Michael Baker INTERNATIONAL

We Make a Difference

November 6, 2019

William P. Cotter, C.M., Chief Operation Officer
Hancock County Port and Harbor Commission
14054 Fred and Al Key Road
Kiln, MS 39556

Re: **Proposed 100,000 SF Hangar**
Stennis International Airport
Work Authorization #9

Dear Mr. Cotter,

The elements of work associated with Work Authorization #9 have been completed and are attached for your used. The attachments include the following:

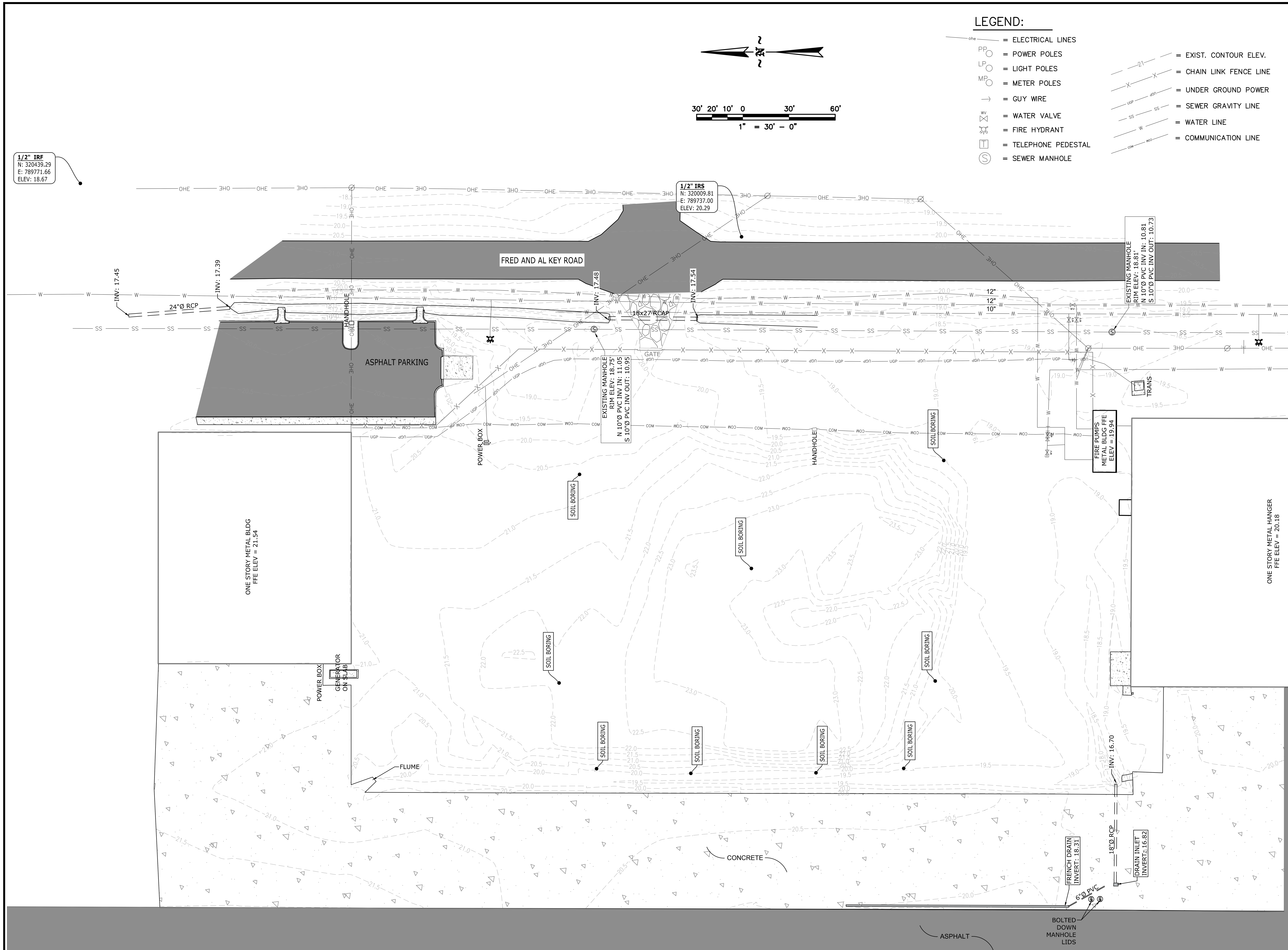
1. Topographic survey of the proposed hangar site.
2. Geotechnical Exploration and Evaluation of the proposed site which includes information on the existing site geology, and recommendations for the construction of the proposed hangar, asphalt parking area, and airfield pavements, and
3. Site photographs taken during geotechnical explorations.

Should you have any questions or require any additional information, please do not hesitate to contact me at (228) 818-2839.

Respectfully,

Jeffrey D. May, PE, PMP
Project Manager

Enclosures



HANCOCK MISSISSIPPI PORT • AIR • SPACE

STENNIS INTERNATIONAL AIRPORT
HANCOCK COUNTY, MISSISSIPPI

Michael Baker INTERNATIONAL
2113 Government Street; Suite D-3
Ocean Springs, Mississippi
Phone: (228) 818-2839 • MBAKERINTL.com

Designer:	DJM
Technician:	DJM
Checked by:	JDM
Project Number:	174739

Notes:

REVISIONS

No.	Description	Date	By

Project Name:
STENNIS INTERNATIONAL AIRPORT
100,000 SQ. FT. HANGAR

Drawing Name:
TOPOGRAPHIC SURVEY

Project Number: 174739	
Date: OCTOBER, 2019	Sheet Number: 1 of 1
Scale: N.T.S.	Drawing Number: TOPO-1

REPORT FOR SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION FOR

Northeast Hanger at the Stennis International Airport
Kiln, Mississippi
BECC Project Number: 219039

GEOTECHNICAL, MATERIALS, AND ENVIRONMENTAL ENGINEERS

BECC
Geotechnical, Materials, and Environmental Engineers

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Vice President

November 5, 2019

Mr. Jeff D. May PE, PMP
Associate Vice President
Operations Manager
Michael Baker International
2113 Government Street, Suite D-3
Ocean Springs, Mississippi 39564

Subject: Report of Subsurface Exploration and Geotechnical Engineering Evaluation for Northeast Hangar
Stennis International Airport
Kiln, Mississippi
BECC Project Number: 219039

Dear Mr. May:

BECC has completed the authorized Subsurface Exploration and Geotechnical Engineering Evaluation for the subject project. This work was conducted in accordance with our proposal number Q1-19098 dated June 25, 2019.

The purpose of BECC's work was to perform a subsurface exploration and geotechnical engineering evaluation for the design and construction of the Northeast Airport Hangar at the Stennis International Airport in Kiln, Mississippi. This report outlines the exploration procedures used and exhibits the data obtained. The findings provided herein are for the exclusive use of the proposed improvements. Further geotechnical exploration may be necessary for other structures planned on or near the subject site.

BECC sincerely appreciates the opportunity to have worked with you on this project. If you have any questions regarding this report, please do not hesitate to contact us.

Respectfully submitted,
BECC, Inc.

Brandon Jenkins
Project Engineer

Richard A. Rhinehart, P.E.
Senior Vice President

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1.0 EXECUTIVE SUMMARY

The project will consist of the construction of an additional hangar for the Stennis International Airport in Kiln, Mississippi. The following is a summary of the exploration including our findings, conclusion and recommendations. Refer to subsequent sections within the text for detailed discussions of these topics.

- Nine (9) soil test borings (designated B-1 through B-9) were drilled to depths of 10 to 40 feet below the existing ground surface. The upper 2.5 feet of subsurface soils typically consisted of loose to medium dense silty sand. This sand was underlain by soft to very hard sandy clay and highly plastic clays to a depth of about 25 feet. The lower soils typically consisted of medium dense to dense silty sands and very stiff to hard sandy clays. Groundwater was encountered between 13.5 and 18 feet below the ground surface.

- Site preparation will require stripping of surface materials from building and paving areas. This should include existing building elements (foundations, slabs, pipes, etc.). Prior to adding new fill soils and for soils at grade, We recommend compaction criteria of 100% of the Modified Proctor maximum dry density (*ASTM D1557*) for soil within 8 inches of final subgrade. Soil below 8 inches should be compacted to 95% of the Modified Proctor. Soil should be compacted within a moisture content range of 2% of the soil's optimum moisture content as determined by the Modified Proctor.

- Engineered fills should be composed of soils with a liquid limit less than 50 and a plasticity index of 25 or less, and have a maximum dry density of greater than 100 pcf. Fill within 12 " of finished subgrade should be compacted to 100 % of the Modified Proctor maximum dry density. Soil below 12" of finished subgrade should be compacted to 95% of the Modified Proctor maximum dry density.

