

Preliminary Geotechnical Engineering Report

**Stennis Preliminary Site Investigation
Stennis Space Center, Mississippi**

March 8, 2017

Terracon Project No. E4165017

Prepared for:

Larson Environmental, LLC
Ocean Springs, Mississippi

Prepared by:

Terracon Consultants, Inc.
Biloxi, Mississippi

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

March 8, 2017



Larson Environmental, LLC
2 Schooner Lane
Ocean Springs, Mississippi 39564

Attn: Lars Larson, RPG
P: [228] 219-2992
E: larslarson28@gmail.com

Re: Preliminary Geotechnical Engineering Report
Stennis Preliminary Site Investigation
Hancock County, Mississippi
Terracon Project No. E4165017

Dear Mr. Larson:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal number PE4165017 dated December 13, 2016, as authorized on December 20, 2016.

This report presents the findings of the subsurface exploration and provides preliminary geotechnical recommendations concerning development of the potential sites based on widely-spaced borings. Supplemental borings and analyses will be necessary to provide final construction and design recommendations once the location of the planned construction is better defined. A draft memo discussing our findings was presented on February 27, 2017. Comments received about the memo have been incorporated into this report.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Adrienne S. Frank
Staff Engineer
Geotechnical Services

Jeffrey W. Williams, P.E.
Senior Engineer
Geotechnical Services
Mississippi PE No. 16392

Enclosures cc: 1 – Client (PDF) & 1 – File



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EXECUTIVE SUMMARY

This preliminary geotechnical investigation has been performed for future development at the Stennis Space Center in Hancock County, Mississippi. Forty (40) soil borings, designated Borings B-01 through B-07 and B-09 through B-41, were drilled to depths of approximately 20 feet below existing grades within the two proposed development areas. This report specifically addresses the preliminary recommendations.

- Based on the information obtained from our subsurface exploration, either Site A or Site B can be developed for the proposed project.
- Very soft to soft soils were encountered in each of the borings made for Area B and about one half of the borings made for Area A. Foundations and pavements generally cannot be supported on these upper soils without mitigation.
- More stable stiff to very stiff lean clays (CL, CL-ML) and medium dense sands (SC, SM, SP-SM) encountered beneath the surficial soils, dependent upon finished grades, should be capable of support of fill, pavement, or lightly- to moderately-loaded foundations (maximum column loads of perhaps 50 kips to 100 kips).
- Large mat foundations with higher loads or fill materials placed to elevate the site grade more than about 4 feet or 5 feet above existing grades could induce consolidation in compressible soils and cause the foundations supported above them to experience significant settlement.
- If the site grade is elevated by more than 4 feet or 5 feet and deep foundations are used to support the planned structures, the piles may be subjected to down drag loads associated with negative skin friction.
- Fat clays (CH) with a high potential for expansion were also encountered in Boring B-03 made for Area B directly beneath the ground surface and at depths of about 13 feet below the existing ground surface in Borings B-27 and B-39 made for Area A.
- Based on historical aerial photography from 1983 and 1985, the portion of Area B represented by Borings B-03 and B-04 could have been impacted/influenced by the construction or expansion of drainage ditches immediately to the south of these boring locations.
- The fat clays (CH) should not adversely affect foundation performance in the areas represented by Borings B-27 and B-39, unless grades are significantly lowered.
- A shallow foundation system could consist of conventional column and wall footings, monolithic slab and grade-beam system or a slab-on-grade foundation with turn down

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footings. We anticipate allowable bearing pressures on the order of 2,000 to 3,000 lbs per sq ft.

- A deep foundation associated with a more heavily loaded and/or settlement sensitive building could consist of a ground-supported floor slab coupled driven precast concrete, timber, steel pipe or H-piles, or auger-cast piles.
- The presence of shallow groundwater will be of concern during construction and for design purposes.
- On-site soils appear suitable for use as engineered fill; however, if the material does not meet the engineered fill criteria, it should not be utilized.
- The 2006 International Building Code (IBC), Table 1613.5.2 seismic site classification for this site is D.
- The pavement design could consist of either a rigid or flexible pavement system.
- A supplemental investigation should be conducted with more closely spaced borings in the specific areas where the construction will take place.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

**PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
STENNIS PRELIMINARY SITE INVESTIGATION
HANCOCK COUNTY, MISSISSIPPI**

Terracon Project No. E4165017

March 8, 2017

1.0 INTRODUCTION

This preliminary geotechnical engineering report has been completed for two future developments at the Stennis Space Center in Hancock County, Mississippi. Forty (40) soil borings, designated Borings B-01 through B-07 and B-09 through B-41, were drilled to depths of approximately 20 feet below existing grades within the development areas. Logs of the borings along with a site location plan and boring location plan are included in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering preliminary recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- seismic considerations
- foundation design and construction
- pavement design

2.0 PROJECT INFORMATION

The following sections present the project information that was available at the time this report was prepared. Should this information be incorrect, or change significantly, the project engineer should be contacted in order to evaluate the effect, if any, on our analysis and preliminary recommendations provided herein and make modifications if required.

2.1 Project Description

Item	Description
Site layout	Appendix A, Exhibit A-2: Boring Location Plan
Proposed Development	The project will consist of the potential development of tracts identified as Area A and Area B at Stennis Space Center in Hancock County, Mississippi. Area A is located generally northeast of the north guard gate and southeast of the intersection of Hwy. 607 and Texas Flat Road. Area B is located generally northeast of the intersection of Hwy. 607 (Trent Lott Blvd.) and Moses Cook Road. We understand that buildings and other improvements will be constructed in the future upon a tract which is determined by others.
Building Construction	Unknown at time of report
Finished floor elevation	Unknown at time of report
Maximum loads	Unknown at time of report
Grading/Slopes	Unknown at time of report
Free-standing retaining walls	Unknown at time of report
Pavements	We have assumed that paved driveways and parking will be constructed within the development areas. No decision has been made at this point regarding pavement surface, so we assume that both rigid (concrete) and flexible (asphalt) pavement sections should be considered.

2.2 Site Location and Description

Item	Description
Location	Two undeveloped tracts totaling 400 acres at Stennis Space Center located in Hancock County, Mississippi. The areas are portions of the tracts identified as Area B (150 acres) at the south side of the site and Area A (250 acres) at the northwest area of the site. (Appendix A, Exhibit A-1: Site Location Plan) <ul style="list-style-type: none"> • Area B – Approximately 30° 23.833' N, 89° 37.075' W • Area A – Approximately 30° 24.673' N, 89° 37.438' W
Existing improvements	Railroad spurs and previous ammunition prep area at northeast portion of Area A
Current ground cover	Both areas are generally heavily wooded
Existing topography	Relatively flat with slopes on the order of 1% to 3% with relatively deep ditches at the southeast corner of Area B

3.0 SUBSURFACE CONDITIONS

Soil and groundwater conditions at each site were investigated by means of forty (40) soil borings. Borings B-01 through B-07 and B-09 through B-16 were drilled within Area B. Borings B-17 through B-41 were drilled within Area A. Boring B-08 was eliminated by the client due to its location within a wetlands area. The soil boring logs in Appendix A provide details of the conditions encountered at each boring location and the field and laboratory data collected.

3.1 Geology

Soils encountered at this site appear to be sediments of the coastal deposits of the Mississippi gulf coast. This formation is geologically young in age and is characterized by a cross-bedded mixture of silt, sand, gravel, and clay. The deposits may also contain limestone at depth. Limestone layers are deep enough that they would not be encountered during shallow or deep foundation installation. The sediments of the coastal deposits lack regional lithologic layering and tend to be discontinuous with variable thickness.

