Beaufort Design Build, LLC

ADDENDUM # 1

May 11, 2020

Beaufort County Engineering
Beaufort County DNA Laboratory Addition

Beaufort, South Carolina

IFB Number 052920E

NOTICE TO ALL BIDDERS

The following shall take precedence over the plans and specifications for the above referenced project and shall become part of the contract documents. Information provided in the plans and specifications and not modified or amended herein shall remain in effect.

Number of items and pages included: 8 items, 3 pages

Attachments: Bid Form
Schedule of Prices
Geotechnical Report

Reminder: Bids for the Beaufort County Engineering, Beaufort County DNA Laboratory Addition project will be received until 3:00 PM on Friday, May 29, 2020. Bids will be received through the Beaufort County Purchasing Office website; www.beaufortcountysc.gov/purchasing/. In order to submit a bid, contractors must be registered as a vendor through the same website. Bids will be opened publicly, at the day and time indicated, and read aloud, at the Beaufort County Purchasing Office; 106 Industrial Village Road, Building 2, Beaufort, South Carolina 29906.

INFORMATION FOR BIDDERS (IFB)

Prebid Conference Cancelation: The Pre-Bid conference scheduled for May 12, 2020 at 2:00 has been canceled. Please visit Vendor Registry at www.bcgov.net , bid opportunities, Bid # 052920E for future updates / addendum.

Item 1: The revised Bid Form is attached.

Item 2: The Schedule of Prices as indicated in the Table of Contents is attached.

GEOTECHNICAL REPORT

Item 3: The Geotechnical Engineering Report prepared by Whitaker Laboratory Inc. and dated April 24, 2020 is attached.

DRAWINGS

Item 4: Sheet A-301 BUILDING AND WALL SECTIONS, SHEET KEY NOTES, key note 21: Roof sheathing shall be 1/2" exterior grade Structural I Plywood. Attach to roof trusses with 10d nails. Space nails at 6" OC in the field and 6" OC at the edges. Exterior wall sheathing shall be 1/2" exterior grade Structural I Plywood. Attach to studs with 10d nails. Space nails at 4" OC in the field and 4" OC at the edges.

Item 5: Sheet A-301 BUILDING AND WALL SECTIONS, SHEET KEY NOTES, key note 41: 3/4" Plywood sheeting to be tongue and groove nailed and glued to the floor joist. Attach to floor joist with 10d nails. Space nails 6" OC in the field and 6" OC at the edges.

Item 6: Sheet AS-101 FOUNDATION PLAN, detail E3: new 1'-0" x 3'-0" footing is to be dowelled to the existing / adjacent footing. Drill and epoxy #4 x 36" at 24" OC into existing footing. Use Simpson Set XP and embed 12" minimum.

Item 7: Sheet AS-101 FOUNDATION PLAN, detail E2: 5/8" anchor bolts at each # 4 rebar (12" min embedment). Use four (4) Simpson SSTB anchor bolts at each of the building's corners. Provide a continuous bond beam (third course from the bottom) with one (1) #4 rebar around the building perimeter. Tie the SSTB16 anchors to the bond beam. Provide #4 hooked (24" horizontal, 32" vertical) at each #4 vertical / concrete filled cell(s).

Item 8: Sheet A-103 ROOF PLAN: Add the following General Notes to this sheet :

Pre-engineered wood truss notes

1. Wood trusses shall be designed by manufacturer to support dead and live load as per code, and shall meet deflection requirements in the code.
2. Wood trusses shall be designed by the manufacturer in accordance with the applicable provisions of the latest edition of the national design specifications of the national forest products association. the design specifications for the metal plate connected to wood trusses of the truss plate institute and international building code.
3. Wood materials shall be southern pine, douglas fir or larch and shall be kiln dried and used at 19%maximum moisture content. Provide grade no.2 or as required to satisfy stress requirements.
4. Connector plate shall not be less than 0.036 inches (20 gauge) in coated thickness, shall meet or exceed astm grade a or higher and shall be hot dipped galvanized to astma 525 (coating g60). minimum steel yields stress shall be 33,000 psi.
6. Trusses shall be fabricated in properly equipped manufacturing facility of a permanent nature. Trusses shall be manufactured by experience workmen, using precision cutting, jigging and pressing equipment under the requirements in quality control standards ost-88 of the truss plate institute.
7. Secondary bending stress in truss top and bottom chords due to dead, live and wind loads shall be considered in design. load duration factors shall be per the "national design specifications for wood construction".
8. Wood trusses shall be erected in accordance with the truss manufacturers requirements. This work shall be done by a qualified and experienced contractor. truss erection by an inexperienced non-qualifed contractor can result in construction collapse and/or serious injury and damage.
9. The contractor shall provide all temporary and permanent bracing as required for safe erection and performance of the trusses. The guideline set forth by the trusses plate institute publication 'hib-91 commentary and recommendations for handling, installing and bracing metal plate connected wood trusses' shall be a minimum requirement.
10. Joist members and components shall not be cut, notched, drilled nor otherwise altered in any way without written approval of engineer.
11. Submit complete shop drawings for wood trusses showing member sizes, species, grade, moisture content, span, camber, dimensions, chord pitch, bracing requirements, horizontal de-

flections, vertical deflection and loadings. Shop drawings shall be submitted to the Architect-of-Record and shall bear the seal of a professional engineer.

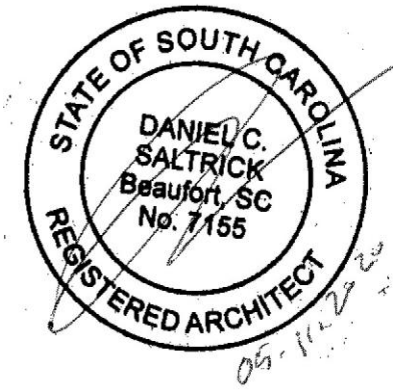
13. Joist shop drawings will be a deferred permit submittal requirement. After approval by the Architect, they must be forwarded to the building official prior to installation.

14. Floor joists shall be designed for live load deflection of no more than l/480. Other deflections for floor and roof trusses are as per the code. Floor truss sizes and spacing may vary from those shown on the plan provided that the strength and the deflection requirements are met.

END OF ADDENDUM # 1

Beaufort Design Build, LLC

Daniel C. Saltrick, AIA



BID FORM

PRICES INDICATED HEREIN REFLECT STRICT COMPLIANCE WITH TERMS, CONDITIONS, PROVISIONS AND SPECIFICATIONS OF THIS INVITATION FOR BID, OR WITH EXCEPTION DETAILED IN AN ENCLOSURE APPENDED HERETO.

SINGLE PRIME CONTRACT
Beaufort County Engineering
Beaufort County DNA Laboratory Addition
IFB NUMBER: 052920E

PREPARED BY:
Beaufort Design Build, LLC
2 Fire Station Lane
Seabrook, South Carolina 29940
843-466-3664

BID DATE: Friday, May 29, 2020

TO:
Beaufort County Purchasing Department
106 Industrial Village Road, Building 2
Beaufort, South Carolina 29906-4291

FROM:
Name of Bidder _____

The undersigned Bidder hereby declares that his Proposal is made without connection with any other person, company, or parties making a similar bid or proposal, and that it is in all respect fair and in good faith, without collusion or fraud. It is the Bidder's intention & purpose to enter into a Contract with Beaufort County. The Bidder signifies that his bid is all-inclusive to perform the Work to construct the **Beaufort County Engineering, Beaufort County DNA Laboratory Addition** project as illustrated in the Contract Documents prepared by Beaufort Design Build, LLC dated April 29, 2020. The Bidder has carefully examined the Contract Documents and Proposal Form and is familiar with the scope, details, intent, and conditions under which the Work, or any part of it, is to be executed, and the conditions which must be fulfilled in the furnishing and/or erection or construction of any or all items of the Work. The Bidder hereby proposes to furnish all labor, materials, equipment and services necessary to perform the Work required in the Drawings, Project Manual (specifications) and the terms of this Proposal for the amounts listed below.