- For the new hanger structure, we anticipate the lightly loaded foundations (50 kips or less) can be supported on compacted structural soil fill or recompacted on-site soils. We recommend a maximum net allowable bearing pressure of 2,000 psf for foundation design.

- In our opinion, auger cast piles can be used as the foundation system to support heavy loaded columns (excess of 50 kips). A 16" diameter installed to 40 feet will have an allowable axial capacity of 85 kips. A 18" diameter installed to 40 feet will have an allowable axial capacity of 100 kips. Driven concrete, H-piles and pipe pile alternatives are presented.

- Floor slabs can be soil supported and designed using a modulus of subgrade reaction of 150 pci. In addition, we suggest that all ground supported slabs be founded on a minimum of 4 inches of open graded stone (#57) or 6 inches of dense grade stone (#825 or #610).

- Several options for paving of the parking lots, roads, and airplane aprons are presented in the report.

NOTE: *It should be noted that this executive summary presents selected elements of our findings and recommendations* ***only.*** *It* ***does not*** *present crucial details needed for the proper application of our findings and recommendations. Our findings, recommendations, and application are related* ***only through the full report****, and are best evaluated with the active participation of the geotechnical engineer who developed them.*

2.0 SCOPE OF WORK

The purpose of the geotechnical exploration was to evaluate general subsurface conditions within the proposed site, and to gather and present data relative to site preparation and foundation design for the proposed Airport Hangar at the Stennis International Airport in Kiln, Mississippi. This work was conducted in accordance our proposal number Q1-19098 dated June 25, 2019. The following items were included as part of our scope of work:

1. Five (5) soil test borings drilled to depths of 40 feet in the proposed hanger location and four (4) soil test borings drilled to depths of 10 feet in the proposed paving areas.

2. Laboratory tests to determine engineering properties of the on-site soils.

3. A geotechnical engineering report is to include the following items:

    - A site plan illustrating the boring locations
    - Boring logs describing the subsurface and groundwater conditions encountered
    - Description of field and laboratory procedures
    - Discussion of site geology
    - Results of the laboratory tests performed
    - General earthwork recommendations
    - Recommendations for foundation design
    - Pavement design parameters and recommended buildup

NOTE: *Our scope of work did not include evaluation of surface or subsurface for environmental contaminants or any other environmental conditions.*

3.0 PROJECT DESCRIPTION

We understand that the project will consist of the design of a new hangar located northeast of the main runway at the Stennis International Airport in Kiln, Mississippi. The hangar will be west of the Hancock County Port and Harbor building on Fred and Al Key Road. The hangar will be approximately 200 feet by 500 feet (100,000 sf) and will have an adjacent concrete apron. Structural loads and site grades are not currently available. We anticipate the proposed hangar will have maximum column loads of 150 kips and maximum wall loads of 4 kips per linear foot. Site grading is expected to be minimum with maximum cut and fills of 3 feet are less from existing site grades.

4.0 SITE GEOLOGY

According to the Mississippi Geological Survey, the site is in the Alluvium Coastal Deposits, part of the Quaternary System & Holocene Age Systems. Published geologic data indicates that the site is underlain by coastal deposits of the Prairie geologic formation (see Geology Map in Appendix). The Prairie formation is alluvial (soils deposited by water) in origin. The soils typically consist of clayey fine sands and moderately silty, fine to very fine sands. The formation is approximately 15 to 40 feet thick. The deposits are varicolored fine to coarse quartz sand containing clay lenses and gravel in places. In areas of the Valley and Ridge geologic province gravel composed of angular to subrounded chert, quartz, and quartzite pebbles are found.

4.1 SEISMIC DESIGN PARAMETERS

The subsurface conditions at the site consist of very soft to very hard clays. Based on the borings performed at the site and our knowledge of the site geology, we recommend a seismic site class definition of "E" be used in design calculations (*International Building Code, 2015*).

Site Coefficient values for spectral response acceleration taken from the International Building Code and the U.S. Seismic Design Maps (USGS) are given below.

Site Location: 30.37850632 Latitude -89.45076467 Longitude

S_S	S_1	S_{MS}	S_{M1}	S_{DS}	S_{D1}
0.104g	0.056g	0.259g	0.197g	0.173g	0.132g

5.0 SUBSURFACE EXPLORATION

BECC performed nine soil test borings (designated B-1 through B-9) on October 1 and 2, 2019. The borings were located in the field by a BECC based on a proposed site location plan provided by Michael Baker International. The boring locations were determined by BECC's engineer by taping distances and estimating right angles from existing site features. Therefore, the boring locations as shown on the "Boring Location Map" in the Appendix and should be considered approximate.

5.1 SOIL BORINGS

Soil drilling and sampling operations were conducted according to ASTM D 1586. The test borings were advanced by mechanically twisting continuous steel auger flights. Within the test borings, soil samples were obtained with a standard 1.4 inch I.D., 2 inch O.D. split spoon sampler. The sampler was first seated 6 inches to penetrate any loose cuttings and was then driven an additional 12 inches with blows of a 140 pound hammer falling 30 inches. The number of blows (N) required to drive the sampler the final 12 inches of penetration is the "Standard Penetration Resistance". The penetration resistance, when properly evaluated, is an index of the soil strength.

Representative portions of the samples obtained were then sealed in air-tight containers and transported to our laboratory. In the laboratory, the samples were classified by a geotechnical engineer. The soil description and the penetration resistance at the specific boring locations are indicated on the Logs of Boring in the Appendix. The samples were transported to our laboratory to perform additional tests. All the samples will be stored on our premises for 60 days from submittal of this report and then discarded unless additional storage time is requested.

6.0 LABORATORY TESTS

In addition to the field exploration, a limited laboratory testing program was conducted to ascertain additional engineering characteristics of the on-site soils. To supplement the visual classification of the soil samples, the following tests were performed. The results are presented on the "Summary of Laboratory Tests" sheet located in the Appendix.

6.1 DESCRIPTION OF SOILS (*VISUAL-MANUAL PROCEDURE*) (*ASTM D 2488*)

The soil samples were visually examined by our engineer and soil descriptions were provided. Representative samples were then selected and tested to determine soil classification as described above. This data was used to correlate our visual descriptions with the Unified Soil Classification.

6.2 NATURAL MOISTURE CONTENT (*ASTM D 2216*)

Natural moisture contents (*M%*) were determined on selected samples. The natural moisture content is the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of solid particles. The test results are shown in the "Log of Boring" sheets in the Appendix.

6.3 PERCENT PASSING #200 SIEVE (*ASTM D 1140*)

Wash #200 tests were performed on the selected samples to determine the amount of "fines" in the represented soil. "Fines" are defined as particles with a grain size equal to or less than a diameter of 0.075 millimeters. These particles are typically found in silts, clays, and silty clays, as well as silty or clayey sands.

6.4 ATTERBERG LIMIT TESTS (*ASTM D 4318*)

Atterberg Limit tests were performed on the selected samples to determine how the characteristics change upon variation in moisture stage. The limits are bracketed by the Liquid Limit (*LL*) and the Plastic Limit (*PL*). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid. The plastic Limit is the moisture content at which the soil is between the "plastic" and semi-solid stage. The soil's Plasticity Index (*PI*) is the difference between the Liquid Limit and the Plastic Limit. The PI is often used as the indicator of the soil's expansive tendencies. The greater the range between the LL and the PL, the more potentially expansive the soil can be.

7.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered by the test borings are shown on the "Log of Boring" sheets in the Appendix. The general subsurface conditions encountered, and their pertinent characteristics are described in the following paragraphs. The stratification lines indicated on the logs of boring represent approximate boundaries between soil types. However, the actual transition may be gradual. Conditions represented by the test borings should be considered applicable only at the test boring locations on the dates shown, and it should be assumed that the conditions may be different at other locations at other times.

7.1 SURFACE MATERIALS

The surface materials at the site consisted of approximately 1 inch of topsoil.

7.2 UPPER SOILS (0 TO 25 FEET BELOW THE SURFACE)

The upper 2.5 feet of subsurface soils typically consisted of loose to medium dense silty sand. This sand was underlain by soft to very hard sandy clay and highly plastic clays. Standard Penetration Test Resistances (N-Values) within the upper soils ranged from 0 to 27 blows per foot (bpf).

Laboratory tests were performed on select samples of the residual soils. Natural moisture contents ranged from 13.0% to 78.9%. Four (4*)* Atterberg Limit tests were performed. The tests indicated Liquid Limits (*LL*) of 16 to 54 and plasticity indexes (*PI*) of 14 to 20 with 18.6% to 93.4% of material passing a #200 sieve. Based on laboratory tests performed, the upper soils were classified as low plasticity clays (CL) and high plasticity clays (CH). See the “Geotechnical Lab Summary” in the Appendix for more details.