3.2 Typical Profile

Generally, lean clays (CL) and clayey sands (SC) were encountered directly beneath the ground surface in our borings. The upper clays (CL) are generally very soft to soft with respect to consistency and the upper sands (SC) are generally very loose to loose. The unstable soils were generally found to extend to depths of 5 feet to 10 feet beneath the ground surface. At Area B, the unstable soils were encountered directly beneath the ground surface or at depths shallower than 2 feet in all of the borings. At Area A, the unstable soils were encountered directly beneath the ground surface or shallower than 2 feet in about one-half of the borings.

Fat clays (CH) were encountered in Boring B-03 made for Area B and Borings B-27 and B-39 made for Area A. Fat clays (CH) were found directly beneath the ground surface in Boring B-03, and below depths of 13 feet in Borings B-27 and B-39. The fat clays (CH) have a moderate to high potential for shrink/swell movement. The fat clays (CH) encountered in Boring B-27 contained significant amounts of organic debris and would be especially susceptible to consolidation should the organic material decompose.

Based on historical aerial photography from 1983 and 1985 provided to us, the area of Area B represented by Borings B-03 and B-04 could have been impacted/influenced by the construction or expansion of drainage ditches immediately to the south of this boring location. The upper clay (CL, CH) soils within these borings may be fill material.

These unstable upper soils were generally underlain by stiff to very stiff lean clays (CL, CL-ML) and medium dense sands (SC, SM, SP-SM). These relatively stable soils were generally found to extend to depths of 10 feet to 15 feet beneath the ground surface.

In Borings B-02, B-06, B-07, B-09, and B-12 through B-16 made for Area B, very soft to soft clays (CL, CH) were generally encountered beneath the stable lean clays (CL, CL-ML) and sands (SC, SM, SP-SM). In Borings B-18, B-19, B-21, B-22, B-23, B-26, B-29, B-30, and B-32 made for Area A, very soft to soft clays (CL, CH) were generally encountered beneath the stable lean clays (CL, CL-ML) and sands (SC, SM, SP-SM). The very soft to soft clays (CL, CH) were found to extend to the 20 foot maximum boring exploration depth.

Conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs in Appendix A.

3.3 Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed are noted on the attached boring logs, and are summarized below.

Boring Location	Depth to Groundwater During Drilling (feet)	Depth to Groundwater After 15 minutes (feet)
Area B		
B-01	1 ½	½
B-02	6	2
B-03	11	9 ½
B-04	15	12 ½
B-05	10	4 ½
B-06	10	5 ½
B-07	9	6 ½
B-09	10	6
B-10	8	8 (no rise detected)
B-11	9	5
B-12	2	2 (no rise detected)
B-13	4	4 (no rise detected)
B-14	8	4

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Boring Location	Depth to Groundwater During Drilling (feet)	Depth to Groundwater After 15 minutes (feet)
B-15	8	4 ½
B-16	3 ½	3 ½ (no rise detected)
Area A		
B-17	not observed during augering	--
B-18	not observed during augering	--
B-19	not observed during augering	--
B-20	not observed during augering	--
B-21	not observed during augering	--
B-22	not observed during augering	--
B-23	not observed during augering	--
B-24	not observed during augering	--
B-25	not observed during augering	--
B-26	not observed during augering	--
B-27	not observed during augering	--
B-28	not observed during augering	--
B-29	(water at surface)	--
B-30	not observed during augering	--
B-31	not observed during augering	--
B-32	not observed during augering	--
B-33	4	4 (no rise detected)
B-34	4 ½	4 ½ (no rise detected)
B-35	not observed during augering	--
B-36	not observed during augering	--
B-37	3	3 (no rise detected)
B-38	(water at surface)	--
B-39	(water at surface)	--
B-40	3	3 (no rise detected)
B-41	3 ½	3 ½ (no rise detected)

Groundwater was not observed in Borings B-17 to B-28, B-30 to B-32, B-35 and B-36 while augering. Below a depth of 10 feet, the boreholes were advanced using rotary-wash drilling techniques and prevented an accurate determination of groundwater conditions below that depth. However, this does not necessarily mean these borings terminated above groundwater. Long term observations

in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in materials of this type.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may differ than indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.0 PRELIMINARY RECOMMENDATIONS

The purpose of this preliminary investigation has been to evaluate the general subsurface soil and groundwater conditions on a preliminary basis and to make preliminary recommendations regarding future development of the sites. This preliminary investigation included drilling widely spaced soil borings, performing laboratory testing, analyzing engineering and geologic data, and preparing the preliminary report.

We understand that the project may include buildings and other structures with associated parking areas. The building and structure sizes, locations, and shapes are unknown at this time. Depending upon structure sizes and loading conditions, foundations could consist of either a shallow foundation system, or if more heavily-loaded buildings are decided upon, a deep foundation system may be used.

The upper generally very soft to soft clays (CL, CH) and very loose to loose clayey sands (SC) encountered directly beneath the ground surface and found to extend to depths of about 5 feet to 10 feet are likely to be unstable during earthwork operations and will have to be mitigated, possibly by removal and replacement with more suitable soil or by chemical treatment with lime or cement. Very soft to soft soils were encountered in each of the borings made for Area B and about one half of the borings made for Area A. Foundations and pavements generally cannot be supported on these upper soils without mitigation.

The more stable stiff to very stiff lean clays (CL, CL-ML) and medium dense sands (SC, SM, SP-SM) encountered beneath the surficial soils, dependent upon finished grades, should be capable of support of fill, pavement, or lightly- to moderately-loaded foundations (maximum column loads of perhaps 50 kips to 100 kips). If the soils are subject to significant increases in moisture content, the strength of the material could be affected requiring some mitigation at the time of construction.

The very soft to soft clays (CL, CH) encountered in several of our borings below a depth of about 15 feet are relatively unstable. Lightly- to moderately-loaded structures supported on shallow foundations above these soils will not induce significant consolidation of these soils. However, large mat foundations with higher loads or fill materials placed to elevate the site grade more than

about 4 feet or 5 feet above existing grades could induce consolidation in these soils and cause the foundations supported above them to experience significant settlement. Additionally, if the site grade is elevated by more than 4 feet or 5 feet and deep foundations are used to support the planned structures, the piles may be subjected to down drag loads associated with negative skin friction.

Fat clays (CH) with a high potential for expansion were encountered in Boring B-03 made for Area B directly beneath the ground surface and at depths of about 13 feet below the existing ground surface in Borings B-27 and B-39 made for Area A. These expansive clays (CH) would adversely affect foundation and pavement performance in the area represented by Boring B-03 where they were encountered directly beneath the ground surface. The fat clays (CH) should not adversely affect foundation performance in the areas represented by Borings B-27 and B-39, unless grades are significantly lowered. Typical buffer thicknesses of low volume change soil above expansive clays found in this region consist of 4 feet underneath building foundations and 2 feet under pavements.

As discussed previously, based on historical aerial photography from 1983 and 1985, the southeast part of Area B represented by Borings B-03 and B-04 could have been impacted/influenced by the construction or expansion of drainage ditches immediately to the south of these boring locations. We would not recommend supporting foundations and pavements on previously filled areas without confirming the fill soils were placed and compacted under controlled conditions.

A shallow foundation system could consist of conventional column and wall footings, monolithic slab and grade-beam system or a slab-on-grade foundation with turn down footings. We anticipate allowable bearing pressures on the order of 2,000 to 3,000 lbs per sq ft. A deep foundation associated with a more heavily loaded and/or settlement sensitive building could consist of a ground-supported floor slab coupled driven precast concrete, timber, steel pipe or H-piles, or auger-cast piles.

The presence of shallow groundwater will be of concern during construction and for design purposes. Excavations made to undercut unstable soils or to dig shallow foundations or below-grade structures are likely to encounter groundwater. The contractor will have to be prepared to control groundwater seepage during construction and foundations will have to be designed to resist uplift associated with buoyant conditions.