A. Total Bid for Base Contract: $ _____

B. Total Bid for Alternate: $ _____

UNIT PRICES: There are no unit prices.

OWNER PREFORMED WORK: None

The Bidder further agrees to begin the work promptly upon receipt of a written Notice to Proceed and to pursue the work with an adequate work force to complete the work within **One Hundred and eighty (180) Calendar Days** from the Notice to Proceed. **Five Hundred Dollars ($500.00)** per calendar day is hereby agreed upon as the Liquidated Damages.

The Bidder acknowledges receipt of the following addenda:

Addendum No._____ Dated_____ Addendum No._____ Dated _____
Addendum No._____ Dated_____ Addendum No._____ Dated _____
Addendum No._____ Dated_____ Addendum No._____ Dated _____
Addendum No._____ Dated_____ Addendum No._____ Dated _____
Addendum No._____ Dated_____ Addendum No._____ Dated _____

The Bidder has enclosed the following with this Proposal:

_____ Invitation for Bid
_____ Bid Form
_____ Schedule of Prices
_____ Bid Bond, cashier's check or certified check in the amount of five percent (5%) of the Total Bid (line **C** above)
_____ Consent of Surety
_____ Certification by Contractor Regarding Non-Segregated Facilities
_____ No-Collusion Affidavit
_____ Contractors Qualifications Statement
_____ Local Vender Preferences
_____ Small and Minority Business Self-Performance Affidavit
_____ Self-Performance Affidavit
_____ Good Faith Efforts Checklist
_____ Non-Discrimination Statement

The undersigned certifies that this Bid does not violate any Federal or State Antitrust Laws.
BID SURETY IS REQUIRED ON BIDS OVER $30,000.00 IN THE FORM OF A BID BOND, CASHIER'S CHECK OR CERTIFIED CHECK IN AN AMOUNT OF 5% OF THE BID AMOUNT, PAYABLE TO THE BEAUFORT COUNTY TREASURER.

I, the undersigned, certify that this bid does not violate any Federal or State Antitrust Laws.

Bidders Federal Social Security Identification (E.I.) No._____

_____
(Company Name)

_____
(Mailing Address)

_____
(Street Address)

_____
(CITY/STATE/ZIP)

BY_____ TITLE_____
(Please print)

_____
(Signature – Bids Must Be Signed)

TELEPHONE_____ DATE_____

FAX #:_____

EMAIL ADDRESS:_____

SEAL

SCHEDULE OF BID PRICES DNA LABORATORY ADDITION		
BID#	**IFB# 052920E**	
OWNER	**BEAUFORT COUNTY**	
BIDDER		
BIDDER SC LICENSE NUMBER		
DATE		
PROJECT BID	$	
PROPOSED BID		
DESCRIPTION OF WORK	**BASE BID**	**ALTERNATE BID**
1. General Conditions		
2. Bonds and insurance		
3. Surveying and record drawings		
4. Mobilization/Demobilization		
5. Engineering/Design		
6. Construction entrance/laydown		
7. Tree Protection		
8. Grading/Excavation		
9. Concrete		
10. Masonry		
11. Wood Framing		
12. Finish Carpentry		
13. Doors, Windows, Hardware		
14. Roofing		
15. Insulation		
16. Siding/Trim		
17. Gypsum board and installation		
18. Flooring		
19. Painting		
20. Millwork		
21. Mechanical		
22. Electrical		
23. Plumbing		
24. Asphalt/Paving		
25. Landscaping		
26. Other (specify)		
BIDS		

Geotechnical Engineering Report

Proposed Addition Structure
Beaufort County DNA Laboratory
111 Industrial Village Road
Beaufort, South Carolina
April 24, 2020
Project No. 4-24-20-5

Prepared For:

Beaufort Design Build, LLC
Seabrook, SC

Prepared By:

Whitaker Laboratory, Inc.
Savannah, Georgia

WHITAKER LABORATORY, INC.

P.O. Box 7078 2500 Tremont Road Savannah, Georgia 31418
(912) 234-0696 Fax (912) 233-5061 Email: info@whitakerlab.net

April 24, 2020

Beaufort Design Build, LLC
2 Fire Station Lane
Seabrook, SC 29940

Attention: Adam Biery
(843) 466-3664
adam@beaufortdesignbuild.com

Referencing: Report of Geotechnical Evaluation Services for
Proposed Addition Structure
Beaufort County DNA Laboratory Addition
111 Industrial Village Road, Beaufort, South Carolina
Project No. 4-24-20-5

Dear Mr. Biery,

As requested, WHITAKER LABORATORY, INC. has conducted a geotechnical investigation at the above referenced site. Authorization to perform this investigation was provided by your acceptance of our proposal dated April 15, 2020. Our findings and recommendations for design and construction are attached and it is important that you read the report in its entirety.

It is a pleasure to provide our services to you and we look forward to further opportunities to assist you on this and other projects.

Respectfully submitted,
WHITAKER LABORATORY, INC.

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 37684 4/24/2020 BLAKE L. JONES

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 20225 4/24/2020 JASON H. FOLLO

Jason H. Follo, P.E.
SC Registered Engineer
#20225

Blake L. Jones, P.E.
SC Registered Engineer
#37684

TABLE OF CONTENTS

REPORT OF GEOTECHNICAL EVALUATION
Proposed Addition Structure
Beaufort County DNA Laboratory
111 Industrial Village Road, Beaufort, South Carolina

I. INTRODUCTION / SCOPE

WHITAKER LABORATORY, INC. has completed this field investigation of the surface and subsurface conditions at this site. The preliminary conditions found, and how those conditions could affect the design and construction of foundations for the structures planned, form the basis for this report. Regardless of the thoroughness of any geotechnical investigation, there are limitations, and deviations from the conditions found in this investigation could be subsequently disclosed. We recommend that this report be provided to all parties involved in the planned development to include but not necessarily limited to the Owner, Architect, Design Engineers, General Contractor and sub-contractors. Unanticipated circumstances often arise during sitework, earthwork and foundation construction. Accordingly, we recommend that our firm be retained to provide the construction surveillance, inspection, and testing on the project, thereby being readily available to assist in the evaluation of any conditions encountered that differ from those anticipated.

The site is located at 111 Industrial Village Road in Beaufort, SC. We understand a new addition structure and associated pavements are planned for construction on this site. In an effort to evaluate subsurface soil conditions and their impact on the design and construction of the planned addition structure, a total of three standard penetration test (SPT) borings were performed. The borings were advanced within the planned construction area extending to depths ranging from 4 to 35 feet below the ground surface.

Please note that this evaluation only applies to the foundations and pavements planned for construction. This evaluation does not apply to any future improvements, which may be made to the site. In particular, if at any time should additional fill be placed, adjacent to or nearby the structures referenced in this report, additional geotechnical borings and a follow up geotechnical analysis will be required. Standard billing rates will apply for this work.

II. EXECUTIVE SUMMARY

The following recommendations shall be considered a summary of the recommendations contained within this report and utilized as such. This report shall be read in its entirety.

- The encountered surface soils can be made suitable for shallow spread pier and/or strip footing foundations with slab-on-grade flooring if liquefaction induced settlement is not of concern to the owner and/or structural design, our foundation loading assumptions are not exceeded and the recommendations contained within this report are performed and verified during construction.

At any time, we will be glad to discuss the contents of this report. This includes insuring that you fully consider potential problems for design and construction procedures in respect to interpretations of the data.