7.3 LOWER SOILS (25 TO 40 FEET BELOW THE SURFACE)

The lower soils were composed of very loose to medium dense silty to clayey sands and stiff to very hard sandy to highly plastic clays. N-values within the lower soils ranged from 8 to 58 bpf. The soils were classified as silty sands (SM).

7.4 GROUNDWATER

Groundwater encountered between 13.5 and 18 feet below the ground surface in borings B-1 through B-5. The presence or absence of water at the boring locations at the time of drilling does not necessarily mean that groundwater will or will not be present at other times. Groundwater levels fluctuate seasonally and are related to the amount of rainfall received in months prior to the observations.

8.0 SITE PREPARATION AND GRADING CONSIDERATIONS

A review of the final grading plans should be conducted by BECC and subsequently some of the comments and recommendations included in this report may require modifications.

8.1 EXISTING STRUCTURES

All existing structures (including above and below ground construction) within the areas to be developed should be removed. Removal should include all vegetation, topsoil, underground pipes and lines, etc., that might interfere with construction. If abandoned underground utilities are to be removed prior to initiation of construction, provisions should be made in the construction specifications and budget to restore the subgrade to a stable condition. Restoration should include backfilling and compaction of the excavated areas.

8.2 CONDITIONING OF SUBGRADE SOILS

In the areas which are at grade or are to receive additional fill, we recommend that the upper 8 inches of existing material be scarified, moisture-conditioned and recompacted. We recommend compaction criteria of 100% of the Modified Proctor maximum dry density (*ASTM D1557*) for soil within 8 inches of final subgrade. Soil below 8 inches should be compacted to 95% of the Modified Proctor. Soil should be compacted within a moisture content range of 2% of the soil's optimum moisture content as determined by the Modified Proctor.

8.3 CONTROLLED STRUCTURAL FILL

We recommend that the engineered fill at the site be free of organics and debris, and rocks greater than three inches in size. Structural fills should be composed of soils with a liquid limit less than 50 and a plasticity index of 25 or less, and have a maximum dry density of greater than 100 pcf. We recommend structural fill be compacted as follows:

Top 12 inches of Finished Subgrade	**100% Modified Proctor (ASTM D 1557)**
Below 12 inches of Finished Subgrade	**95% Modified Proctor (ASTM D 1557)**

A sufficient number of field density tests should be performed to evaluate the grading contractor's performance during filling. Lift thickness for general fills should be limited to eight inches loose measure. Backfilling in limited access areas such as utility trenches should have a lift thickness limited to six inches loose measure. In the areas of the landfill excavations, the controlled fill materials should be benched into the sides of the landfill material.

We also recommend that structural fill be placed within 2 percent of optimum moisture content. The grading contractor should acknowledge the importance of proper fill moisture conditioning. **We suggest that the project specifications address that both fill compaction and acceptable fill moisture content will be required for the acceptance of structural fills.** It will be particularly important to have a water truck available if filling takes place during the hot, dry summer months.

8.4 BACKFILLING OF UTILITY TRENCHES

Backfilling of storm drain and utility trenches is often accomplished in an uncontrolled manner, leading to subsequent settlement of the fill and cracking of pavements. It is recommended that utility trenches be backfilled with acceptable fill in six inch lifts and compacted with pneumatic-piston tampers to the project requirements. Should seepage occur in utility trenches, it may be necessary to "floor" the trench with open-graded gravel to provide a dry working surface.

8.5 SURFACE DRAINAGE & PROTECTION OF SOILS DURING GRADING

The soils at the site are moisture sensitive and can become easily disturbed causing loss of strength. Proper surface drainage will be very important during grading at the site. If the soils become wet after being exposed it may become necessary to undercut or recondition. On many projects reworking of disturbed soils becomes a point of controversy. We recommend that the specifications for this project provide performance guidelines for protection of exposed soils and correction of disturbed areas.

9.0 FOUNDATION RECOMMENDATIONS

The evaluations stated in the following paragraphs are based on the general data obtained through our exploration and experience with similar structures and subgrade conditions. Detailed column or wall loads were not available to BECC at the time of this report. Additional geotechnical exploration and evaluation may be necessary once final plans and design parameters have been determined.

The recommendations stated in the following sections assumes the recommendations in Section 8.0 are followed. We have developed recommendations for lightly loaded foundations and heavy loaded foundations. We note the recommendations were based on the soil conditions encountered by the 40' deep soil borings which primarily consisted of low consistency sands and clays. It is possible that higher consistency soils are at deeper depths. If so, higher capacity piles could be designed with possible savings in construction costs. BECC could supplement our recommendations if deeper soil borings are drilled at the site.

9.1 SPREAD FOUNDATIONS (LIGHTLY LOADED FOUNDATIONS)

We anticipate the lightly loaded foundations (50 kips or less) can be supported on compacted structural soil fill or recompacted on-site soils. We recommend a maximum net allowable bearing pressure of 2,000 psf for foundation design. This recommendation is based upon the present design concept and the assumption that the site preparation, compaction, etc., will be performed as discussed within this report. We recommend the foundations bear a minimum of 1 foot below the ground surface. We recommend that the soils exposed in the foundation bottoms, be compacted to a minimum of 95% of the Modified Proctor maximum dry density (ASTM D 1557) within 2% of the soil's optimum moisture content.

Based on a maximum column load of 50 kips (5 ft by 5 ft spread footing), we expect total settlement to be one (*1*) inch or less and differential settlements between adjacent columns (40' or less spacing) to be less than ½ inch.

9.3.1 SPREAD FOUNDATION CONSTRUCTION

The following items should be included in the project specification in regard to foundation design and construction.

- We recommend minimum footing dimensions of 18 and 24 inches for continuous strip footings and individual column footings, respectively.

- The footing bearing surface should be observed by a BECC geotechnical engineer or his representative to verify that the soil complies with the above recommendations. During field observations, it may be necessary to lower the bearing elevation in order to reach a suitable bearing stratum. Also, it will be necessary to adjust the footing depth in the event that pockets of soils are found during field observation by the project geotechnical engineer.

- Where it is necessary to extend a footing beyond the planned bearing depth in order to reach a suitable bearing level, the over-excavation should be backfilled with lean concrete or compacted engineered fill or stone and the footing can be constructed at the planned bearing elevation.

- If water is encountered in the footing excavations, extreme care should be exercised to ensure that the foundation subgrade is not disturbed. A thin concrete "mud mat" poured over surfaces should be used to protect foundation excavations from any seepage.

- The base of all satisfactory foundation excavations should be protected against any detrimental change in conditions such as disturbance from rain, frost, or flooding. Surface runoff water should be drained away from the excavation and not be allowed to pond.

- If possible, all footing concrete should be poured during the same day the excavation is made. If this is not possible, then the footing excavation should be adequately protected.

- Backfill adjacent to exterior walls should be composed of clean soil fill meeting the project fill requirements. No debris or rubble should be placed adjacent to the exterior walls. Fill should be compacted immediately after placement to preclude surface water infiltration into the foundation materials. Water must not be allowed to pond above newly constructed foundations because the integrity of the bearing soils could be compromised and building settlement could result.

- Gutters, downspouts, leader pipes, and splash blocks should be used to carry roof drainage away from the structure. Roof runoff should discharge at least three feet away from the structure. Exterior grades should be sloped away from the building to achieve positive drainage of surface water.

9.2 AUGER CAST PILES (HEAVY LOADED FOUNDATIONS)

In our opinion, auger cast piles can be used as the foundation system to support heavy loaded columns (excess of 50 kips). Auger cast piles is a deep foundation system made by rotating a continuous flight hollow stem auger into the ground to a predetermined depth. High strength grout is pumped through the hollow stem as the auger is withdrawn. In general, auger cast pilings systems work by utilizing both wall skin friction and end bearing. The auger cast piles at this site will act primarily as friction piles. Usually a group of auger cast piles are tied together with a pile cap in order to support a column load. A minimum grout compressive strength of 4,000 psi (at 28 days) is recommended. A minimum recommended center of spacing of auger cast piles is three pile diameters.

The following is a summary of the pile capacity for the design depth of 40 feet.

Allowable Capacity of Auger Cast Pile

PILE DIAMETER (in)	PILE DEPTH (ft)	ALLOWABLE COMPRESSIVE CAPACITY (kips)	ALLOWABLE LATERAL CAPACITY (kips)
16	40	85	20
18	40	100	25

Auger cast piles of this diameter installed to this length will have a maximum settlement of 1 inch. The allowable lateral capacity listed above is based on maximum pile head deflection of 1/2 inches. The pile section and associated allowable loads were designed for compressive loading and did not consider uplift loads.