Based on experience with similar projects, either asphalt cement concrete (flexible) or a Portland cement concrete (rigid) pavement system could be used for the proposed project. Detailed traffic patterns and anticipated loading conditions were not available at the time that this report was prepared. The thickness of pavements subjected to heavy truck traffic should be determined using expected traffic volumes, vehicle types, and vehicle loads and should be in accordance with local, city, or county ordinances.

Design of buildings and other structures subject to earthquake ground motions requires classification of the upper 100 feet of the site profile in accordance with Chapter 20 of ASCE 7. The Site Class types are listed below and are basically defined by an average value of either shear wave velocity, standard penetration resistance, or undrained shear strength.

- A. Hard Rock
- B. Rock
- C. Very dense soil and soft rock
- D. Stiff soil
- E. Soft clay soil
- F. Soils vulnerable to potential failure or collapse under seismic loading

Based on the results of our site characterization program, we conclude that Site Class D is appropriate for the subject sites. Note that the scope of services did not include site profile determination to a depth of 100 feet. Explorations for this project extended to a maximum depth of 20 feet and the site classification assumes that materials encountered at the bottom of the deepest exploration continue to a depth of 100 feet. Based upon the subsurface conditions encountered in borings, we expect that the soil conditions below the maximum explored depth are consistent with the Site Class noted for this site.

The recommendations presented above are preliminary in nature and not intended for use in specific design. Pending finalized plans and structure locations, an additional geotechnical investigation consisting of additional soil borings will be required to provide specific earthwork, mitigation, and foundations and pavement recommendations.

5.0 GENERAL COMMENTS

The analysis and recommendations presented in this report are based upon the preliminary data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

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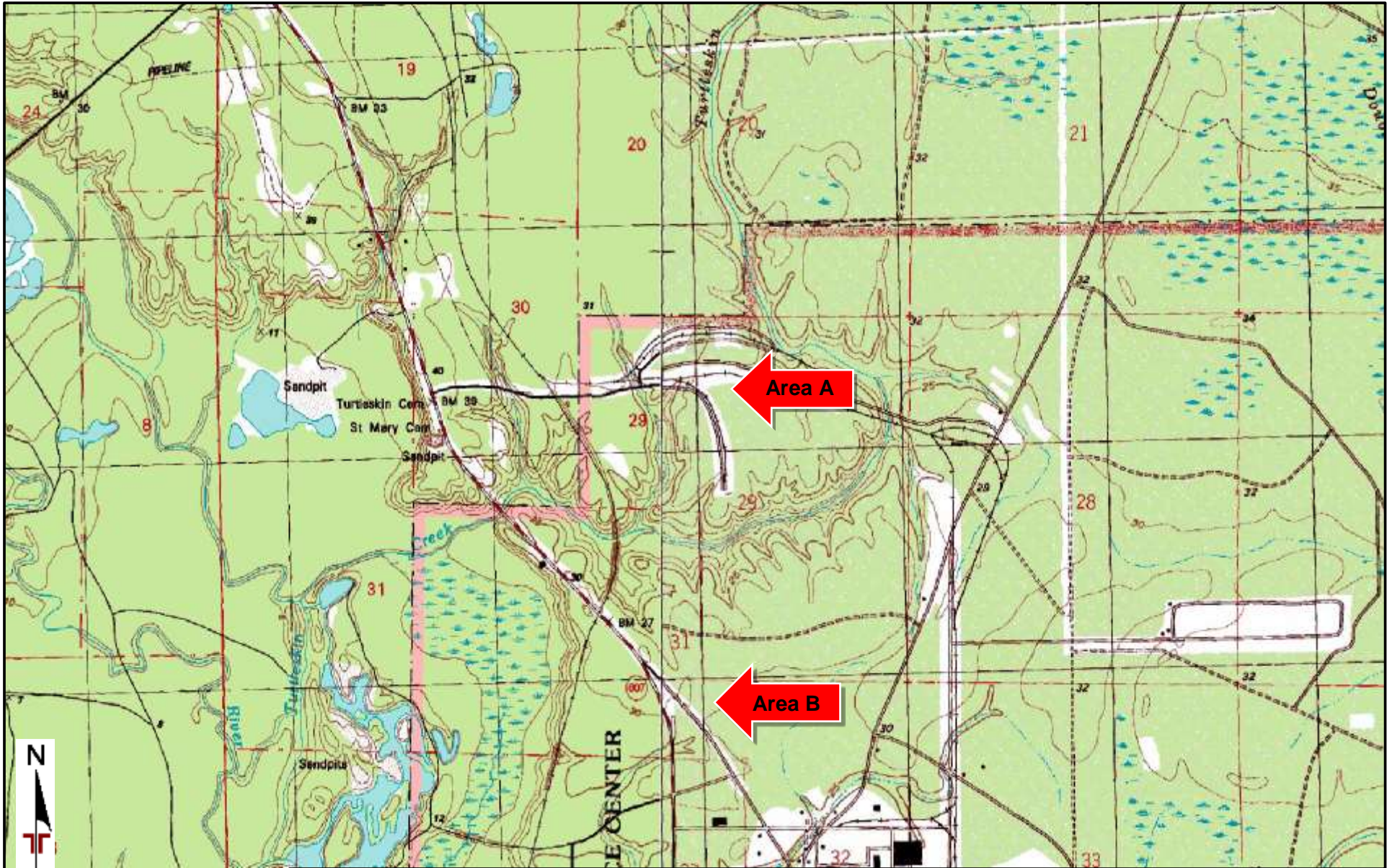
Stennis Preliminary Site Investigation ■ Hancock County, Mississippi

March 8, 2017 ■ Terracon Project No. E4165017



This report has been prepared for the exclusive use of Larson Environmental, LLC for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
 QUADRANGLES INCLUDE: NICHOLSON, MS (1/1/1998) and DEAD TIGER CREEK, MS (1/1/1996).

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: JWW

Drawn by: ASF

Checked by: JWW

Approved by: JWW

Project No. E4165017

Scale: 1"=2,000'

File Name: Exhibit A-1_E4165017

Date: February 2017

Terracon

285 Gulfwater Drive
 Biloxi, MS 39531-2629

SITE LOCATION PLAN

Stennis Preliminary Site Investigation
 Stennis Space Center
 Hancock County, Mississippi

Exhibit

A-1



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	JWW
Drawn by:	ASF
Checked by:	JWW
Approved by:	JWW

Project No.	E4165017
Scale:	AS SHOWN
File Name:	Exhibit A-2a.E4165017
Date:	February 2017