III. PROJECT INFORMATION & DESCRIPTION

We have not been provided foundation loads for the building, however for the purpose of this report we will assume that foundation loads will not exceed 30 kips for columns and/or 2 kips per linear foot for walls. We will further assume that site grades will not be raised more than 2 feet above existing ground surface elevations to achieve finished grade elevations for the ground surface and/or slabs-on-grade.

Item	Description
Proposed Improvements	New Building Addition Structure
Finished Grade elevation for ground surface and/or slabs-on-grade	Assume maximum 2 feet above existing grade
Maximum Foundation loads	Assume 30 kips for columns and 2 kips for walls
Maximum Floor Loads for slabs-on-grade	Assume 100 pounds per square foot
Maximum allowable settlement	Assume 1 inch overall and ½ inch differential
Above information was assumed by Whitaker Laboratory, Inc.	

If our assumptions are incorrect, we should be contacted immediately, provided the correct information and allowed an opportunity to change and/or modify the recommendations contained within this report if necessary.

IV. SITE LOCATION & DESCRIPTION

Item	Description
Location	111 Industrial Village Road, Beaufort, SC
Existing Structures	None within planned construction area
Current ground cover	Grassed area
Existing topography	Generally flat with elevated mound in center

At the time of our site visit, the planned building pad area consisted of an open grassed area with elevated mound in center (approximately 18"). Elevated mound may be from existing drain field. The site and boring locations on the site were accessible to our rubber tire truck mounted drilling equipment at the time of our mobilization.

V. AREA GEOLOGY

This project is located in Beaufort, South Carolina. This overall project area resides along the eastern edge of the South Atlantic Coastal Plain. In South Carolina and Georgia, this broad, gently sloping region extends southeastward from the Fall Line (Chesterfield - Columbia - Augusta - Macon - Columbus) to the Atlantic Ocean. The soils encountered are sedimentary in origin, and consist of layered marine deposits of sands, silts, and clays. These deposits have since been subjected to successive erosion and re-deposition, by fluctuations of sea levels, storm tides, and winds. Many of the surface sands are the result of depositional forces along ancient beaches, which formed during the changing shoreline and river conditions. Intermittent deposits of shells occur within the strata at irregular intervals. The surface soils in a majority of this Coastal Plain area were deposited during the Pleistocene Era, however surface soils near the coast are likely of the Holocene Era.

VI. TEST BORINGS AND SUBSURFACE CONDITIONS

The field exploration to determine the characteristics of the subsurface materials included a reconnaissance of the project site, and the drilling of exploratory borings. Standard penetration test borings were performed using rotary head drilling equipment and advancing hollow stem augers. Sampling and Standard Penetration Testing, (SPT), was performed in accordance with ASTM D-1586. SPT samples were taken at 2.5 foot intervals of depth for the first 10 feet, and at 5.0 foot intervals thereafter. Standard Penetration testing is done with a 140 pound hammer falling 30-inches and a two inch diameter sampling spoon. Results of Standard Penetration Testing (SPT N values) provide an indication of the relative consistency, density and in-situ strengths of the tested soils.

Soil samples from SPT testing and from the auger cuttings have been used for identification and visual classification. The subsurface stratification and the profile as presented in the boring logs, represent approximate boundary lines between the strata and materials encountered. These boundary lines are usually gradual and not clearly defined, and it is sometimes difficult to record changes in stratification precisely. It should be noted that underlying soil conditions can, and do, vary considerably within short lateral distances. It is possible that conditions may be revealed between boring locations that are different from those found by our borings and used for our analysis.

The approximate locations of the borings are shown on the attached BORING LOCATION PLAN. Our drilling crews, based on landmarks and features available at the time of drilling, have estimated the locations of the borings in the field. If the precise location of the boreholes is critical, this can be determined by employing a land surveying firm to plot the true locations. Such survey should be completed promptly and before any disturbance to the area has occurred. If desired, Whitaker Laboratory, Inc. will be glad to coordinate surveying arrangements for an additional fee.

Below approximately 6 to 8 inches of topsoil, the subsurface soils on this site predominately consist of loose to dense sands and silty sands (SP-SM and SM) extending to the termination depth of the deeper boring at 35 feet below the ground surface.

The above description of the subsurface profile should be considered a general description intended to highlight the major strata encountered. More detailed profiles can be observed within the attached logs. Please note that boring logs are only representative of their location. Stratification transitions should be expected to occur outside and between boring locations. Taking into account that sampling was not performed on a continuous basis within SPT borings, lines drawn representing elevations of stratification changes shown on the SPT boring log were estimated.

VII. GROUNDWATER TABLE

The apparent groundwater table was measured for each boring location at the time of boring. Groundwater levels were measured to range from 2 to 3 feet below the ground surface at the time of boring. The groundwater elevation can be expected to fluctuate with the season of the year, surrounding ground surface conditions, and with recent rainfall amounts. Thus, groundwater elevations shown on the boring logs should be considered an estimate and valid only for the time and date of observation.

If groundwater remains at the observed levels, it may impact construction. We have addressed groundwater concerns within the earthwork and foundation design considerations section of this report.

VIII. SEISMIC SITE CLASSIFICATION AND COEFFICIENTS

Liquefaction Potential:

Whitaker Laboratory, Inc. performed a liquefaction analysis on the soils encountered within boring B-1. Liquefaction typically occurs when very loose to loose non-cohesive soils encountered below the groundwater table experience a significant loss of shear strength due to the increase in pore water pressure resulting from seismic vibrations.

The design earthquake utilized in our analysis (Charleston, SC earthquake with magnitude 7.3 and a 2% probability of exceedance in 50 years) yielded peak horizontal ground surface accelerations of 0.43g on this site.

Based upon the design earthquake and characteristics of subsurface soils, the liquefaction analysis indicated that the encountered sand stratifications present below the groundwater table have potential to liquefy during the design seismic event. The amount of settlement estimated during and shortly after a seismic event of this magnitude approximated 5 ½ inches.

Settlements of this magnitude could cause damage to the structure. If the risk of anticipated settlements due to liquefaction are unacceptable to the owner, extensive ground modification would need to be performed on the liquefiable soil stratums or supporting the structure on pile foundation systems bearing below the potentially liquefiable soil zones would be required. Whitaker Laboratory should be contacted if this risk is unacceptable. Additional evaluation will be required to provide foundation recommendations capable of guarding the structure against liquefaction induced settlements.

Seismic Parameters:

International Building Code:

Assuming the structure has a period of vibration under 0.5 second and disregarding liquefaction potential, this site would be defined as a Site Class "D". The classification is determined by average soil properties in the top 100 feet of the soil profile, including standard penetration test N values, shear wave velocities, in-situ shear strengths and moisture contents, as specified by IBC 2018 & ASCE 7-10.

$S_s = 0.610$
$S_1 = 0.194$
$S_{MS} = 0.801$
$S_{M1} = 0.430$
$S_{DS} = 0.534$
$S_{D1} = 0.286$

A summary report is attached in Appendix III of this report. If the period of vibration for the planned structure is in excess of 0.5 second or the size and design of this structure justifies additional investigation, a Site Specific Geotechnical Investigation and dynamic site response analysis shall be performed. Our firm has the ability to provide our clients such testing and evaluation, and we will be available to discuss the cost, and potential benefit, if any, of such if you desire.

IX. EARTHWORK AND FOUNDATION DESIGN CONSIDERATIONS

The encountered surface soils can be made suitable for shallow spread pier and/or strip footing foundations with slab-on-grade flooring if liquefaction induced settlements are not of concern to the owner and/or structural design, our foundation loading assumptions are not exceeded and the recommendations contained within this report are performed and verified during construction.

