEG

▽ **ESTIMATED SEASONAL HIGH** >20 Feet

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, %
0	(SP-SM) Loose dark brown to orange SAND with silt		SPT 1	3-5-5-4 (10)					
		4	SPT 2	2-3-2-2 (5)					
5	(SM) Very loose to loose orange silty SAND		SPT 3	2-2-2-3 (4)					
			SPT 4	2-2-3-5 (5)				13	8.7
10			SPT 5	3-3-4-5 (7)					
		12							
15	(SC) Loose to medium dense pale gray and orange clayey SAND		SPT 6	3-6-8 (14)					
20		20	SPT 7	3-3-5 (8)					
	Bottom of borehole at 20.0 feet.								



5.3 Laboratory Results

GSE Engineering & Consulting, Inc.

SUMMARY REPORT OF LABORATORY TEST RESULTS

Project Number: 14197

Project Name: Proposed Southern Wrecker and Recovery

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
B-3	8-10	Loose very clayey pale gray SAND	23				37			SC
B-4	6-8	Very loose to loose orange silty SAND	8.7				13			SM
P-1	2-5	Brown SAND with silt	4.4				9.2		4.7	SP-SM
P-2	2-5	Brown to pale brown SAND with silt	5.1				10		5.6	SP-SM
P-3	2-5	Brown SAND with silt	5.0				9.9		7.8	SP-SM
P-4	2-5	Brown SAND with silt	4.8				8.7		7.0	SP-SM

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 ≥ 4 and 1 ≤ Cc ≤ 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 ≥ 6 and 1 ≤ Cc ≤ 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

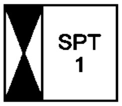
CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

	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

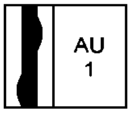
	No. OF BLOWS, N	CONSISTENCY
	0 - 2	Very Soft
SILTS	3 - 4	Soft
&	5 - 8	Firm
CLAYS:	9 - 15	Stiff
	16 - 30	Very Stiff
	31 - 50	Hard
	OVER 50	Very Hard

	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

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

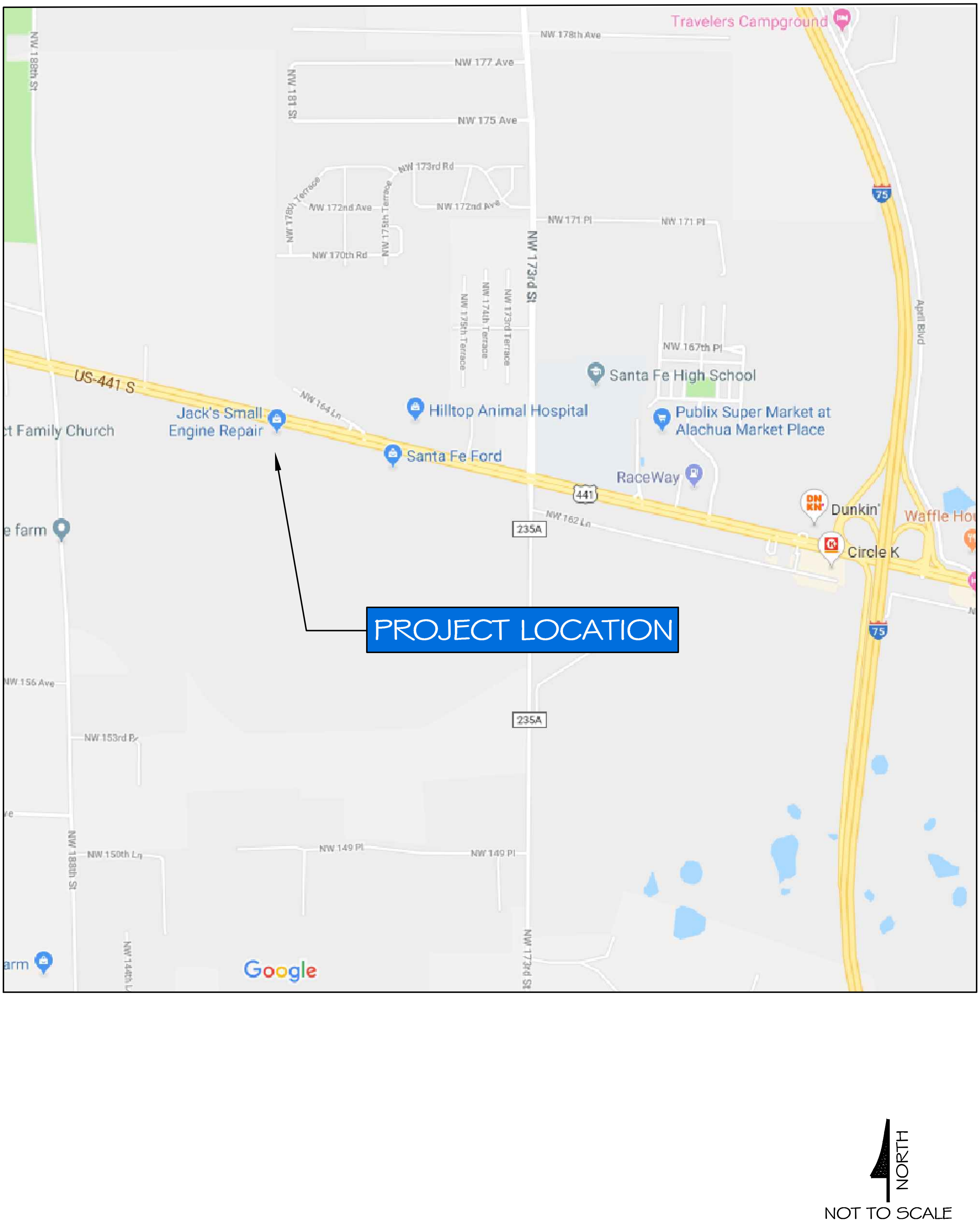
The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on Figure 2. This report does not reflect any variations that may occur between these borings.