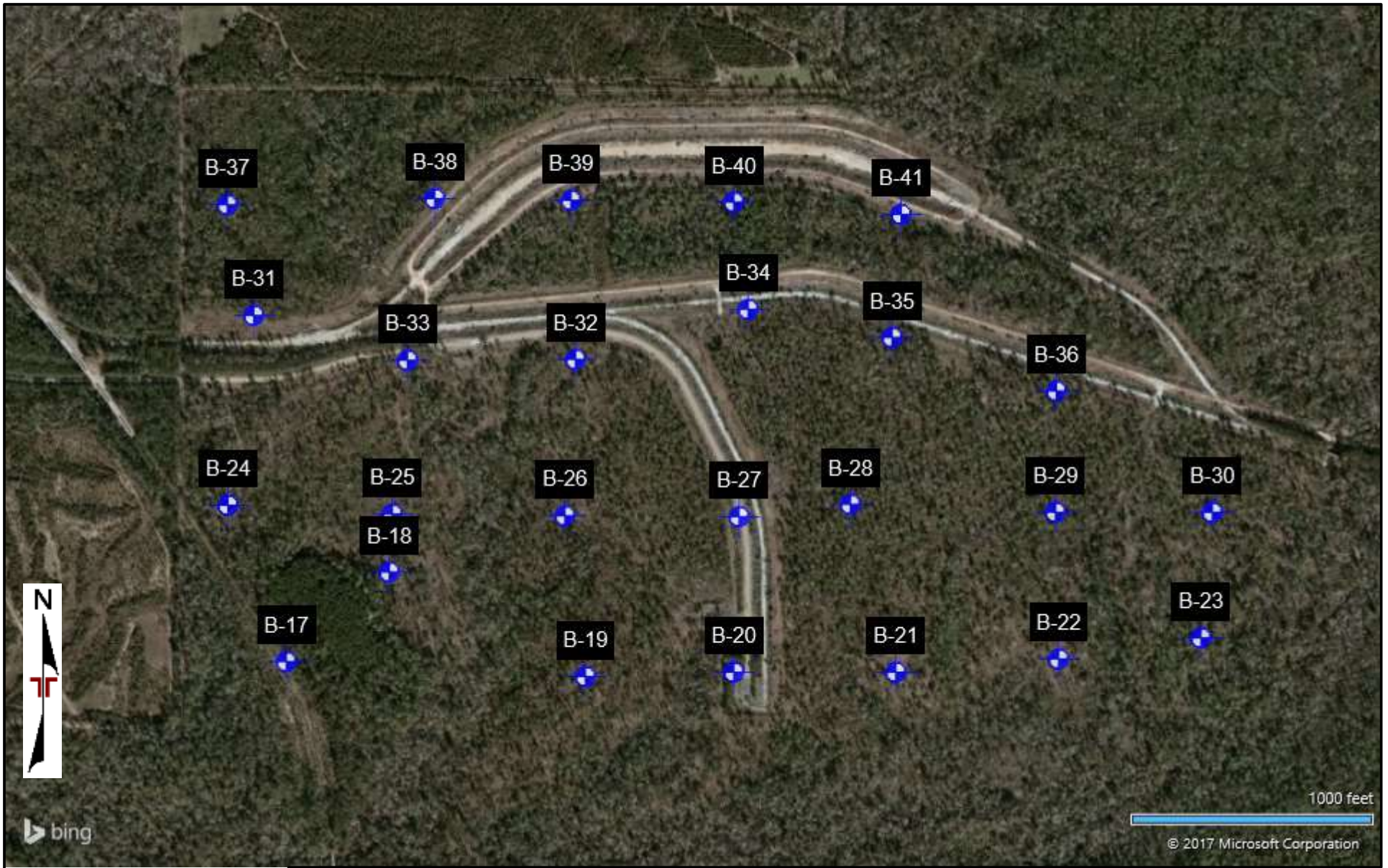
Terracon

285 Gulfwater Drive
Biloxi, MS 39531-2629

EXPLORATION PLAN – AREA B

Stennis Preliminary Site Investigation
Stennis Space Center
Hancock County, Mississippi

Exhibit
A-2a



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: JWW
 Drawn by: ASF
 Checked by: JWW
 Approved by: JWW

Project No. E4165017
 Scale: AS SHOWN
 File Name: Exhibit A-2b.E4165017
 Date: February 2017

Terracon
 285 Gulfwater Drive
 Biloxi, MS 39531-2629

BORING EXPLORATION PLAN – AREA A

Stennis Preliminary Site Investigation
 Stennis Space Center
 Hancock County, Mississippi

Exhibit
A-2b

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Field Exploration Description

The subsurface exploration consisted of drilling and sampling forty (40) borings at the property. The boring locations were laid out by the client. Ground surface elevations at the boring locations were not available and have been omitted from the boring logs. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The borings were drilled with a track-mounted and ATV-mounted rotary drill rig using short-flight augers to advance the boreholes. Samples of the soil encountered in the borings were obtained using split-barrel sampling procedures.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the second and third 6-inch increment of an 18-inch or 24-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N value). This value is used to estimate the in-situ relative density of cohesionless soils and consistency of cohesive soils.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled in accordance with Mississippi state regulations.

A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.

BORING LOG NO. B-01

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39491° Longitude: -89.6234°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
0	SANDY LEAN CLAY (CL) , brown and gray, very soft		▽	X	WOH N=0	182		
2	- organic debris to 2'		▽	X	WOH N=0	19		50
4		5		X	WOH N=0	21		
6	SANDY LEAN CLAY (CL) , brown and gray, stiff to very stiff			X	2-4-8 N=12	16		
8		10		X	5-9-10 N=19	14		
10	SILTY SAND (SM) , brown and gray, medium dense			X	6-9-11 N=20	25		
12	- loose from 14' to 16'	15		X	3-2-2 N=4	25		
14		20		X	5-17-12 N=29	19		
16								
18								
20	Boring Terminated at 20 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 1/7/2017

Boring Completed: 1/7/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-4

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-02

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39484° Longitude: -89.62185°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
2.0	SANDY LEAN CLAY (CL) , brown and gray, very soft		▽	X	WOH N=0	20		
	SANDY LEAN CLAY (CL) , brown and gray, stiff			X	1-4-6 N=10	17		
		5	▽	X	2-5-5 N=10	17		
				X	3-6-3 N=9	22	48-14-34	
8.0	SILTY SAND (SM) , brown and gray, medium dense			X	3-10-12 N=22	19		
	- loose below 14'			X	4-6-9 N=15			
		15		X	3-2-3 N=5			
18.0	LEAN CLAY (CL) , organic debris, gray, soft			X	1-1-1 N=2	23		
20.0	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 1/7/2017

Boring Completed: 1/7/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-5

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-03

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39498° Longitude: -89.61996°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
0.0 - 4.0	SILTY CLAY & CLAY (CL/CH) , brown and gray, very soft to soft, (possible fill)			X	0-0-1 N=1	20		
4.0 - 8.0	SILTY CLAY & CLAY (CL/CH) , brown and gray, stiff, (possible fill)	5		X	0-1-1 N=2	19		
8.0 - 14.0	SILTY SAND (SM) , brown and gray, medium dense			X	2-4-6 N=10	22	59-17-42	
14.0 - 20.0	SILTY SAND (SM) , brown and gray, very loose			X	2-7-8 N=15	15		
20.0	- loose below 18'		▽	X	3-9-10 N=19	16		
			▽	X	6-6-5 N=11			
				X	WOH N=0	29		35
				X	1-2-3 N=5			
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 1/7/2017

Boring Completed: 1/7/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-6

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-04

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39449° Longitude: -89.61784°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
2.0	LEAN CLAY (CL) , brown and gray, stiff, (possible fill)			X	3-5-6 N=11	11		
11.0	LEAN CLAY (CL) , brown and gray, soft to medium stiff, (possible fill) - wood fragments from 4' to 6' - trace gravel from 6' to 8'	5		X	1-2-2 N=4	17		
11.0				X	0-4-2 N=6	18		
11.0				X	0-1-1 N=2	18		
11.0				X	1-2-3 N=5	19		
11.0	SILTY SAND (SM) , brown and gray, loose		▽	X	2-2-3 N=5	15		24
15.0			▽	X	2-3-6 N=9			
20.0	- medium dense below 18'			X	3-8-10 N=18			
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 1/7/2017

Boring Completed: 1/7/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-7

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-05

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.3962° Longitude: -89.62384°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
6.0	SILTY CLAY (CL-ML) , with sand, brown and gray, soft to medium stiff			X	1-1-1 N=2	17	19-15-4	
	- stiff below 4'			X	1-1-3 N=4	16		
		5	▽	X	4-6-8 N=14	18		
14.0	SILTY SAND (SM) , brown and gray, medium dense			X	3-7-7 N=14	17		22
				X	4-11-12 N=23	18		
		10	▽	X	4-7-7 N=14			
20.0	SILTY SAND (SM) , brown and gray, very loose			X	WOH N=0	20		
	- loose below 18'			X	1-2-2 N=4	21		
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 1/8/2017