Earthwork:

- We recommend that the building site plus a minimum of 10 feet beyond the perimeter of all structural areas be stripped of any organics, stumps, roots and unsuitable organic surface soils. Stripping depths will likely require extending to depths reaching 6 to 8 inches below existing grades to remove unsuitable surface organic soils.

- Existing utilities (possible drain field) shall be removed from under the building.

- After stripping and/or utility removal, all exposed subgrade soils shall be thoroughly compacted in-place to 95% of ASTM-D-1557 and pass proof-rolling inspections prior to backfilling/filling operations begin. Areas found to pump or deflect should be undercut to a competent material and backfilled with an approved compacted material.

- Compaction efforts on all exposed subgrade soils after stripping and/or utility removal shall be made with a large vibratory smooth drum roller (Cat CS 74 or equivalent - centrifugal force range of 37,300 – 74,600 lb).

- The exposed subgrade soils within all structural areas shall be inspected, tested and approved by Whitaker Laboratory personnel prior to backfilling/filling placement begins.

- Backfill and fill material required to raise the pad and pavement areas to achieve finished subgrade elevations, should consist of granular soils and meet the requirements for material type and placement as outlined within the SITE WORK RECOMMENDATIONS section of this report.

- Please note that dense sands (100+ blow count material) were encountered at depths bracketing elevations 6 to 8 ½ feet below the ground surface on this site. Excavations that require extending below a depth of 6 feet below existing grades can prove to be difficult with standard/typical excavation equipment. Whitaker Laboratory, Inc. recommends that contractors verify capabilities of intended excavation equipment to be utilized on this site prior to bidding.

Foundations:

Once the above is accomplished, footings can be excavated. Bottom of footing excavations shall be thoroughly compacted to meet or exceed 95% of the soils modified proctor maximum dry density in accordance with ASTM-D-1557. Footing inspections should also be conducted by performing dynamic cone penetrometer testing within bottom of footing excavations to depths reaching 3 feet below bottom of footing elevation to verify adequate bearing material is present. Subsurface bearing soils deemed unsuitable based upon dynamic cone penetrometer testing should be undercut to a competent material and backfilled with an approved material.

After the above is completed and verified by Whitaker personnel during construction, footings may be designed for safe soil bearing pressures of 2000 PSF. Our technicians, prior to placing steel and concrete, should approve all footing excavations. All footings should have minimum plan dimensions of 24 inches. Bearing edges of slabs-on-grade should be a minimum of 18 inches wide. All footings, and bearing edges should reside at least 12 inches below finished grade. Overall settlements on the order of one inch should be anticipated. Differential settlement is anticipated to be on the order of ½ the overall settlement. Floor slabs can be designed utilizing a modulus of subgrade reaction "k" value of 150 pci.

Lateral loads can be resisted by passive earth pressure due to compacted structural fill placed against the sides of the footings. The upper 1-foot of resistance should be neglected unless the fill is confined by a pavement or floor slab. A soil unit weight of 110 pcf and passive earth pressure coefficient of 3.0 can be utilized in the analysis. Additionally, a friction coefficient of 0.35 between the concrete footings and underlying soil can be used in combination with passive earth pressures to resist lateral loads. The coefficient of friction should be applied to dead normal loads only.

Groundwater Recommendations:

Due to groundwater being encountered as shallow as 2 feet below the existing ground surface elevations, dewatering may be required during earthwork and/or foundation construction.

Typically, the groundwater level needs to be 24 inches below subgrade elevations to properly compact the subgrade and subsequent backfill materials. Utilizing an initial thin layer of stone compacted into the subgrade soils will help, however, dewatering may still be critical to adequately compact the subgrade, backfill and fill soils. Although dewatering techniques consisting of well point systems, sump pits with pumps, and/or drainage ditches are typically effective methods to lower groundwater, the means and methods for dewatering should ultimately be the responsibility of the contractor.

X. SITE WORK RECOMMENDATIONS

We will be pleased to discuss these recommendations with the owner and the site work contractor selected to do the work. We believe it will be beneficial to the project, for the owner and the contractor to have a clear understanding of our recommendations.

1. Prior to construction, all building areas, plus at least 10 feet on each side and all areas to be paved, should be stripped of all vegetation, topsoil and root systems. Site drainage during construction should be considered prior to this clearing and stripping. Preventing the ponding of storm water is of particular importance.

2. Topsoil, organics, root-mat and other surface materials will likely vary across the site. Individual test borings may not accurately reflect the presence of, or the thickness of such materials due to site variability and/or surfacing clearing to facilitate access for drilling equipment. Site clearing and grubbing, when unsupervised, and particularly in areas of wet soils and times of wet weather, may push organic debris into otherwise stable soils. Undercutting and clearing with a track hoe in lieu of bulldozers can minimize this.

3. Any stump holes or other depressions should be cleared of loose material and debris, and should then be back-filled with approved fill. The backfill should be placed in 6-inch thick lifts and compacted to 95% density in accordance with ASTM D-1557.

4. Any existing utilities that underlie the site should be relocated and their trenches back-filled with approved soil. The backfill should be placed in 6-inch lifts and compacted to 95% density according to ASTM D-1557.

5. Prior to fill placement, the subgrade should be proof rolled with a loaded dump truck to locate unstable or soft areas. Any unstable areas should then be investigated to determine the cause of the instability. If due to unsuitable soils, such as highly organic soils or soft clays, the areas should be undercut to firm soil and replaced with approved fill compacted in 6-inch lifts to minimum density of 95% in accordance with ASTM D-1557. If the instability is due to excess moisture in otherwise stable soil, the area should be drained and compacted to 95% density.

6. Any fill or backfill required to level or raise the site should be placed in 8 to 10 inch thick, loose lifts and compacted by appropriate compaction equipment to 95% density in accordance with ASTM D-1557.

7. All of the fill and backfill (including utility line backfill) for this project should consist of clean, free draining granular soils. The fill should be free of objectionable roots, clay lumps, organics and other debris. The fill should be readily compactable during placement. Soils classified as SW, SP, SP-SM or SM with a maximum of 15% passing a #200 sieve may be acceptable. Soils with the minus #200 fraction classified as MH, CH, OH, ML, CL or SC may be rejected. Soils with a maximum plasticity index of 25 and a maximum liquid limit 40 may be acceptable for use only beneath building pads which are situated well above the groundwater table with approval from the geotechnical engineer. Soils classified as SC or CL, exhibiting moisture sensitivity, soils with excessive clay content, or excessive moisture should not be used without approval from the geotechnical engineer. Approved sands will also need to be moisture conditioned as necessary to facilitate proper compaction throughout its entire depth. If utility trenches cannot be sufficiently dewatered to readily allow compaction of the specified pipe bedding material, then a class I (ASTM-D-2321) gravel or gravel mixture will be required.

8. To assist in reducing moisture beneath the structure, and to reduce the potential for mold growth, the site shall be graded and filled as necessary to direct drainage away from the structure. If sub drains are installed, these alone may not prevent moisture vapor beneath the structure that can cause mold growth. (Also refer to paragraph 10 below). Care must be taken to not place concrete on top of wet soils. For example, if fill or natural soils experience heavy rain, the soils should be properly drained and dried, prior to placement of concrete. Otherwise moisture migration through the slab will occur.

9. Compact all footing excavations and slab subgrades to a minimum density of 95% in accordance with ASTM-D-1557, prior to placement on concrete. The footing excavations, and all prepared slab subgrade, should be maintained in a dry and compacted condition until the concrete is placed. Areas that are softened by water or that are disturbed by construction activity should be re-worked, re-compacted, or appropriately repaired to the required bearing and density. If necessary, stone backfill or other corrective measures may be implemented to stabilize footings.