9.2.1 Auger Cast Pile Installation

The installation of the piles should be in accordance with "Auger Cast-In-Place Piles Manual" (2016) published by the Deep Foundations Institute. We recommend one compressive load test be performed at the site to confirm the foundation design and the contractor's ability to install the piles. The load test should be performed in accordance with ASTM D 1143.

Control of the grouting/concreting phase of construction may be the most important aspect of QA/QC for auger cast piles. The obvious objective is that adequate grout or concrete be delivered to the discharge point of the auger at the proper pressure to complete the pile. **Poor grouting/concreting can result in a pile that cannot perform as intended in supporting the structure, including both geotechnical and structural failure.**

The soil conditions at the site contains layers of very soft clays very loose sands. In these soils, the installation of auger cast piles can present problems concerning ground stability due to soft-ground conditions, which can produce necks or structural defects in the pile. Even with oversupply of concrete or grout (which is a costly measure and the piles become less economical), the result is a bulge in the very soft zones that can cause an increase in downdrag loads. Under these conditions, it is difficult to reliably control the volume per unit length of the pile during withdrawal of the auger. **The soft soil conditions will lead to larger grout takes. We estimate grout volume will be on the order of 30% greater than the nominal size of the piles.**

The auger cast pile contractor should have at least 10 years of experience in auger cast pile installation. In general, the simple manual observation and control system described is not considered to provide sufficient control for building projects. These manual observations can be made by the inspector during grouting/concreting as a check and/or backup to the automated systems. The system recommended for this project includes automated monitoring of the auger position; volume of grout/concrete that is delivered; pressure with which it is delivered; and rotation and lifting speed of the auger. Such system should provide the following and be provided by the auger cast contractor:

- the position of the auger tip [monitored automatically by a position sensor];
- the volume of grout [measured by an in-line flowmeter that provides a reliable and accurate measure of the grout/concrete that is delivered in real time];
- the pressure with which the grout/concrete is delivered [monitored using a gauge in the line near the swivel at the top of the auger, or in the auger itself near the tip (latter option is better);
- the rotation of the auger [monitored by a sensor];
- the lifting speed [controlled by the operator based on real time observation of the control parameters noted above, displayed graphically in the cab of the rig, and compared to target values]; and
- the entire operation [recorded as a part of the documentation process].

9.2.2 Post-Construction Integrity Testing

As discussed previously, the most reliable means of achieving consistent QA/QC is automated monitoring and control during construction, with documentation of the installation via these measurements. The use of post-construction integrity testing is best utilized to verify that the installation parameters used for control (i.e., penetration speed, grout or concrete pressures and volumes during auger withdrawal) are appropriate for the site-specific project conditions.
Integrity tests can also be used to further evaluate piles that did not meet drilling or grouting criteria. Coring of the piles can be used to supplement or to provide a visual check of suspected defects detected by integrity testing. The necessary frequency of post-construction integrity testing is left to the judgment of the owner and can vary from project to project.

A frequency of 10% to 20% of production piles subjected to integrity testing is typical. In addition, all preproduction and verification test piles should be tested. When agencies have little experience with auger cast piles, particularly difficult project conditions exist, or project or site conditions give reason to expect problems with pile integrity, integrity testing of more than 20% of production piles may be required. A typical reasonable approach for load-bearing piles is to subject the first 10 to 15 piles to be constructed on a project to integrity tests to establish that the contractor's construction practice at the site is adequate. Thereafter, the frequency of such tests can be set to meet the specified frequency criteria, can be reduced, or even perhaps eliminate further integrity tests if the construction records for the remaining production piles are similar to those of the initial piles that were subjected to integrity tests.

9.3 DRIVEN PILES (HEAVY LOADED FOUNDATIONS

An alternative to auger cast piles are driven piles (precast concrete, steel H-pile, or steel pipe). Driven piles will have more noise and vibrations during pile installation. However, the final cost can be more controlled than auger cast piles, because of the unknown of final grout quantity to build the auger cast piles.

The following recommendations are made regarding pile design and specification:

PRECAST CONCRETE PILES 40 FEET LONG

TYPE PILE	**12" Square Precast Concrete**
PILE TIP	None
DRIVING HAMMER	Energy of 25,000 to 35,000 ft. lbs.
DRIVING CRITERIA	Determine during load test
DESIGN CAPACITY	**Downward: 74 kips maximum** Lateral: 20 kips maximum (1/2" pile deflection; fixed head condition)
TEST PILES	Minimum of one test pile subjected to a full scale load testing per ASTM D 1143.
PILE SPACING	Minimum of 36 inches center to center is recommended
PILE SPLICING	Maximum 2 per pile with full penetration weld or approved splicer for developing the moment capacity of pile.
MONITORING	All pile driving should be monitored by a BECC representative.

STEEL H-PILES 40 FEET LONG

TYPE PILE	**HP 12X53**
PILE TIP	None
DRIVING HAMMER	Energy of 25,000 to 35,000 ft. lbs.
DRIVING CRITERIA	Determine during load test
DESIGN CAPACITY	**Downward: 70 kips maximum** Lateral: 20 kips maximum (1/2” pile deflection; fixed head condition)
TEST PILES	Minimum of one test pile subjected to a full scale load testing per ASTM D 1143.
PILE SPACING	Minimum of 36 inches center to center is recommended
PILE SPLICING	Maximum 2 per pile with full penetration weld or approved splicer for developing the moment capacity of pile.
MONITORING	All pile driving should be monitored by a BECC representative.

STEEL PIPE PILES 40 FEET LONG

TYPE PILE	**12” Diameter with 0.375” thick wall**
PILE TIP	1/2” Steel Plate
PILE FILL	Fill with Concrete 3,000 psi
DRIVING HAMMER	Energy of 25,000 to 35,000 ft. lbs.
DRIVING CRITERIA	Determine during load test
DESIGN CAPACITY	**Downward: 55 kips maximum** Lateral: 20 kips maximum (1/2” pile deflection; fixed head condition)
TEST PILES	Minimum of one test pile subjected to a full scale load testing per ASTM D 1143.
PILE SPACING	Minimum of 36 inches center to center is recommended
PILE SPLICING	Maximum 2 per pile with full penetration weld or approved splicer for developing the moment capacity of pile.
MONITORING	All pile driving should be monitored by a BECC representative.

10.0 FLOOR SLAB CONSIDERATIONS

It is our opinion that the floor slab for the structure can be built on-grade, achieving support from recompacted on-site soils or new controlled engineered fill. A modulus of subgrade reaction (k for a 1 square foot bearing plate) value of 150 pci is recommended for floor slab design. We recommend soils in floor slab areas be compacted to a minimum of 95% of the Modified Proctor maximum dry density (*ASTM D 1557*). Prior to any fill placement or floor slab construction, we recommend that the exposed sub-grade materials be evaluated by a BECC representative. This evaluation may include proofrolling with a triaxle dump truck. Any soft of unstable areas will require undercutting and replacement with compacted engineered fill.

We suggest that all ground supported slabs be founded on a minimum of 4 inches of open graded stone (#57) or 6 inches of dense grade stone (#825 or #610). The granular materials will provide more uniform support, and also to act as a capillary break. We recommend that slab joints and construction be in accordance with the guidelines of the American Concrete Institute (*ACI*) and the Portland Cement Association (*PCA*).

On most projects, there is a significant time lag between initial grading and the time when the contractor is ready to construct the slab-on-grade. Even though the soils may have been placed and compacted adequately during initial grading, exposure to weather, construction traffic, etc., can destroy the integrity of subgrade soils. On many projects, this becomes a point of controversy when remedial work is required for proper slab support. Prior to the construction of concrete slabs, the subgrade should be evaluated by a BECC representative. This evaluation may include proofrolling. We suggest that provisions be included in the project specifications for the contractor to restore the sub-grade soils to an acceptable condition, (as discussed in this report) prior to the construction of slabs. Such restoration may include moisture conditioning of the surficial soils and recompaction to the project requirements.

11.0 AUTOMOBILE PARKING AND DRIVEWAY RECOMMENDATIONS

In areas that will be paved and are not at grade or will be cut, the soils exposed should be scarified, moisture conditioned and compacted to 95% of their Modified Proctor maximum dry density. The rational pavement design method requires a CBR test be performed on the **actual soils** exposed at finished subgrade level.

We understand that new bituminous pavement will be required for automobile parking and driveway areas for the new facility. We have developed pavement recommendations based on a soil CBR value of 6. We recommend a typical **minimum** pavement section (*automobile parking lot*) of:

LIGHT DUTY PAVEMENT SECTION

THICKNESS (in)	MATERIAL
1	403-A: 12.5-mm mixture, ST
2	403-A: 25-mm mixture, ST
6	304-F: MDOT 825B Crushed Stone Base

Pavement areas subject to truck traffic should consist of:

HEAVY DUTY PAVEMENT SECTION

THICKNESS (in)	MATERIAL
2	403-A: 19-mm mixture, ST
3	403-A: 25-mm mixture, ST
6	304-F: MDOT 825B Crushed Stone Base

Note: ST is for Standard Traffic (less than 1 million ESALs) All pavement materials and installation procedures should meet the Mississippi Department of Transportation (*MDOT*) specifications.