Boring Completed: 1/8/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-06

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39662° Longitude: -89.62199°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
DEPTH									
8.0	LEAN CLAY (CL) , with sand, brown and gray, medium stiff - soft from 2' to 4' - very stiff below 6'	5	▽	X	3-3-3 N=6	13			
				X	0-1-1 N=2	18			
				X	2-2-4 N=6	21			
				X	7-7-9 N=16	17	44-14-30		
10.0	SILTY SAND (SM) , brown and gray, medium dense	10	▽	X	8-10-11 N=21	18		30	
				X	4-9-8 N=17				
				X	3-7-4 N=11				
18.0	LEAN CLAY (CL) , organics, gray, soft			X	1-1-1 N=2	77			
20.0	Boring Terminated at 20 Feet	20							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 1/7/2017

Boring Completed: 1/7/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-9

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-07

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39655° Longitude: -89.61991°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
	CLAYEY SAND (SC) , brown and gray, very loose to loose			X	0-0-1 N=1	18		46
		4.0		X	1-2-5 N=7	12		
	CLAYEY SAND (SC) , brown and gray, medium dense			X	4-7-8 N=15	18		
		5.0	▽	X	4-5-6 N=11	18		
	SILTY SAND (SM) , brown and gray, medium dense			X	8-6-9 N=15	18		
		8.0	▽	X	4-7-8 N=15			
	LEAN CLAY (CL) , gray, soft			X	2-1-1 N=2			
	- very soft below 18'	14.0		X	WOH N=0	33		
		20.0		X				
	Boring Terminated at 20 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 1/7/2017

Boring Completed: 1/7/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-10

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-09

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39851° Longitude: -89.62386°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
0.0 - 4.0	SILTY CLAY (CL-ML) , with sand, brown and gray, soft			X	3-1-1 N=2	18	21-15-6	
4.0 - 5.0				X	1-1-1 N=2	22		
5.0 - 8.0	SILTY CLAY (CL-ML) , with sand, brown and gray, medium stiff to stiff	5	▽	X	2-3-4 N=7	16		
8.0 - 10.0				X	1-2-10 N=12	22		
10.0 - 14.0	POORLY GRADED SAND WITH SILT (SP-SM) , brown and gray, medium dense - loose below 11'	10	▽	X	4-10-14 N=24	22		11
14.0 - 15.0				X	5-7-2 N=9			
15.0 - 20.0	LEAN CLAY (CL) , with sand, gray, very soft - soft to medium stiff below 18'	15		X	WOH N=0	38		
20.0	Boring Terminated at 20 Feet	20		X	0-1-3 N=4	25		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 2/6/2017

Boring Completed: 2/6/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-11

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-10

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39849° Longitude: -89.62199°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
	LEAN CLAY (CL) , with sand, brown, very soft	2.0		X	WOH N=0	25		
	LEAN CLAY (CL) , with sand, brown, stiff to very stiff			X	1-5-9 N=14	17		
		5		X	6-6-7 N=13	19	35-17-18	
				X	4-8-12 N=20	20		
	SILTY SAND (SM) , brown and gray, medium dense	8.0	▽					
		10		X	5-10-12 N=22	27		
				X	6-10-12 N=22			
	- loose from 14' to 16'	15		X	3-2-2 N=4			
	- clay pockets below 18'			X	4-9-7 N=16	22		
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 2/6/2017

Boring Completed: 2/6/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-12

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-11

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39906° Longitude: -89.62051°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
	DEPTH								
	LEAN CLAY (CL) , with sand, brown and gray, soft			X	1-1-2 N=3	21			
	LEAN CLAY (CL) , with sand, brown and gray, stiff to very stiff			X	6-6-8 N=14	17	42-18-24		
		5	▽	X	6-10-9 N=19	19			
				X	3-6-10 N=16	23			
	SILTY SAND (SM) , brown and gray, medium dense			X	5-9-12 N=21				
		10	▽	X	3-5-9 N=14	26			12
				X	3-6-6 N=12				
		15							
	SILTY SAND (SM) , with clay pockets, brown and gray, very loose			X	WOH-1-2 N=3				
		18.0							
		20.0							
	Boring Terminated at 20 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 2/6/2017

Boring Completed: 2/6/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-13

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-12

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.39878° Longitude: -89.61762°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
	DEPTH								
	LEAN CLAY (CL) , with sand, brown and gray, very soft	2.0	▽	X	WOH N=0	27			
	LEAN CLAY (CL) , with sand, brown and gray, medium stiff to stiff			X	1-3-5 N=8	21	36-16-20		
		5		X	4-6-7 N=13	19			
				X	4-6-9 N=15	17			
		10		X	5-5-9 N=14				
	- very stiff from 11' to 13'			X	9-9-9 N=18				
		15		X	3-4-2 N=6				
		18.0							
	LEAN CLAY (CL) , with sand, brown and gray, soft to medium stiff	20.0		X	1-2-2 N=4	31			
	Boring Terminated at 20 Feet	20							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 2/8/2017

Boring Completed: 2/8/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-14

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_SLOGS.E4165017_RESTORE(2-23-17).GPJ_TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-13

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40021° Longitude: -89.62361°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
6.0	LEAN CLAY (CL) , with sand, brown and gray, very soft - soft below 2'	5	▽	X	WOH N=0	29		
				X	0-0-2 N=2	22		
				X	0-1-2 N=3	20	25-15-10	
18.0	LEAN CLAY (CL) , with sand, brown and gray, stiff to very stiff	10		X	2-6-8 N=14	23		
				X	6-8-8 N=16	19		
				X	8-9-10 N=19	25		37
20.0	LEAN CLAY (CL) , with sand, brown and gray, very soft	15		X	4-8-8 N=16			
				X	0-0-1 N=1			
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 2/8/2017

Boring Completed: 2/8/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-15

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_SLOGS.E4165017_RESTORE(2-23-17).GPJ_TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-14

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40034° Longitude: -89.62194°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
	DEPTH								
2.0	LEAN CLAY (CL) , with sand, brown and gray, very soft			X	WOH N=0	23			
8.0	LEAN CLAY (CL) , with sand, brown and gray, medium stiff - stiff below 4'	5	▽	X	0-1-5 N=6	20			
				X	1-7-10 N=17	16	25-15-10		
				X	5-7-11 N=18	25			
10.0	SILTY SAND (SM) , brown and gray, medium dense	10		X	5-10-11 N=21				
				X	2-4-6 N=10				
				X	4-11-10 N=21				
18.0	LEAN CLAY (CL) , with sand, brown and gray, soft			X	1-1-2 N=3	33			
20.0	Boring Terminated at 20 Feet	20							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 2/8/2017

Boring Completed: 2/8/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-16

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-15

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40027° Longitude: -89.6199°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
		DEPTH						
	LEAN CLAY (CL) , with sand, brown and gray, very soft	2.0		X	WOH N=0	19		
	LEAN CLAY (CL) , with sand, brown and gray, medium stiff to stiff			X	0-1-4 N=5	16		
			▽					
				X	4-6-6 N=12	15	37-15-22	
				X	3-5-8 N=13	22		
			▽					
	SILTY SAND (SM) , brown and gray, medium dense	8.0		X	11-12-14 N=26			
				X	4-9-10 N=19			
				X	1-5-7 N=12	28		15
	LEAN CLAY (CL) , with sand, brown and gray, soft	18.0		X	1-1-2 N=3	74		
	Boring Terminated at 20 Feet	20.0		X				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ Rise after 15 minutes



Boring Started: 2/8/2017

Boring Completed: 2/8/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-17

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-16

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40041° Longitude: -89.61768°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
2.0	SANDY LEAN CLAY (CL) , brown and gray, very soft			X	0-0-1 N=1	23		66
20.0	LEAN CLAY (CL) , with sand, brown and gray, medium stiff to stiff		▽	X	1-2-3 N=5	19		
		5		X	3-5-6 N=11	17		
				X	3-5-7 N=12	22		
		10		X	4-5-6 N=11	18		
				X	3-6-6 N=12			
	- very soft; organic debris from 14' to 16'	15		X	0-0-1 N=1	143		
				X	1-3-7 N=10			
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected
- Saturated at surface