10. All slabs-on-grade should be supported on a minimum of 4-inches of granular, free-draining gravel or coarse sand to reduce moisture migration by capillarity. A vapor retarding membrane, overlying this granular base, is recommended to further reduce moisture migration into finished areas of the structure. Note that the use of these measures will not totally prevent moisture under or on top of slabs or beneath structures. (Also refer to paragraph 8 above).

11. Any footing excavations that are directly adjacent to the existing foundations should be done in small increments to avoid undermining them and causing a loss of support to the existing structure. If necessary, the excavations should be sheeted and braced or grouting should stabilize the soil in the immediate area.

XI. PAVEMENT RECOMMENDATIONS

Subgrade for driveways and parking areas should consist of a minimum of 24-inches of clean sand subgrade compacted to a density of 95% of its maximum dry density as determined by ASTM-D-1557. Pavement designs should also provide a minimum of 24-inches separation between the bottom of the base course material and the seasonal high ground water table. Undercutting, re-compacting, and/or replacing of existing surface soils will be required unless subgrade consists of organic free, virgin sandy soils that are proven to be a minimum of 24-inches thick, 24-inches above the seasonal high ground water table, compacted to 95% of ASTM D-1557 and passes a proof-roll. Final grades and elevations will determine the extent of any filling, undercutting and backfilling that may be required. The pavement design must provide for the pavement subgrade soils to drain and not ever become saturated by surface water, perched groundwater or groundwater table.

Due to groundwater residing as shallow as 2 feet below existing grades, Whitaker recommends bottom of pavement sections reside at or above existing ground surface. As long as bottom of pavement section elevation reside at or above the existing ground surface elevation, combined with near surface soil conditions consisting of sandy soils on this site, the in-situ sandy soils can be made suitable for use as pavement subgrade material as long as the in-place sandy soils are compacted for a full 24-inch depth below bottom of pavement section elevations. In addition, the use of under drains should not be necessary as long as bottom of pavement section elevations do not reside below existing ground surface elevations.

If site grades are not raised as recommended, underdrains should be incorporated in the pavement design to permanently maintain groundwater 2 feet below bottom of pavement section elevation. These systems should be provided below and/or adjacent to the pavement section. Depending on the pavement section (crown, inverted crown, curb & gutter) and depending on adjacent landscaping, islands, medians, or irrigation sprinkler plans; under drains may need to be provided along the centerline, at the low point, on both sides of the pavement, adjacent to all curb, adjacent to all irrigated areas and/or along the entire perimeter of all parking areas.

Perforated under-drain pipe shall be enclosed in a filter fabric sock or fabric wrapped rock filled trench, and then surrounded by a zone of fabric compatible granular backfill. Due to variations in such commercially available filter fabrics and filter socks, in order to minimize clogging of the fabric pores and passing of fines into the drain systems, a submittal from the manufacturer of the proposed fabric product, to the site civil engineer, must identify compatible granular backfill soils by grain size distribution. Such submittal shall necessarily include the pore sizes of the filter fabric. Based upon our experience a non-woven (6 to 8 oz) filter fabric works well for soil types in this area.

Under drains should be designed to promote continuous positive drainage away from the pavement area and day-lighted to a drainage feature that will not restrict or back up the flow of water. The site design will require setting pavement grades, pond elevations and/or drainage features to accommodate gravity flow under drains with invert elevations residing a minimum of 4 feet below existing grades.

As mentioned above, compaction efforts on exposed subgrade soils (after stripping) shall be made with a large vibratory smooth drum roller (Cat CS 74 or equivalent - centrifugal force range of 37,300 – 74,600 lb).

All proof rolling, construction observations, compaction testing of paved areas must be in accordance with the SITE WORK section above.

If a rain event of 0.5 inches or more, occurs after initial proof rolling and prior to subsequent placement of base or surface wearing course, the proof roll testing must be repeated just prior to additional work.

The below recommended pavement sections should be considered standard and typical for the area. We have not been provided traffic data and/or been instructed to perform CBR testing on subgrade soils, therefore these pavement sections should not be considered a pavement design. The below recommended pavement sections are based upon the assumption that the sandy subgrade soils will yield a minimum CBR value of 8 if compacted to 95% ASTM D-1557 for a full 24-inch depth. In addition, the below recommended light duty pavement sections should be considered for car traffic areas only. Below recommended heavy duty sections should be utilized for all areas receiving truck traffic (delivery trucks and garbage trucks with 18-kip axle loads). In addition the heavy duty sections recommended below are for low volume truck traffic (15 to 20 trucks per day).

LIGHT DUTY PAVEMENT (CARS & LIGHT TRUCKS)

SUBGRADE:	Minimum – 24-inches of drained, compacted, coarse grained soil
BASE COURSE:	Minimum - 6 inches of graded aggregate base course
SURFACE COURSE:	Minimum - 2 inches of Hot Mix Asphalt Surface Course Type B

HEAVY DUTY PAVEMENT (LOADED TRUCKS WITH 18+ kip AXLE LOADS)

SUBGRADE:	Minimum – 24-inches of drained, compacted, coarse grained soil
BASE COURSE:	Minimum - 8 inches of graded aggregate base course
BINDER COURSE:	Minimum - 2.0 inches of Hot Mix Asphalt Binder Course Type B
SURFACE COURSE:	Minimum - 2.0 inches of Hot Mix Asphalt Surface Course Type B

In all projects, a minimum mat temperature of 185° F must be maintained through final roller pass.

Please note that specifications for above mentioned base course, binder course and surface course can be found under division 300, 402 and 403 respectively of the South Carolina Department of Transportation Standard Specification for Highway Construction, Edition of 2000. The mix design must include "lime".

All testing procedures, pavement densities, void ratios, and all criteria for final pavement approval must be agreed upon by the parties after completion of a rolling pattern or test strip segment. It must also be agreed that the reference to SCDOT Specifications shall mean the entirety of the specification. Portions of such Standard State pavement specifications are not stand alone provisions, and must be considered as mutually complementary provisions, to be used in their entirety. Selected portions of the Standard State specifications may be included, only after completion of a rolling pattern or test strip segment, and the agreement of the parties.

Several studies have shown that recycled concrete aggregates may have suitable physical and geotechnical properties for road construction; however, the studies related to leaching behavior and potential clogging have not been investigated in depth. Whitaker Laboratory recommends that recycled concrete aggregate and/or recycled masonry materials should not be used in project designs and construction where geotechnical fabrics are part of a drainage filter design. Such recycled materials have the potential for precipitating calcium-based compounds and causing clogging of the fabric filter materials

PORTLAND CEMENT CONCRETE PAVEMENT

HEAVY DUTY:	8-inches of Portland cement concrete with minimum compressive strength of 4000 PSI.
LIGHT DUTY:	5-inches of Portland cement concrete with minimum compressive strength of 4000 PSI.

Whitaker Laboratory recommends incorporating a minimum of 4-inches of graded aggregate base course below the above concrete pavement sections for maintaining a smooth and level surface during placement of the pavement section.

Joints must be placed a MAXIMUM spacing in FEET of 2.5 times the pavement thickness in inches, and in no case more distant apart than 15 feet.

Pavement Design should include:

- Requirements to seal all pavement joints to prevent surface water entry into base / subgrade. Such provision should minimize pumping failures at joints.
- Requirements that pavement sections and panels subject to repetitive braking and/or acceleration should be designed with lug anchors or tie-bars to minimize separation or misalignment at the joints.
- Provisions for load transfer across construction joints by dowels or other acceptable means.
- In general, the design should follow the recommendations and practices for all components as described in ACI 330.1 and/or ACI 330R as applicable.