11.1 GENERAL PAVEMENT CONSIDERATIONS

Typically during construction, pavement subgrades become disturbed because of traffic and environmental conditions. Prior to construction of pavements, it is essential that the subgrade be restored to a properly compacted condition. The specifications should include notes pertaining to subgrade restoration immediately prior to pavement construction.

12.0 GENERAL PAVEMENT RECOMMENDATIONS

Based on soil classification tests and our experience, we have based our pavement design calculations on a California Bearing Ratio (CBR) value of 6 and a modulus of subgrade reaction of 150 pci. We recommend that additional tests be performed during construction on the actual soils at the finished subgrade level to verify they have at least a CBR of 6.

12.1 AIRCRAFT APRON PAVEMENT DESIGN

Pavement design for the aircraft areas was developed based on the following factors:

1. Minimum CBR of 6 and a modulus of subgrade reaction of 150 pci for subgrade soils
2. 1,200 annual departures
3. 12,500 lbs. gross weight of aircraft with 3 wheel gear configuration

Pavement design was based FAA Advisory Circular 150/5320-6F and FAARFIELD FAA pavement design software.

OPTION 1 (Flexible Design)	**3" Asphalt (P-401) 6" Crushed Aggregate Base (P-209)**
OPTION 2 (Flexible Design)	**3" Asphalt (P-401) 4" Bituminous Base (P-403)**
OPTION 3 (Rigid Design)	**5" Concrete (P-501, 650 psi flexural) 4" Crushed Aggregate Base (P-209)**
OPTION 4 (Rigid Design)	**5" Concrete (P-501, 650 psi flexural) 4" Bituminous Base (P-403)**

All subgrade, base, and pavement construction operations and materials should meet minimum requirements of the Federal Aviation Association (FAA). The applicable sections of the specifications are identified as follows:

TITLE	FAA Specification Section
Soils and Soil Aggregates	P-153
Aggregates and Subbases	P-154
Crushed Aggregate Bases	P-209
Hot Mix Flexible Asphalt Pavement	P-401/P-403
Portland Cement Rigid Concrete Pavement	501

In concrete paving, reinforcing steel is typically not necessary if a liberal joint pattern is used in design, and proper workmanship is conducted. Concrete paving joint spacing and design should follow the requirements in FAA Advisory Circular 150/5320-6F. The recommended maximum joint spacing by the circular for 5 inch thick concrete paving is 12.5 feet. The recommended dowel is 3/4" diameter, 18" long and 12" spacing.

We recommend that pavement subgrades within the top 12" be compacted to a minimum of 100% of the Modified Proctor (ASTM D 1557) maximum dry density within 2% of the soil's optimum moisture content. Soil below 12" should be compacted to a minimum of 95% of the Modified Proctor.

13.0 CONSTRUCTION MONITORING

We strongly recommend that **BECC, Inc.** be retained to provide a comprehensive construction-monitoring program when the project proceeds. This program would assist the owner in determining that the work is being carried out in general conformance with the plans and specifications and help avoid the potential of change orders and cost overruns. Construction monitoring includes testing of construction materials such as compacted fill and concrete. Also included is engineering observation during the site preparation, foundation and wall construction phases of the project. Monitoring/testing during the earthwork and foundation construction phases is particularly important since assumptions (*and recommendations*) have been made based on the soil boring data. Confirmation that actual subsurface conditions are comparable to the assumed conditions is an essential part of the subsurface exploration process.

13.1 SUBGRADE OBSERVATION, PROOFROLLING

The purpose of proofrolling will be to densify the exposed near-surface soils and also to reveal soft pockets of soil that will require remedial measures. Areas that pump or rut during the proofrolling operations should be undercut or reconditioned. The geotechnical engineer can determine the depth and extent of areas that will require undercutting.

13.2 FILL MONITORING

We recommend that in-place density tests should be performed in the field by an engineering technician to evaluate the contractor's performance with regard to meeting the project specifications for fill placement. A commonly used testing frequency is one test per eight inch lift to fill placed per 2,500 square feet of fill area. The engineering technician can assist the grading contractor in soil moisture content evaluation by performing on-site fill moisture content tests.

13.3 FOUNDATION EXCAVATIONS

We recommend that the excavations for foundations be observed and tested by a BECC representative. Such testing is necessary to determine the appropriateness of the bearing level, the adequacy of the bearing materials and the conformity of the foundation to the specification with respect to depth, planned dimensions, cleanliness, etc.

14.0 GENERAL REMARKS/REPORT LIMITATIONS

This report has been prepared for the exclusive use of **Michael Baker International**, for specific application to the subject project. All recommendations contained in this report have been made in accordance with generally accepted soil and foundation engineering practices. No other warranties are implied or expressed. In addition, the analysis and recommendations submitted in this report are based in part upon the data obtained from the soil test borings. The nature and extent of variations between the soil borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

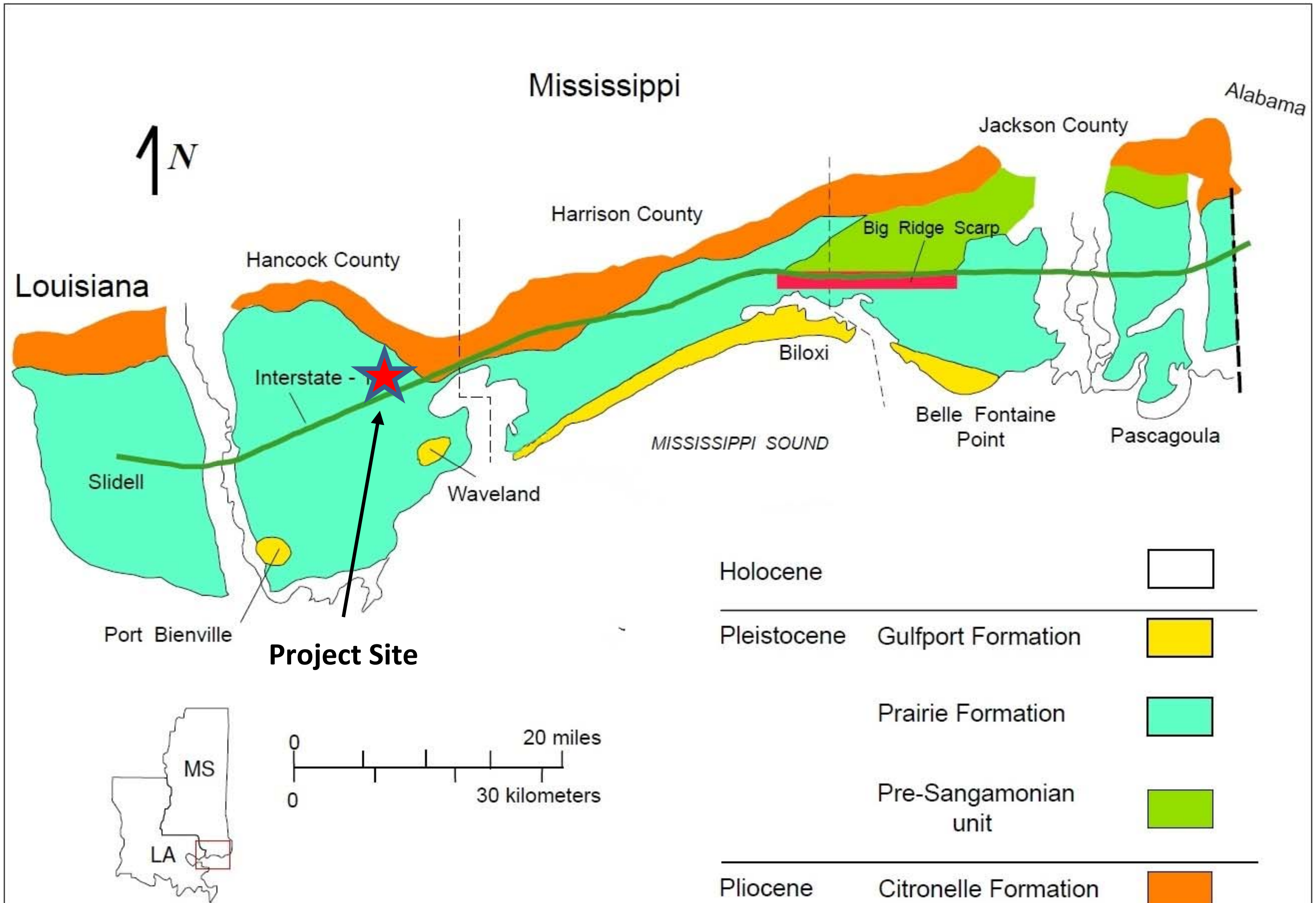
We emphasize that this report was for design purposes only and is not sufficient to prepare an accurate bid. Contractors reviewing this report should acknowledge that the recommendations and discussions herein are for design purposes.