Boring Started: 2/8/2017

Boring Completed: 2/8/2017

Drill Rig: DR003

Driller: R. Warren

Project No.: E4165017

Exhibit: A-18

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017_RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-17

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40766° Longitude: -89.62797°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
							LL-PL-PI	
DEPTH								
4.0	SANDY LEAN CLAY (CL) , reddish-brown and gray, medium stiff - very stiff below 2'			X	1-1-3-3 N=4	20		
				X	8-9-13-12 N=22	18		
4.0	LEAN CLAY (CL) , with sand, brown and gray, stiff - medium stiff below 8'	5		X	8-9-5-5 N=14	29	47-14-33	
				X	6-5-3-3 N=8	29		
		10		X	3-3-4-2 N=7			
				X	3-2-2 N=4	26		
20.0	Boring Terminated at 20 Feet	20		X	3-3-4 N=7	20		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/18/2017

Boring Completed: 1/18/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-19

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017_RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-18

PROJECT: Preliminary Site Investigation

**CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi**

**SITE: Stennis Space Center
Hancock County, Mississippi**

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40868° Longitude: -89.62661°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
	SANDY LEAN CLAY (CL) , reddish-brown and gray, stiff			X	1-1-8-6 N=9	22		
	LEAN CLAY (CL) , with sand, brown and gray, medium stiff to stiff	2.0		X	5-4-4-4 N=8	27		
				X	6-5-3-3 N=8	26		
	LEAN CLAY (CL) , with sand, brown and gray, soft	6.0		X	4-1-1-2 N=2	23		
				X	2-1-2-3 N=3	27		
				X	1-1-1 N=2	25	27-13-14	
	- soft to medium stiff below 18'			X	3-2-2 N=4	29		
	Boring Terminated at 20 Feet	20.0						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/18/2017

Boring Completed: 1/18/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-20

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017_RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-19

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40749° Longitude: -89.62402°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
							LL-PL-PI	
DEPTH								
2.0	CLAYEY SAND (SC) , dark brown, loose			X	2-1-3-3 N=4	26		
13.0	LEAN CLAY (CL) , with sand, brown and gray, very stiff	5		X	11-16-10-10 N=26	20	48-13-35	
		5		X	10-14-13-12 N=27	20		
		10		X	11-13-15-15 N=28	23		
		10		X	14-13-10-10 N=23	17		
13.0	LEAN CLAY (CL) , with sand, brown and gray, soft	15		X	2-1-1 N=2	19		
	- medium stiff below 18'	20		X	3-2-4 N=6	21		
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



Boring Started: 1/17/2017

Boring Completed: 1/17/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-21

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-20

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40754° Longitude: -89.62206°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
	DEPTH								
2.0	CLAYEY SAND (SC) , brown, medium dense			X	3-5-8-8 N=13	12			
6.0	SANDY LEAN CLAY (CL) , brown and gray, very stiff			X	8-8-9-8 N=17	19			
6.0	CLAYEY SAND (SC) , brown and gray, medium dense			X	9-13-10-13 N=23	21	29-10-19		
13.0	CLAYEY SAND (SC) , brown and gray, medium dense			X	7-6-5-5 N=11	22			
13.0	CLAYEY SAND (SC) , brown and gray, medium dense			X	4-5-5-5 N=10	22			
13.0	LEAN CLAY (CL) , light brown, stiff			X	4-5-5 N=10	25			
20.0	- medium stiff; with organic debris below 18'			X	3-3-3 N=6	25			
	Boring Terminated at 20 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/14/2017

Boring Completed: 1/14/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-22

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-21

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40754° Longitude: -89.61992°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
	LL-PL-PI							
	DEPTH							
2.0	CLAYEY SAND (SC) , reddish-brown, loose			X	2-3-3-3 N=6	17		44
6.0	SANDY LEAN CLAY (CL) , brown and gray, stiff to very stiff	5		X	5-6-8-10 N=14	18		
13.0	CLAYEY SAND (SC) , trace gravel, brown and gray, medium dense			X	10-11-11-11 N=22	16		
20.0	LEAN CLAY (CL) , with sand, gray, soft			X	10-9-7-7 N=16	23		
20.0	LEAN CLAY (CL) , with sand, gray, soft			X	6-6-5-8 N=11	23		
20.0	LEAN CLAY (CL) , with sand, gray, soft			X	3-2-2 N=4	20	28-12-16	
20.0	LEAN CLAY (CL) , with sand, gray, soft			X	2-1-2 N=3	28		
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/14/2017

Boring Completed: 1/14/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-23

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-22

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40769° Longitude: -89.61777°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
		DEPTH							
2.0	CLAYEY SAND (SC) , organics, brown, very loose			X	2-1-1-2 N=2	50			
8.0	SANDY LEAN CLAY (CL) , brown and gray, stiff to very stiff			X	3-3-8-8 N=11	16			
13.0	CLAYEY SAND (SC) , brown and gray, medium dense			X	7-8-10-9 N=18	17	42-12-30		
20.0	LEAN CLAY (CL) , with sand, gray, soft			X	9-9-9-10 N=18	23			
				X	7-8-9-7 N=17	23			
				X	1-1-1 N=2	35			
				X	2-1-1 N=2	18			
	Boring Terminated at 20 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS
<i>No free water observed during augering</i>



Boring Started: 1/16/2017	Boring Completed: 1/16/2017
Drill Rig: DR-898	Driller: Mark C.
Project No.: E4165017	Exhibit: A-24

BORING LOG NO. B-23

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40793° Longitude: -89.61589°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
							LL-PL-PI	
	DEPTH							
2.0	CLAYEY SAND (SC) , organics, brown, very loose			X	1-1-1-3 N=2	26		
5	SANDY SILTY CLAY (CL-ML) , brown and gray, soft to medium stiff			X	3-2-2-2 N=4	18	20-14-6	
10	- very stiff below 6'			X	2-3-5-7 N=8	18		
15				X	9-9-9-9 N=18	19		
20				X	7-7-7-7 N=14	24		
13.0	SANDY SILTY CLAY (CL-ML) , brown and gray, soft - organic debris to 15'			X	2-2-1 N=3	50		
20.0	Boring Terminated at 20 Feet			X	1-1-1 N=2	32		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/18/2017

Boring Completed: 1/18/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-25

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS E4165017 RESTORE(2-23-17) GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-24

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40944° Longitude: -89.62874°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
<div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: 8px; padding: 2px;">THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17</div>	CLAYEY SAND (SC) , organics, brown, very loose			X	2-1-2-2 N=3	30		
	- loose below 3'			X	1-2-2-2 N=4	21		
	4.0	CLAYEY SAND (SC) , brown, medium dense			X	4-6-8-8 N=14	16	NP
			5		X	7-8-10-8 N=18	23	
					X	7-6-8-9 N=14	25	
			10					
					X	5-5-5 N=10	23	
		15						
				X	9-3-3 N=6	25		
		20						
	LEAN CLAY (CL) , gray, medium stiff							
	18.0							
	Boring Terminated at 20 Feet							
	20.0							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/18/2017

Boring Completed: 1/18/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-26

BORING LOG NO. B-25

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40934° Longitude: -89.62657°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
4.0	CLAYEY SAND (SC) , brown and gray, very loose			X	1-1-2-1 N=3	20		
4.0				X	1-1-1-1 N=2	24		41
5.0	CLAYEY SAND (SC) , brown and gray, medium dense	5		X	7-10-11-11 N=21	19		
10.0	- loose below 8'			X	7-7-9-9 N=16	19		
10.0		10		X	5-4-4-4 N=8	24		
15.0				X	4-3-3 N=6	28		
18.0				X	2-2-2 N=4	25		
20.0	LEAN CLAY (CL) , gray, soft to medium stiff			X				
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/18/2017