XII. QUALITY CONTROL AND TESTING

Documented inspections and/or testing performed by Whitaker Laboratory personnel, at the following critical milestones during construction, will be required for the recommendations contained within this report to be validated:

Earthwork:

- After stripping and prior to backfill or fill placement: Perform density testing and proofrolling on exposed subgrade soil to verify exposed subgrade soils are compacted and stable enough to begin receiving backfill and/or fill.
- Collect sample of proposed backfill & fill material, perform laboratory testing and determine suitability for use (approve or disapprove).
- During backfill/fill placement: Perform density testing on each lift of backfill and/or fill soil.

Footings:

- Once footings are excavated: Perform inspection on bearing subgrade soils within bottom of footing excavations to depths reaching 3 feet below bottom of footing elevation prior to placement of reinforcing steel or concrete. Provide recommendations for undercutting and replacement if deemed necessary.

At the appropriate time, please contact Whitaker Laboratory, Inc. for budgetary and scheduling purposes for the performance of the above required inspection and testing services.

We further offer concrete, asphalt, masonry, and structural steel inspections and testing. Whitaker Laboratory, Inc. also performs observational services for mold mitigation, including observation of installation of vapor retarding membranes, subdrains, overall site drainage, and regularly scheduled observations after construction of site and landscape drainage, and monitoring of humidity and moisture in slabs and basement walls.

XIII. QUALIFICATIONS OF REPORT

Any recommendations or opinions offered in this report are based on our interpretation of the data obtained from this investigation. It should be noted that underlying subsurface and soil conditions can, and do, vary considerably within short lateral distances. Regardless of the thoroughness of any subsurface investigation, it is possible that conditions may be revealed between boring locations that are different from those found by our borings and used for our analysis. For this reason, we recommend that the site preparation and foundation construction for this project be monitored closely. If deviations of the soil conditions from those presented in this report appear, we will be glad to furnish any additional analyses and recommendations that may be required.

This report was made to investigate subsurface properties of the site and is not intended to serve as a wetlands survey, toxic mold assessment, or environmental site assessment. No effort has been made to define, delineate, or designate any area as wetlands or an area of environmental concern or contamination. Any references to low areas, poorly drained areas, etc. are related to geotechnical applications. Any recommendations regarding drainage and earthwork are made on the basis that such work can be permitted and performed in accordance with the current laws pertaining to wetlands, storm water runoff, and environmental contamination.

This report does not attempt to define or represent any FEMA, or otherwise designated, flood, erosion, scour, or other hazardous zones; nor does it presume to reflect that governmental or other authorities will grant approval of the project and issue appropriate permits.

WARRANT: WHITAKER LABORATORY, INC. and its professional engineers strive to perform all services in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering profession practicing in the same locality and under similar conditions. No other warranty or representation, expressed or implied, is included or intended in this agreement, in any report, opinion, document, or otherwise.

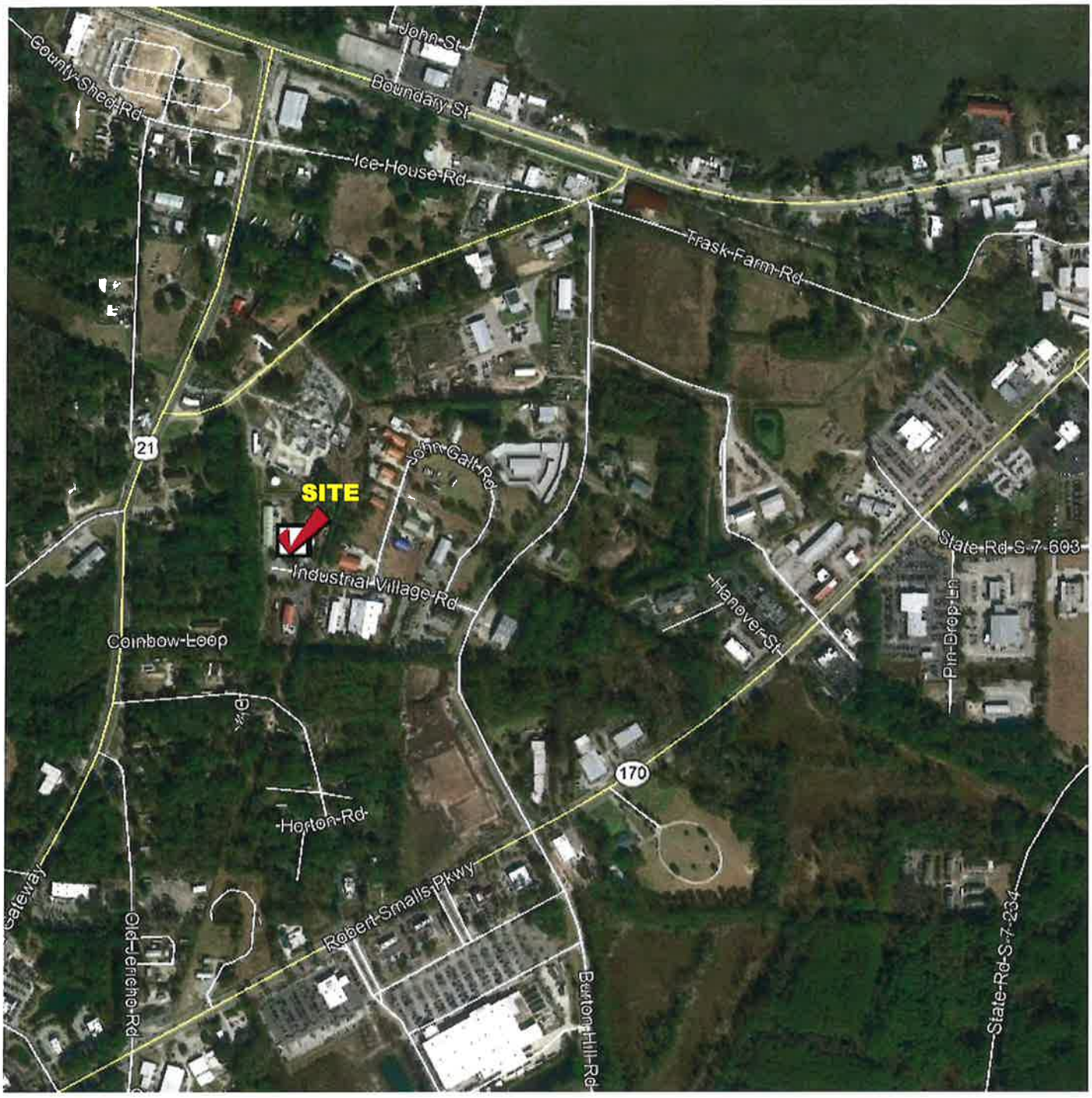
We carry commercial general liability insurance, including completed operations, and professional liability insurance in aggregate amounts deemed adequate, and we comply with the statutory requirements for workmen's compensation insurance. Accordingly, by accepting and relying on the contents of this report, the liability of WHITAKER LABORATORY, INC. and its professional engineers, to the client, owner, or any other party, for any loss or damage, resulting from any cause, including professional acts, errors, omissions, negligence, toxic mold and other environmental claims, breach of warranty or breach of contract, shall not exceed the total compensation received by us for services related to this project; and client will defend, settle, and discharge any claims or allegations of liability for same against us by others. If client desires higher monetary limits of our liability, we will be pleased to discuss such higher limits and the impact on liability and fees.

In the event the client makes a claim against us, at law or otherwise, for any alleged act, error, omission, negligence, breach of warranty or breach of contract, arising from the performance of our services, it is mutually agreed that initially, the client and Whitaker Laboratory, Inc. will attempt to resolve such dispute through direct negotiations between the appropriate representatives of each party. Secondly, if such negotiations are not fully successful, the parties agree to resolve any remaining disputes by formal nonbinding arbitration mediation in accordance with the rules and procedures to be agreed upon by the parties. Mediation is a pre-condition to litigation. The exclusive venue for any disputes relating to Whitaker Laboratory's service shall be in Chatham County, GA. Furthermore, if the client fails to prove such claim, then client shall pay all costs accrued by us in defending ourselves.