If significant changes are made in the character of the proposed development, a consultation should be arranged to review them with respect to prevailing subsurface conditions. At that time, it may be necessary to submit supplementary recommendations.

It is imperative that the geotechnical engineer be provided the opportunity to review the final plans and specifications to verify that the recommendations in this report are properly interpreted and incorporated in the design. It will be the client's responsibility to furnish the final grading and foundation plans to BECC for the necessary review. If the geotechnical engineer is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

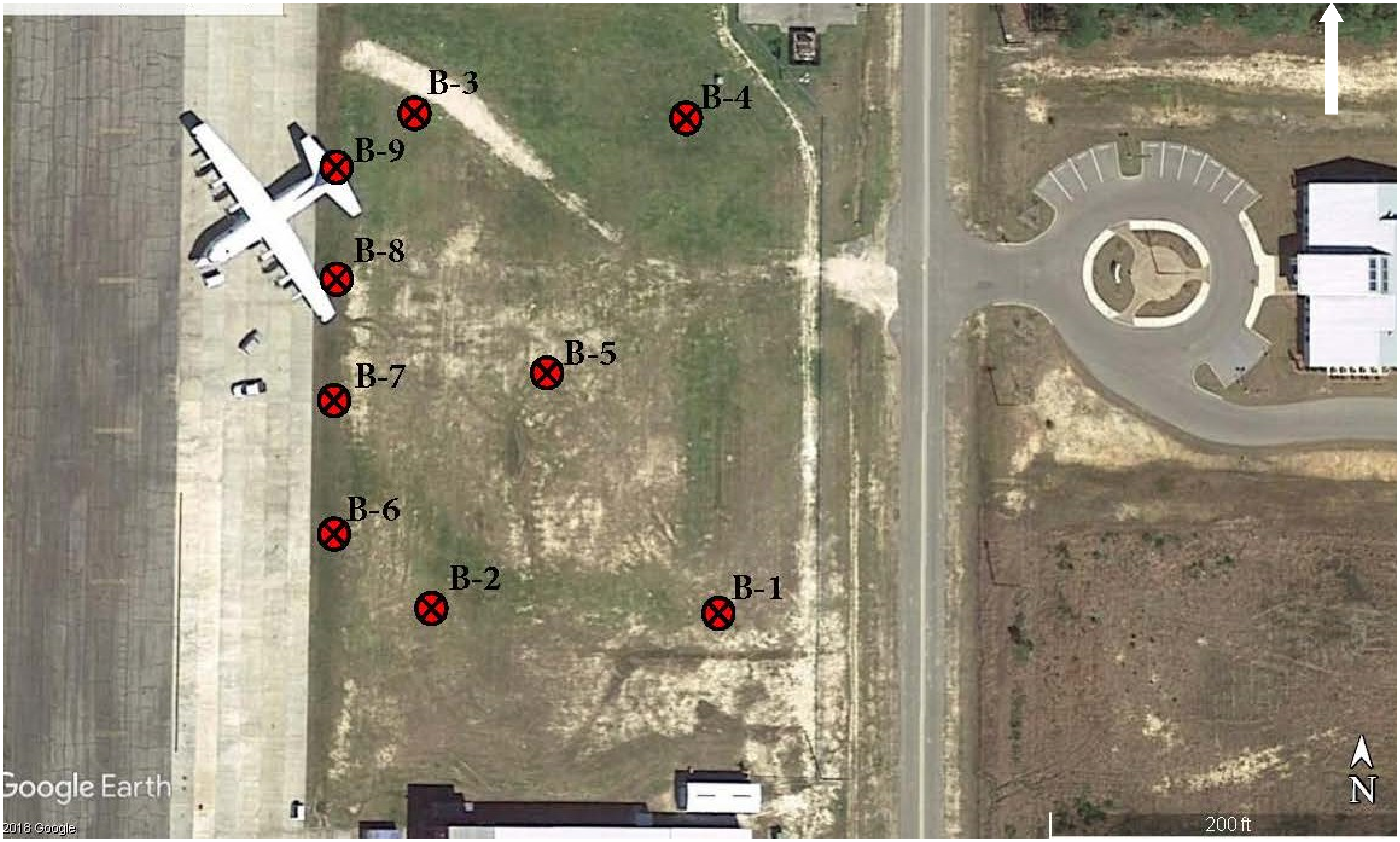
APPENDIX

Geotechnical, Materials, and Environmental Engineers



Map Source: USGS, H. Mississippi Coast: "Stratigraphy and Quaternary Evolution in the Northern Gulf Coastal Plain Framework", 2001

BECC Birmingham Engineering and Construction Consultants, Inc. Geotechnical, Materials, and Environmental Engineers	**Northeast Hanger** **Stennis International Airport** Kiln, Mississippi	**Geology Map**	BECC Project No: 219039	Date: 11/5/2019
		Scale: As Shown	Map Sheet Sheet 1 of 1	



BECC Birmingham Engineering and Construction Consultants, Inc. Geotechnical, Materials, and Environmental Engineers	**Stennis Airport Hangar** Kiln, Mississippi	**Boring Location Map**	BECC Project No: 219039	Date: 10/30/2019
		None	Map Sheet Sheet 1 of 1	

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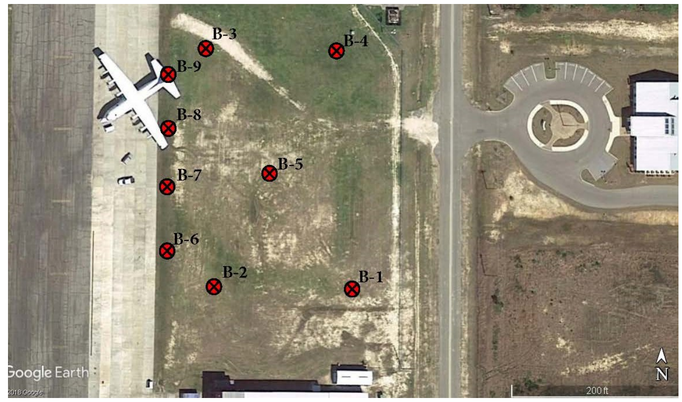

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-1

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers

LOGGED BY B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	SPT N VALUE (20 40 60 80)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0			Medium Dense, Gray Brown Silty SAND	SS 1		8-13-10 (23)		13.0					Approximatley 1" of Topsoil Encountered at Surface
			CL	Very Stiff, Light Gray Brown Sandy CLAY	SS 2		5-7-10 (17)		18.0	32	16	73.7		
	5				SS 3		12-12-15 (27)							
					SS 4		5-6-9 (15)		27.3					
	10			Stiff, Gray CLAY	SS 5		3-4-5 (9)							
	15			Loose, Gray Brown Silty SAND	SS 6		0-4-5 (9)						▽	Groundwater was Encountered at 18.5' at Time of Drilling
	20			Stiff, Light Gray Sandy CLAY	SS 7		3-5-5 (10)		21.1					
	25			Loose to Medium Dense, Gray Brown Silty SAND	SS 8		3-4-5 (9)							
	30			--- trace of wood fragments	SS 9		6-9-7 (16)		78.9					
	35			Stiff, Dark Gray Brown Sandy CLAY	SS 10		5-7-7 (14)							
	40													

Soil boring terminated at 40.0 feet

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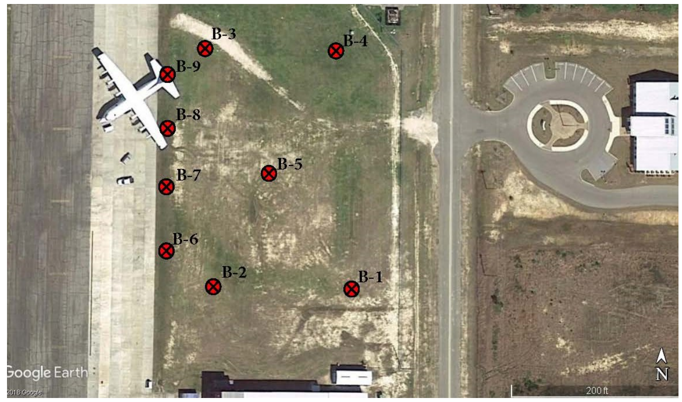