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



PROPOSED SOUTHERN WRECKER
AND RECOVERY
ALACHUA, ALACHUA COUNTY, FLORIDA
GSE PROJECT NO. 14197

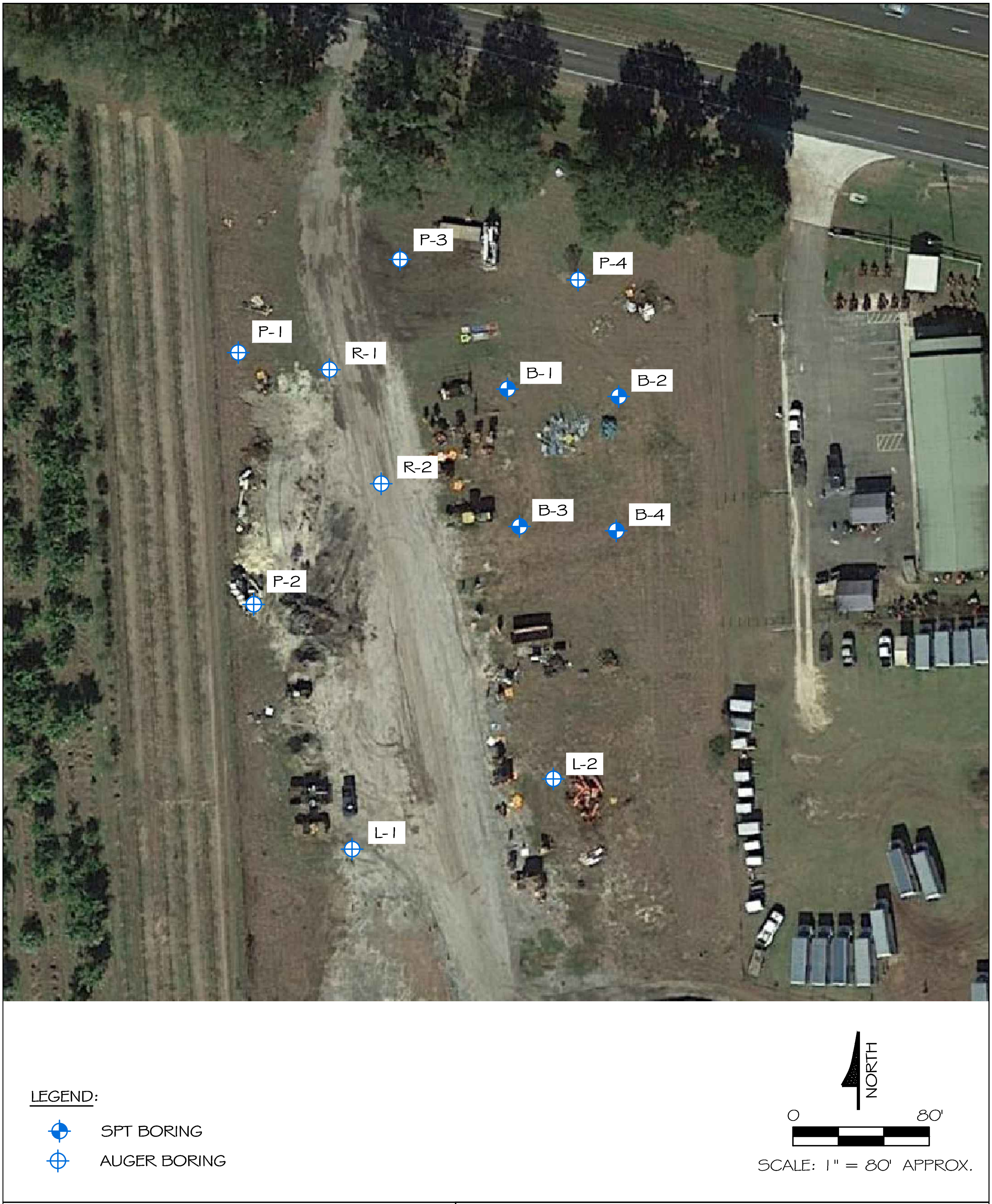
PROJECT SITE LOCATION MAP

DESIGNED BY : JEG
CHECKED BY : KLH
DRAWN BY : EFM

GSE
Engineering & Consulting, Inc.

FIGURE

1



PROPOSED SOUTHERN WRECKER
AND RECOVERY
ALACHUA, ALACHUA COUNTY, FLORIDA
GSE PROJECT NO. 14197

AERIAL PHOTOGRAPH SHOWING APPROXIMATE LOCATIONS OF FIELD TESTS

DESIGNED BY : JEG
CHECKED BY : KLH
DRAWN BY : EFM

GSE
Engineering & Consulting, Inc.

FIGURE

2