TITLE: The ownership of opinions, technical ideas, methods and means, drawings, calculations, and other data developed by us during the course of preparing proposals or rendering engineering services remains exclusively with us. It is a condition of this report or proposal that the client agrees not to use the opinions, technical ideas, methods and means, drawings, calculations or any other data for projects or locations, other than those specifically addressed in the report, and that no one other than the client may use this report, without the written permission of WHITAKER LABORATORY, INC.

APPENDIX I

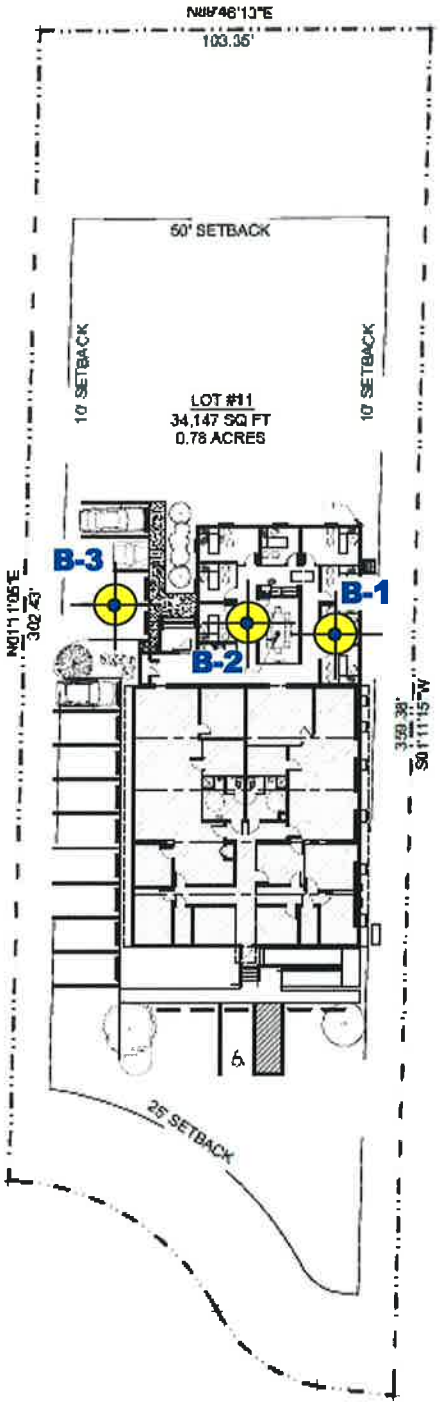
SITE VICINITY & BORING LOCATION PLANS



Site Vicinity Map

Proposed Beaufort County DNA Laboratory Addition
111 Industrial Village Road
Beaufort, South Carolina

N



Boring Location Plan

Proposed Beaufort County DNA Laboratory Addition
111 Industrial Village Road
Beaufort, South Carolina

N

ALL BORING LOCATIONS ARE APPROXIMATE, & ARE BASED ONLY ON FIELD ESTIMATES.

APPENDIX II

BORING RECORDS

Client: Beaufort Design Build LLC

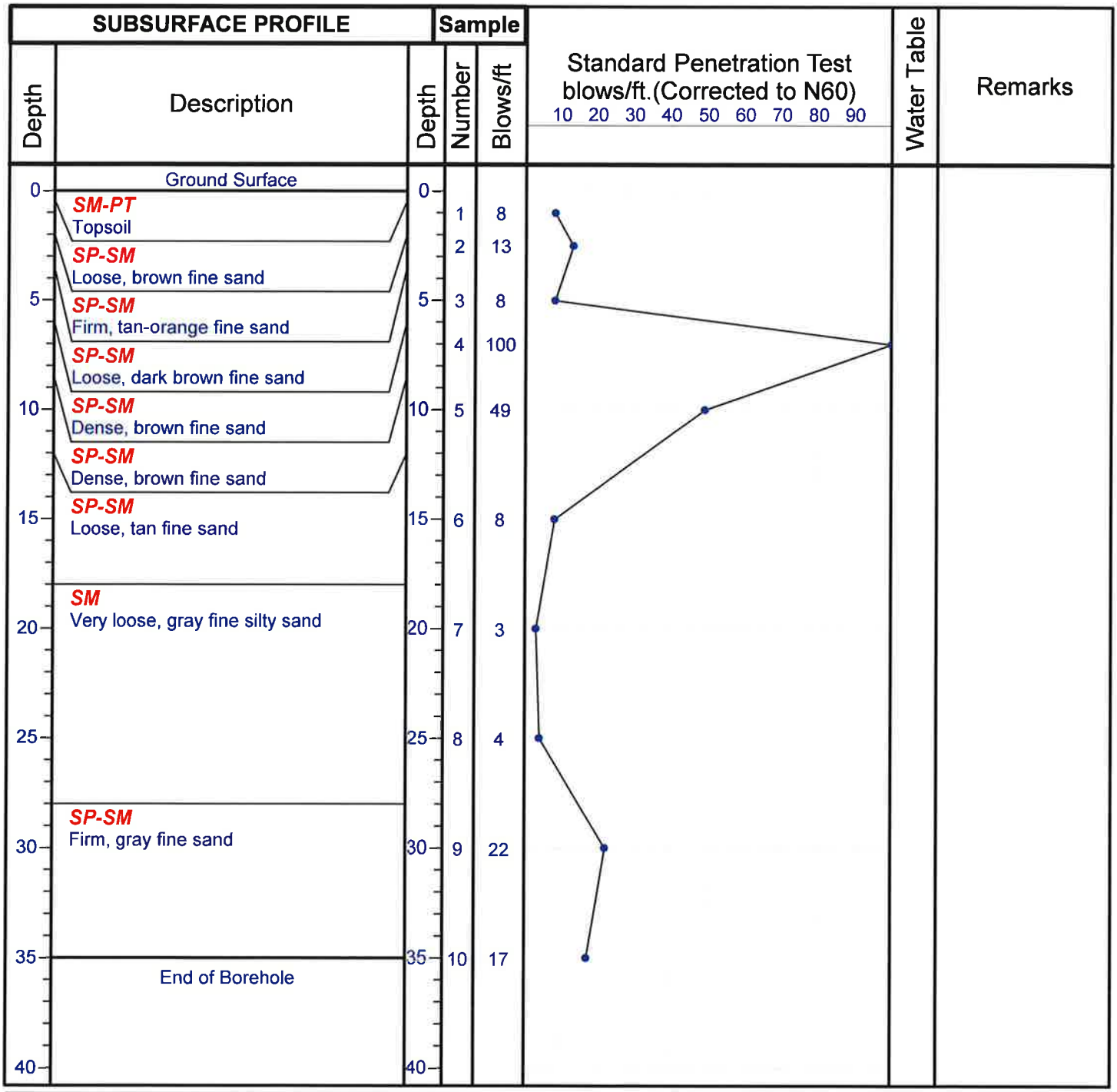
Boring No. B-1

Project: Beaufort County DNA Laboratory Addition

Date: 4/21/20

Location: 111 Industrial Village Road - Beaufort, SC

Engineer: Follo



Drilled By: Wilkerson (B48)

Drill Method: H. S. Auger

Drill Date: 4/21/20

WHITAKER LABORATORY, INC.
2500 Tremont Road
Savannah, GA 31405

Hole Size: 6.5"

Datum:

Sheet: 1 of 1

WHITAKER LABORATORY, INC.
P.O. BOX 7078
SAVANNAH, GEORGIA 31418

Project Name Beaufort County DNA Laboratory Addition **Date** 4/21/2020

Project Location 111 Industrial Village Road, Beaufort, SC

Boring Number ______ **Field Engineer** Ron Wilkerson (B-48)

Ground Surface Elevation ______ **Ground Water Elevation** ______

Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-2			0	8"	Fine Brown Sand with Organics	
			8"	2'	Loose Fine Orange/Tan Sand (SP-SM)	-1' –6
			2'	4'	Loose Fine Tan Sand (SP-SM)	-3' – 6
					Groundwater Encountered at 3 feet	
B-3			0	6"	Fine Brown Sand with Organics	
			6"	2.5'	Loose Fine Brown Sand (SP-SM)	-1' – 6
			2.5'	4'	Loose Fine Tan Sand (SP-SM)	-3' – 9
					Groundwater Encountered at 3 feet	

APPENDIX III

SEISMIC PARAMETERS

LIQUEFACTION ANALYSIS

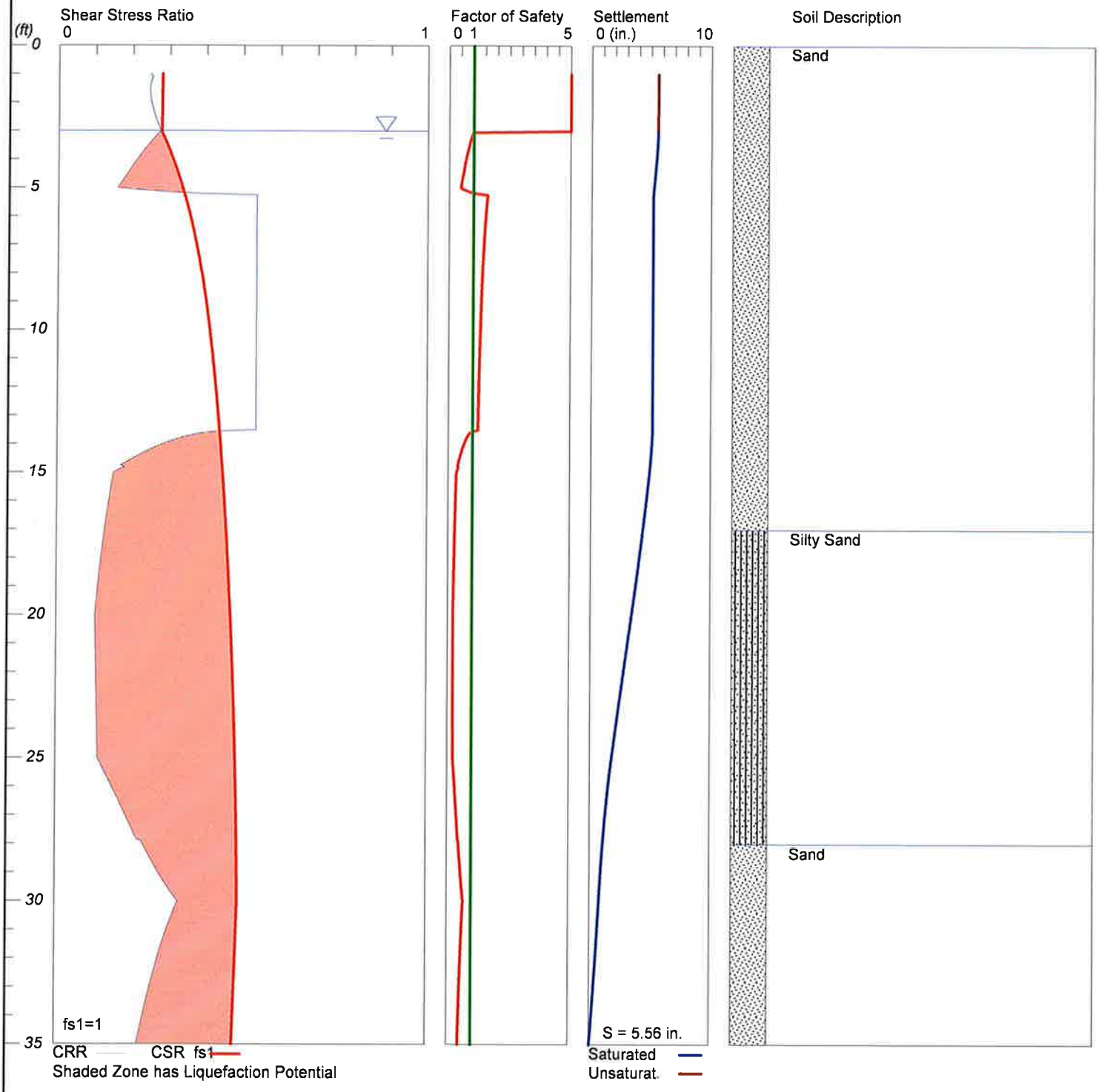
Laboratory Addition

Hole No.=CPT-1 Water Depth=3 ft

Ground Improvement of Fill=1 ft

Magnitude=7.3

Acceleration=0.43g



OSHPD

Beaufort County Laboratory Addition, Beaufort, SC

Latitude, Longitude: 32.4351, -80.7211

Date	4/24/2020, 8:09:37 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.61	MCE_R ground motion. (for 0.2 second period)
S_1	0.194	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.801	Site-modified spectral acceleration value
S_{M1}	0.43	Site-modified spectral acceleration value
S_{DS}	0.534	Numeric seismic design value at 0.2 second SA
S_{D1}	0.286	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.312	Site amplification factor at 0.2 second
F_v	2.211	Site amplification factor at 1.0 second
PGA	0.352	MCE_G peak ground acceleration
F_{PGA}	1.248	Site amplification factor at PGA
PGA_M	0.439	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	0.61	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.672	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.194	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.211	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.908	Mapped value of the risk coefficient at short periods
C_{R1}	0.923	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

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APPENDIX IV

IMPORTANT GENERAL NOTES

GENERAL NOTES

The "standard" penetration resistance is an indication of the density of cohesion less soils and of the strength of cohesive soils. The "standard" penetration test is measured with a 1.4 inch I.D., 2 inch O.D., sampler driven one (1) foot with a 140 pound hammer falling 30 inches.

RELATIVE DENSITY OF SOIL THAT IS PRIMARILY SAND

Number of Blows	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 20	Firm
21 - 30	Very firm
31 - 50	Dense
Over 51	Very dense

CONSISTENCY OF SOIL THAT IS PRIMARILY SILT OR CLAY

Number of Blows	Consistency
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
Over 31	Hard

While individual test boring records are considered to be representative of subsurface conditions at the respective boring locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

The subsoil stratification shown on these profiles is not warranted but is estimated based on accepted soil engineering principles and practices and reasonable engineering judgment.

Unless notified, samples will be disposed of after 60 days.

GROUP

MAJOR DIVISIONS	SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS		
More than 50% retained on No. 200 Sieve*		
GRAVELS		
50% or more of coarse fraction retained on No. 4 sieve		
CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silty mixtures
	GC	Clayey gravels, gravel sand clay mixtures
SANDS		
More than 50% of coarse fraction passes No. 4 sieve		
CLEAN SANDS	SW	Well graded sand and gravelly sands, little or no fines
	SP	Poor graded sands and gravelly sands, little or no fines
SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand clay mixtures
FINE GRAINED SOILS		
50% or more passes No. 200 Sieve*		
SILTS AND CLAYS		
Liquid Limit 50% or less		
	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS		
Liquid Limit greater than 50%		
	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS	PT	Peat, muck and other highly organic soils

*Based on the material passing the 3 in. (75 mm) sieve.