Boring Completed: 1/18/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-27

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-26

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40932° Longitude: -89.62429°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
							LL-PL-PI	
	DEPTH							
	CLAYEY SAND (SC) , organics, brown, loose			X	2-2-3-3 N=5	22		
	LEAN CLAY (CL) , brown and gray, very stiff	2.0		X	4-6-9-9 N=15	17	39-12-27	
		6.0		X	10-9-9-9 N=18	15		
	CLAYEY SAND (SC) , brown and gray, medium dense			X	10-15-13-12 N=28	14		
		13.0		X	10-10-9-9 N=19	16		
	LEAN CLAY (CL) , gray, soft			X	2-1-2 N=3	22		
	- soft to medium stiff below 18'	20.0		X	2-2-2 N=4			
	Boring Terminated at 20 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/17/2017

Boring Completed: 1/17/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-28

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-27

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017_RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40931° Longitude: -89.62199°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
	CLAYEY SAND (SC) , brown and gray, loose			X	6-5-4-4 N=9	12		
	CLAYEY SAND (SC) , brown and gray, medium dense	2.0		X	5-7-6-6 N=13	14		27
				X	8-10-10-10 N=20	16		
				X	10-10-11-9 N=21	22		
	LEAN CLAY (CL) , gray, stiff	8.0		X	7-6-4-4 N=10	30		
	FAT CLAY (CH) , organic debris, gray, very stiff	13.0		X	5-7-9 N=16	52	152-54-98	
	LEAN CLAY (CL) , very stiff	18.0		X	7-9-9 N=18	27		
	Boring Terminated at 20 Feet	20.0						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/14/2017

Boring Completed: 1/14/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-29

BORING LOG NO. B-28

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40945° Longitude: -89.62052°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
2.0	CLAYEY SAND (SC) , brown and gray, loose			X	3-3-3-3 N=6	13		
6.0	CLAYEY SAND (SC) , brown and gray, medium dense			X	7-8-8-8 N=16	17		
10.0	SANDY LEAN CLAY (CL) , brown and gray, very stiff			X	9-13-10-12 N=23	14		
14.0	- stiff below 8'			X	7-8-8-11 N=16	25		62
18.0	- organic debris from 13' to 15'			X	12-6-3-4 N=9	29		
22.0				X	6-6-5 N=11	113		
26.0				X	8-8-8 N=16	26		
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/14/2017

Boring Completed: 1/14/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-30

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-29

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40936° Longitude: -89.61781°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
	DEPTH								
2.0	CLAYEY SAND (SC) , organics, brown, very loose		X		1-1-2-1 N=3	29			
5	SANDY LEAN CLAY (CL) , brown and gray, soft to medium stiff - very stiff from 4' to 8'		X		1-1-3-6 N=4	15			
10	- stiff below 8'		X		10-11-9-7 N=20	18			
13.0			X		7-8-8-8 N=16	18	33-13-20		
15			X		7-6-8-8 N=14	17			
20.0	LEAN CLAY (CL) , with organic debris, dark brown, soft		X		1-2-2 N=4	71			
20.0	Boring Terminated at 20 Feet		X		2-1-1 N=2	27			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Water at surface

Water at surface



Boring Started: 1/16/2017

Boring Completed: 1/16/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-31

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-30

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.40936° Longitude: -89.61574°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
							LL-PL-PI	
DEPTH								
	CLAYEY SAND (SC) , gray, very loose			X	1-1-1-1 N=2	49		
	SANDY LEAN CLAY (CL) , brown and gray, stiff to very stiff			X	2-4-5-7 N=9	19	27-12-15	
			5		X	11-13-10-13 N=23	22	
					X	9-11-12-12 N=23	17	
					X	9-8-7-7 N=15	22	
					X	2-2-2 N=4	35	
	SANDY LEAN CLAY (CL) , brown and gray, soft to medium stiff							
		15						
				X	3-2-2 N=4	20		
		20						
	Boring Terminated at 20 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



Boring Started: 1/16/2017

Boring Completed: 1/16/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-32

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-31

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.4116° Longitude: -89.6284°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
	0' - 2.0'			X	1-1-2-4 N=3			
	2.0' - 4.0'			X	5-5-7-6 N=12	14		
	4.0' - 5.0'		5		X	3-3-4-7 N=7	18	
	5.0' - 7.0'				X	7-8-9-9 N=17	14	
	7.0' - 10.0'				X	10-11-11-12 N=22	15	
	10.0' - 15.0'				X	9-8-8 N=16	18	
	15.0' - 20.0'				X	7-6-6 N=12	19	
Boring Terminated at 20 Feet		20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/12/2017

Boring Completed: 1/12/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-33

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-32

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.4111° Longitude: -89.62415°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
							LL-PL-PI	
		DEPTH						
	CLAYEY SAND (SC) , brown and gray, loose			X	2-2-2-2 N=4	21		
	CLAYEY SAND (SC) , brown and gray, medium dense	2.0		X	3-5-6-5 N=11	21		39
				X	7-8-8-8 N=16	20		
				X	7-4-3-3 N=7	21		
				X	5-5-6-6 N=11	24		
		13.0		X	2-1-3 N=4	28		
	LEAN CLAY (CL) , gray, soft to medium stiff							
		20.0		X	2-2-2 N=4	30		
	Boring Terminated at 20 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/17/2017

Boring Completed: 1/17/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-34

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017.RESTORE(2-23-17).GPJ.TERRACON.DATATEMPLATE.GDT.3/8/17

BORING LOG NO. B-33

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41109° Longitude: -89.62637°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
	DEPTH								
6.0	SANDY LEAN CLAY (CL) , brown and gray, medium stiff - organic debris from 2' to 4'	5	▽	X	2-3-3-5 N=6	12			
				X	2-2-3-3 N=5	68			
				X	2-3-3-3 N=6	21			
6.0	LEAN CLAY (CL) , gray, medium stiff to stiff			X	4-3-5-3 N=8	29	33-14-19		
				X	6-4-4-4 N=8	23			
				X	1-2-2 N=4	21			
20.0	Boring Terminated at 20 Feet	20		X	4-3-3 N=6	19			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 1/17/2017

Boring Completed: 1/17/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-35

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017_RESTORE(2-23-17).GPJ TERRACON_DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-34

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41167° Longitude: -89.62187°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
4.0	CLAYEY SAND (SC) , brown and gray, loose to medium dense			X	3-3-4-4 N=7	21		
6.0	CLAYEY SAND (SC) , brown and gray, very loose	5	▽	X	6-5-7-7 N=12	18		46
6.0	CLAYEY SAND (SC) , brown and gray, loose to medium dense			X	2-1-1-2 N=2	15		
14.0	CLAYEY SAND (SC) , brown and gray, loose to medium dense			X	2-2-5-6 N=7	24		
14.0	LEAN CLAY (CL) , gray, medium stiff to stiff			X	8-6-6-8 N=12	23		
14.0	LEAN CLAY (CL) , gray, medium stiff to stiff			X	2-1-7 N=8	27	39-13-26	
20.0	- soft below 18'			X	2-2-1 N=3	27		
	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 1/13/2017

Boring Completed: 1/13/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-36

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-35

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41135° Longitude: -89.61997°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
							LL-PL-PI	
DEPTH								
0	SANDY LEAN CLAY (CL) , brown and gray, stiff to very stiff			X	3-5-5-9 N=10	15		
5				X	9-8-7-7 N=15	18		
10				X	8-6-7-7 N=13	18	38-10-28	
15	- medium stiff below 8'			X	7-7-9-9 N=16	17		
20				X	8-4-3-3 N=7	15		
13.0	LEAN CLAY (CL) , gray, soft to medium stiff			X	3-2-2 N=4	28		
20.0	- stiff below 18'			X	4-5-5 N=10			
	Boring Terminated at 20 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/13/2017

Boring Completed: 1/13/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-37

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017.RESTORE(2-23-17).GPJ.TERRACON.DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-36