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-2

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers

LOGGED BY B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0			Loose, Orange Gray Brown Silty SAND	SS 1		5-3-4 (7)		15.7					Approximatley 1" of Topsoil Encountered at Surface
				Stiff, Orange Gray Brown Silty CLAY	SS 2		3-4-6 (10)							
	5		CL	Very Stiff to Stiff, Orange Light Gray Sandy CLAY	SS 3		9-11-12 (23)		16.2	46	24	93.4		
					SS 4		5-6-8 (14)							
	10			Soft, Gray Sandy CLAY	SS 5		0-1-2 (3)		25.8				▽	Groundwater was Encountered at 13' at Time of Drilling
	15			Stiff, Gray Brown Sandy CLAY	SS 6		3-4-6 (10)							
	20			Dense, Gray Brown Silty SAND	SS 7		12-13-20 (33)		16.6					
	25			Loose, Gray Brown Silty SAND	SS 8		3-4-4 (8)		26.1					
	30			Dense, Gray Brown Silty SAND --- trace of wood fragments	SS 9		12-11-19 (30)		28.5					
	35				SS 10		13-17-20 (37)							
	40													

Soil boring terminated at 40.0 feet

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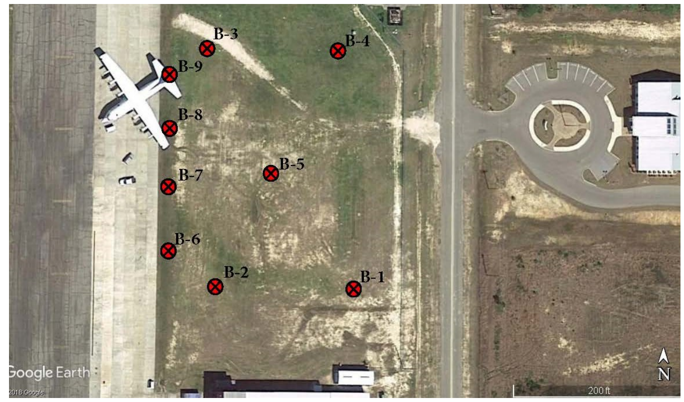

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-3

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers

LOGGED BY B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0			Medium Dense, Gray Brown Silty SAND	SS 1		6-6-5 (11)							Approximatley 1" of Topsoil Encountered at Surface
				Soft, Dark Gray Brown Sandy CLAY	SS 2		2-2-2 (4)		21.9					
	5				SS 3		0-0-3 (3)							
				Stiff, Gray Brown Sandy CLAY	SS 4		4-5-8 (13)		23.6					
	10			Stiff, Gray CLAY	SS 5		3-3-5 (8)							
	15			Very Soft, Gray CLAY	SS 6		0-0-0 (0)		39.2				∇	Groundwater was Encountered at 17.5' at Time of Drilling
	20			Medium Stiff, Gray CLAY	SS 7		0-2-3 (5)							
	25		SM	Medium Dense to Dense, Gray Silty SAND	SS 8		8-11-13 (24)		21.3	16	NP	18.6		
	30				SS 9		3-7-12 (19)							
	35				SS 10		10-17-25 (42)		21.8					
	40													

Soil boring terminated at 40.0 feet

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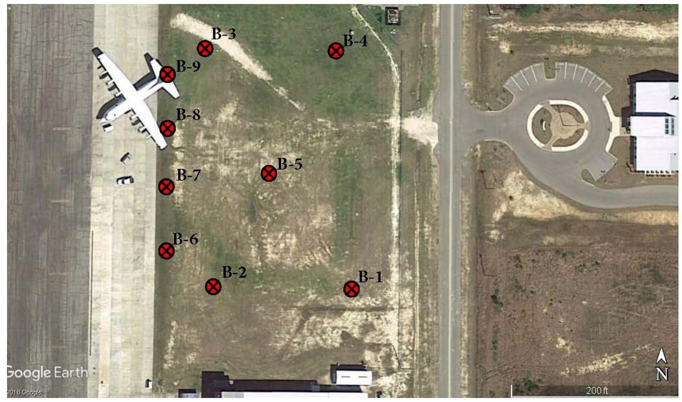

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-4

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers

LOGGED BY B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0			Medium Dense, Gray Brown Very Silty SAND	SS 1		7-7-6 (13)		14.5					Approximatley 1" of Topsoil Encountered at Surface
	5			Medium Stiff, Gray Brown Sandy CLAY	SS 2		3-3-2 (5)							
				Stiff to Very Stiff, Orange Gray Brown Sandy CLAY	SS 3		5-7-8 (15)		25.5					
	10				SS 4		8-9-10 (19)							
	15		CH	Stiff, Gray Highly Plastic CLAY	SS 5		3-3-6 (9)		34.8	54	36	88.6		
	20			Very Soft, Gray Brown Sandy CLAY	SS 6		0-0-0 (0)						▽	Groundwater was Encountered at 17.5' at Time of Drilling
	25				SS 7		0-0-0 (0)		25.4					
	30			Dense, Dark Gray Brown Clayey SAND	SS 8		17-24-25 (49)		18.5					
	35			Medium Dense, Light Gray Silty SAND	SS 9		6-6-10 (16)							
	40			Very Stiff, Gray Blue Highly Plastic CLAY	SS 10		4-8-8 (16)							

Soil boring terminated at 40.0 feet

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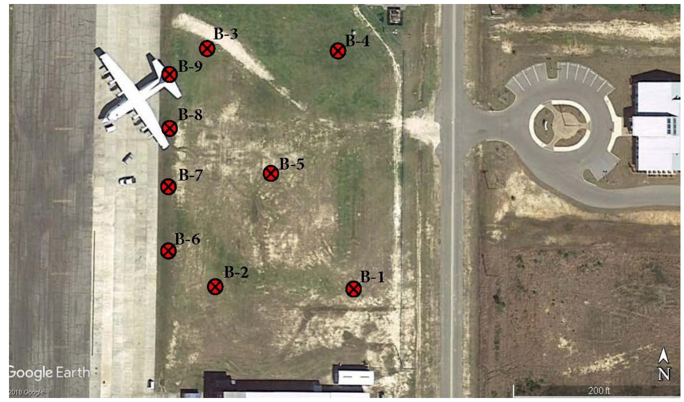


PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-5

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

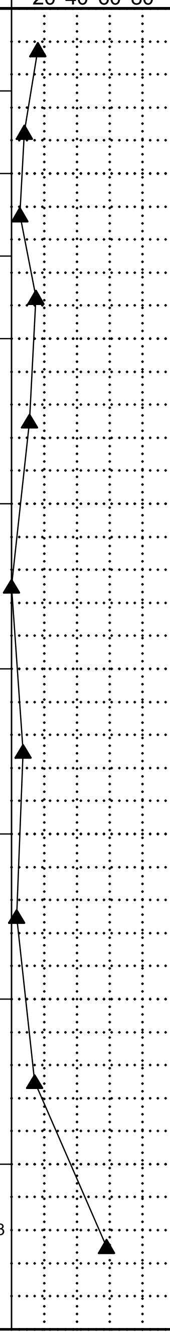
CONTRACTOR South Brothers

LOGGED BY B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0			Medium Dense, Gray Brown Silty SAND	SS 1		8-8-8 (16)						Approximatley 1" of Topsoil Encountered at Surface
				Stiff, Gray Brown Sandy SILT	SS 2		3-3-5 (8)	23.6					
	5			Medium Stiff, Gray Brown Sandy CLAY	SS 3		4-3-2 (5)						
				Very Stiff to Stiff, Light Gray Sandy CLAY	SS 4		5-7-8 (15)	17.9					
	10				SS 5		5-5-6 (11)	26.2					
	15			Very Soft, Gray Brown Silty CLAY	SS 6		2-0-0 (0)					▽	Groundwater was Encountered at 18.5' at Time of Drilling
	20			Loose to Very Loose, Gray Brown Silty SAND	SS 7		1-3-4 (7)	63.0					
	25			--- trace of wood fragments	SS 8		2-0-3 (3)						
	30			Medium Dense, Light Gray SAND	SS 9		5-7-7 (14)						
	35		CL	Very Hard, Light Gray Sandy CLAY	SS 10		19-25-33 (58)	27.5	29	15	60.5		
	40												

▲ SPT N VALUE ▲

20 40 60 80



Soil boring terminated at 40.0 feet

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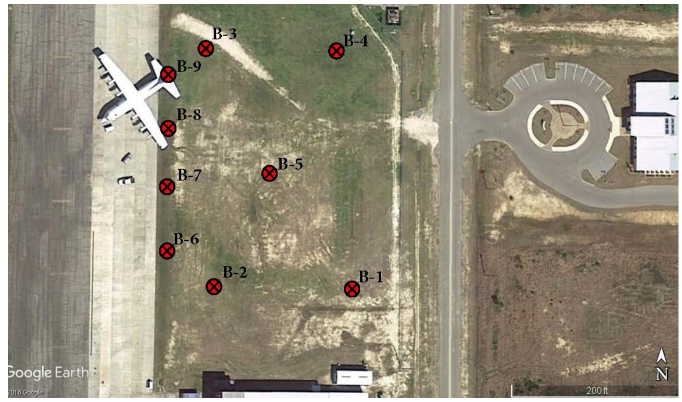