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41074° Longitude: -89.6178°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
							LL-PL-PI		
6.0	LEAN CLAY (CL) , brown and gray, stiff to very stiff	5		X	3-4-4-4 N=8	15			
				X	5-6-5-5 N=11	19	37-11-26		
				X	9-10-9-9 N=19	19			
10.0	CLAYEY SAND (SC) , brown and gray, medium dense	10		X	8-7-7-7 N=14	24			
				X	7-10-8-8 N=18	25			
	- loose from 13' to 15'			X	4-2-3 N=5	31			33
20.0	Boring Terminated at 20 Feet	20		X	7-6-4 N=10	26			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

No free water observed during augering



859 S Pear Orchard Rd
Ridgeland, MS

Boring Started: 1/14/2017

Boring Completed: 1/14/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-38

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-37

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41286° Longitude: -89.62875°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		
							LL-PL-PI	PERCENT FINES	
	DEPTH								
38/17 GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT	CLAYEY SAND (SC), brown and gray, very loose			X	2-1-1-2 N=2	22		39	
	CLAYEY SAND (SC), brown and gray, medium dense		▽	X	4-7-9-9 N=16	17			
		5		X	10-11-10-11 N=21	12			
				X	9-12-12-8 N=24	19			
			10		X	8-7-7-9 N=14	17		
				X	4-2-2 N=4	24			
	CLAYEY SAND (SC), brown and gray, loose								
		15							
	CLAYEY SAND (SC), brown and gray, medium dense			X	8-7-6 N=13	22			
		18.0							
		20.0							
	Boring Terminated at 20 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 1/12/2017

Boring Completed: 1/12/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-39

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 38/17

BORING LOG NO. B-38

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41293° Longitude: -89.62601°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
	DEPTH							
	4.0	CLAYEY SAND (SC) , brown and gray, very loose to loose		X	2-1-2-2 N=3	19		33
					X	1-2-6-9 N=8	16	
		5	CLAYEY SAND (SC) , brown and gray, medium dense		X	10-13-10-12 N=23	19	
					X	8-8-7-8 N=15	17	
					X	6-7-7-5 N=14	18	27
					X	3-5-8 N=13	22	
	20.0			X	8-8-7 N=15	17		
	Boring Terminated at 20 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

Water at surface

Water at surface



Boring Started: 1/12/2017

Boring Completed: 1/12/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-40

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-40

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41289° Longitude: -89.62206°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	
							LL-PL-PI	PERCENT FINES
DEPTH								
2.0	SANDY LEAN CLAY (CL) , brown and gray, soft			X	2-1-1-2 N=2	18		
6.0	SANDY LEAN CLAY (CL) , brown and gray, medium stiff to stiff		▽	X	3-3-3-8 N=6	20		
6.0		5		X	8-7-6-6 N=13	28		
20.0	SILTY SAND (SM) , brown and gray, loose			X	4-4-3-3 N=7	19		
20.0	- medium dense from 13' to 15'			X	5-3-6-3 N=9	20		
20.0		15		X	4-5-5 N=10	24		
20.0		20		X	4-4-4 N=8	24		
20.0	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 1/13/2017

Boring Completed: 1/13/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-42

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

BORING LOG NO. B-41

PROJECT: Preliminary Site Investigation

CLIENT: Larson Environmental, LLC
Ocean Springs, Mississippi

SITE: Stennis Space Center
Hancock County, Mississippi

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 30.41275° Longitude: -89.61985°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS	PERCENT FINES
	LL-PL-PI							
DEPTH								
2.0	SANDY LEAN CLAY (CL) , brown and gray, soft to medium stiff			X	1-2-2-6 N=4	19		
6.0	SANDY LEAN CLAY (CL) , brown and gray, stiff		▽	X	6-8-3-3 N=11	21		
6.0		5		X	4-4-8-10 N=12	21		
6.0	SILTY SAND (SM) , brown and gray, medium dense			X	10-13-12-13 N=25	22		
6.0				X	9-9-7-6 N=16	21	25-17-8	
6.0				X	6-5-5 N=10	19		
6.0				X	4-7-5 N=12	24		
20.0	Boring Terminated at 20 Feet	20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Solid-Flight Auger: 0' to 10'
Rotary Wash: 10' to 20'

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ Initially encountered
- ▽ No rise detected



Boring Started: 1/13/2017

Boring Completed: 1/13/2017

Drill Rig: DR-898

Driller: Mark C.

Project No.: E4165017

Exhibit: A-43

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL SLOGS.E4165017 RESTORE(2-23-17).GPJ TERRACON DATATEMPLATE.GDT 3/8/17

APPENDIX B
SUPPORTING INFORMATION

Preliminary Geotechnical Engineering Report

Stennis Preliminary Site Investigation ■ Hancock County, Mississippi

March 8, 2017 ■ Terracon Project No. E4165017



Laboratory Testing

The laboratory testing program consisted of performing water content tests, Atterberg Limits and grain size determination tests on representative soil samples. Information from these tests was used in conjunction with field penetration test data to evaluate soil strength in-situ, volume change potential, and soil classification. Results of these tests are provided on the boring logs included in Appendix A.

Descriptive classifications of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System. Also shown are estimated Unified Soil Classification Symbols. A brief description of this classification system is attached to this report in Appendix C. All classification was by visual/manual procedures, (ASTM D2487). Selected samples were further classified using the results of Atterberg limit testing, (ASTM D4318). The Atterberg limits test results and percent fines (i.e. percent passing the No. 200 sieve) are also provided on the boring logs. The USCS group symbol is shown on the boring logs, and a brief description of the USCS is included with this report in Appendix C.












Procedural standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Atterberg Limits provide a quantitative measure of the soil plasticity and are useful in evaluating the potential for the soil to change volume with variation in water content. Information from these tests was used in conjunction with field penetration test data to evaluate in-situ soil strength and volume change potential.

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING			WATER LEVEL		Water Initially Encountered	FIELD TESTS	(HP) Hand Penetrometer	
	Auger	Split Spoon			Water Level After a Specified Period of Time		(T) Torvane	
					Water Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)	
	Shelby Tube	Macro Core		Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.			(PID) Photo-Ionization Detector	
							(OVA) Organic Vapor Analyzer	
								
Grab Sample	No Recovery							

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, tsf	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	0 - 6	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	0.25 to 0.50	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	0.50 to 1.00	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	1.00 to 2.00	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	2.00 to 4.00	15 - 30	19 - 42
			Hard	> 4.00	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification			
				Group Symbol	Group Name ^B		
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F		
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GP	Poorly graded gravel ^F		
			Fines classify as CL or CH	GM	Silty gravel ^{F,G,H}		
		Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	GC	Clayey gravel ^{F,G,H}	
			Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SW	Well-graded sand ^I	
	Fines classify as CL or CH			SP	Poorly graded sand ^I		
	Fine-Grained Soils: 50% or more passes the No. 200 sieve		Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above "A" line ^J	SM	Silty sand ^{G,H,I}
					$PI < 4$ or plots below "A" line ^J	SC	Clayey sand ^{G,H,I}
		Organic:		Liquid limit - oven dried	< 0.75	CL	Lean clay ^{K,L,M}
				Liquid limit - not dried		ML	Silt ^{K,L,M}
PI plots on or above "A" line				OL	Organic clay ^{K,L,M,N}		
Silts and Clays: Liquid limit 50 or more		Inorganic:	PI plots on or above "A" line	OH	Organic silt ^{K,L,M,O}		
			PI plots below "A" line	CH	Fat clay ^{K,L,M}		
		Organic:	Liquid limit - oven dried	< 0.75	MH	Elastic Silt ^{K,L,M}	
			Liquid limit - not dried		OH	Organic clay ^{K,L,M,P}	
			Liquid limit - not dried	OH	Organic silt ^{K,L,M,Q}		
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat		

^A Based on the material passing the 3-inch (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$E \quad Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