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-6

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers

Drilling **LOGGED BY** B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0.0			Loose, Gray Brown Silty SAND	SS 1		5-5-5 (10)		15.9					Approximatley 1" of Topsoil Encountered at Surface
	2.5			Stiff to Very Stiff, Orange Gray Brown Sandy CLAY	SS 2		5-7-7 (14)							No Groundwater Encountered at Time of Drilling
	5.0				SS 3		13-11-12 (23)		26.4					
	7.5				SS 4		5-7-9 (16)							
	10.0													

Soil boring terminated at 10.0 feet

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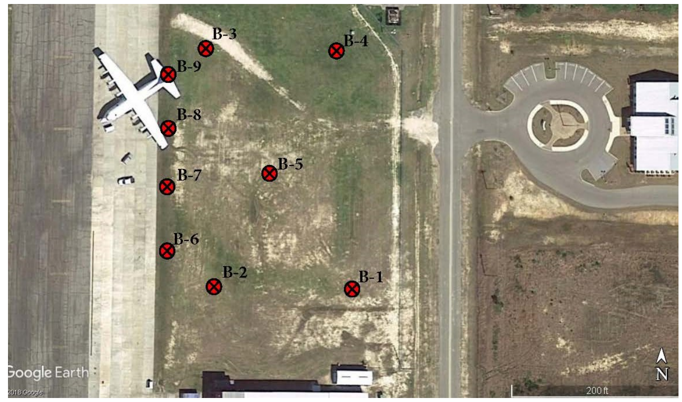

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-7

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers Drilling

LOGGED BY B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0.0			Loose, Orange Gray Brown Silty SAND --- trace of root fibers	SS 1		6-4-4 (8)							Approximatley 1" of Topsoil Encountered at Surface
	2.5			Soft, Gray Brown Sandy CLAY	SS 2		12-2-2 (4)		26.9					No Groundwater Encountered at Time of Drilling
	5.0				SS 3		2-2-1 (3)							
	7.5			Stiff, Orange Gray Brown Sandy CLAY	SS 4		5-4-7 (11)		20.5					
	10.0													

Soil boring terminated at 10.0 feet

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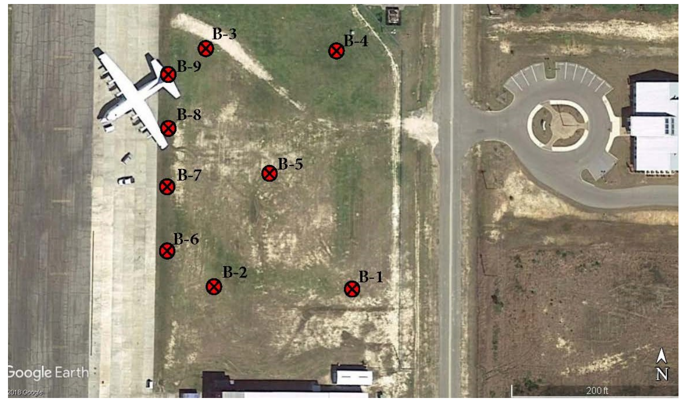

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-8

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers

Drilling **LOGGED BY** B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0.0			Loose, Gray Brown Very Silty SAND --- trace of root fibers	SS 1		3-3-3 (6)		23.6					Approximatley 1" of Topsoil Encountered at Surface
	2.5			Very Soft, Gray Brown Sandy CLAY	SS 2		0-0-0 (0)							No Groundwater Encountered at Time of Drilling
	5.0			Stiff to Very Stiff, Gray Brown Sandy CLAY	SS 3		3-4-7 (11)							
	7.5				SS 4		5-7-9 (16)		27.0					
	10.0													

Soil boring terminated at 10.0 feet

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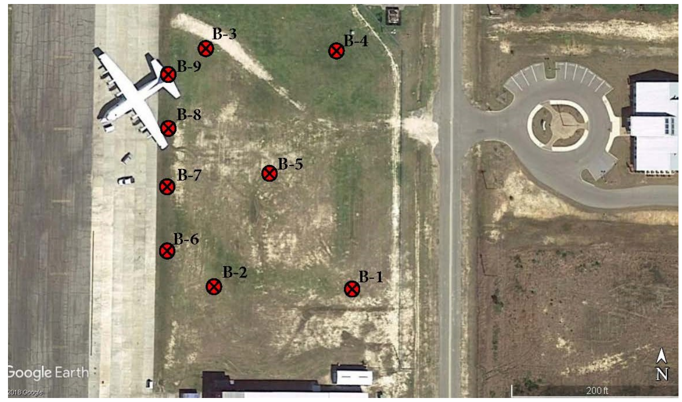

PROJECT Northeast Hanger at Stennis International Airport

BECC PROJECT NO. 219039 **BORING NUMBER** B-9

BORING LOCATION See Map

GEOLOGY Alluvium Coastal Deposits

DATE COMPLETED 10/1/19 **GROUND ELEVATION**

METHOD Hollow Stem Auger **HOLE DIAMETER** 6 inches

CONTRACTOR South Brothers

Drilling **LOGGED BY** B.Jenkins **REVIEWED BY** R.Rhinehart

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	UNIFIED CLASSIFICATION	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲ 20 40 60 80	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	WATER LEVEL	NOTES
	0.0			Loose, Gray Brown Very Silty SAND										Approximatley 1" of Topsoil Encountered at Surface
				--- trace of root fibers	SS 1		4-4-4 (8)							
	2.5			Soft, Gray Brown Sandy CLAY	SS 2		0-0-3 (3)		20.4					No Groundwater Encountered at Time of Drilling
	5.0			Stiff, Orange Gray Brown Sandy CLAY	SS 3		4-5-6 (11)		26.5					
	7.5				SS 4		5-5-8 (13)							
	10.0													

Soil boring terminated at 10.0 feet

GEOTECHNICAL LAB SUMMARY

Project Name: Northeast Hanger Stennis International Airport
BECC Project No.: 219039

Boring	Sample		Percent Passing #200 Sieve	Moisture (%)	Atterberg Limits			USCS
	Start Depth (ft.)	End Depth (ft.)			LL	PL	PI	
B-1	1.0	2.5		13.0			---	---
B-1	3.5	5.0	73.7	18.0	32	16	16	**CL**
B-1	8.5	10.0		27.3			---	---
B-1	23.5	25.0		21.1			---	---
B-1	33.5	35.0		78.9			---	---
B-2	1.0	2.5		15.7			---	---
B-2	6.0	7.5	93.4	16.2	46	20	26	**CL**
B-2	13.5	15.0		25.8			---	---
B-2	23.5	25.0		16.6			---	---
B-2	28.5	30.0		26.1			---	---
B-2	33.5	35.0		28.5			---	---
B-3	3.5	5.0		21.9			---	---
B-3	8.5	10.0		23.6			---	---
B-3	18.5	20.0		39.2			---	---
B-3	28.5	30.0	18.6	21.3	NP	NP	NP	**SM**
B-3	38.5	40.0		21.8			---	---
B-4	1.0	2.5		14.5			---	---
B-4	6.0	7.5		25.5			---	---
B-4	13.5	15.0	88.6	34.8	54	18	36	**CH**
B-4	23.5	25.0		25.4			---	---
B-4	28.5	30.0		18.5			---	---
B-5	3.5	5.0		23.6			---	---
B-5	8.5	10.0		17.9			---	---
B-5	13.5	15.0		26.2			---	---
B-5	23.5	25.0		63.0			---	---
B-5	38.5	40.0	60.5	27.5	29	14	15	**CL**
B-6	1.0	2.5		15.9			---	---
B-6	6.0	7.5		26.4			---	---
B-7	3.5	5.0		26.9			---	---

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Boring	Sample		Percent Passing #200 Sieve	Moisture (%)	Atterberg Limits			USCS
	Start Depth (ft.)	End Depth (ft.)			LL	PL	PI	
B-7	8.5	10.0		20.5			---	---
B-8	1.0	2.5		23.6			---	---
B-8	8.5	10.0		27.0			---	---
B-9	1.0	2.5		19.6			---	---
B-9	3.5	5.0		20.4			---	---
B-9	6.0	7.5		26.5			---	---

Proposed 100K SF Hangar
Existing Site Photographs
10/3/2019

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