

ATTACHMENT 4

GEOTECHNICAL REPORTS

January 12, 2007 Southern Earth Sciences Report

March 26, 2008 Southern Earth Sciences Report

(Note: The second geotechnical report was prepared after additional investigations were performed due to resiting of the Operations Building, Maintenance and Storage Complex. There have been additional minor adjustments in facility locations since the report was completed.)

ATTACHMENT 4

GEOTECHNICAL REPORTS

January 12, 2007 Southern Earth Sciences Report

762 Downtowner Loop West
P.O. Box 160745
Mobile, AL 36616

Tel.: (251) 344-7711
Fax: (251) 341-9488
www.soearth.com



January 12, 2007

URS GROUP, INC.
7650 West Courtney Campbell Causeway
Tampa, FL 33607

ATTENTION: Mr. Fred Walker, P.E.

REFERENCE: Proposed Riverine and Combat Craft
Operations Facility, Project No. P-210
Stennis Space Center
Hancock County, Mississippi
SESI Project M06-469

Dear Mr. Walker:

Southern Earth Sciences, Inc., has completed the subsurface exploration and engineering studies and analyses for the above referenced project. Authorization to proceed was given us by you. The following report provides a discussion of the development, exploration procedures used, subsurface conditions encountered, considerations for site preparation, and foundation recommendations.

SITE DESCRIPTION

Riverine Training Facility

The area is bound by wooded areas to the north, south and west, and an unnamed tributary (canal) of the Pearl River to the east. At the time of our investigation, we noted the site was partially wooded with moderate underbrush and contained a number of pieces of mobile utility equipment. In addition, an open shed and several small temporary structures were noted along the north and west areas of the site. The topography varied approximately from Elevation 21.57 to the meanderings of the canal shoreline at Elevation 0.0.

Bulkhead

The site is bound by open areas to the north and west, a wooded area to the south and the aforementioned canal to the east. At the time of our investigation, we noted the site was clear. The topography varied approximately from Elevation 5.0 to the meanderings of the canal shoreline at Elevation 0.0.

Helicopter Landing Area

The site is essentially surrounded by wooded areas. At the time of our investigation, we noted the site had been recently cleared and installation of underground utilities appeared to be in progress. The topography varied approximately from Elevation 25.4 to Elevation 1.3.

All elevations, as noted above, are approximate and are based on a drawing provided by URS Corporation titled Boring Location Plan, Riverine and Combat Craft Operations Facility, dated November 29, 2006.

GEOLOGIC SETTING

The site is located in the southern, lower, Gulf Coastal Plain physiographic province of Mississippi. Soils encountered and sedimentary deposits are primarily from the Holocene period, and consist of loam, sands, gravels and clay of the Coastal Deposits formation.

PROJECT INFORMATION

It is our understanding that the Riverine Facility project will consist of a one- to two-story building of steel and masonry construction with a concrete floor slab on grade. For the purpose of this report, we have assumed design column loads of 200 kips and maximum wall loads of 8 kips per lineal foot, as no structural loads were provided. In addition, we have assumed that the total thickness of fill used to achieve the desired final subgrade elevation will be limited to approximately 2 feet.

In the area to the north, we understand a bulkhead type retaining wall will be constructed along the canal shoreline and a helicopter landing pad will be placed on grade in an open area.

FIELD INVESTIGATIVE PROCEDURES

On December 19 through 22, 2006, we performed fifteen (15) split-spoon sample soil borings in locations and to depths as directed. The boring locations were staked in the field by your firm prior to the arrival of the drilling equipment. A Test Location Plan showing the approximate locations of the borings are included in **APPENDIX A**.

The soil borings with Standard Penetration Tests (SPT) were advanced to depths of 16½ to 61½ feet using track-mounted, mud-rotary type drilling equipment. All samples obtained in the field were returned to our laboratory and visually classified in accordance with the Unified Soil Classification System. Logs for the soil borings are attached to this report in **APPENDIX B**.

LABORATORY TESTING

In order to define the soil properties more closely, classification tests were performed on selected samples obtained in the borings. A summary of the test data is included in **APPENDIX C**.

SUBSURFACE CONDITIONS ENCOUNTERED

Subsurface conditions for each area will be discussed separately. All references to depth are made with respect to the existing ground surface at the time the borings were performed.

Riverine Training Facility

A review of the subsurface conditions shows loose to medium sands with varying root content to 2 feet, followed by loose to very dense sand and clayey sand interlaced with medium to very stiff clays to depths of 13 to 18 feet. This was underlain by loose to very dense sands to 38 to 42 feet and soft to medium clay to the depth of the exploration at 61½ feet. The only notable exceptions occurred in Boring No. RB-8, which showed a stratum of soft clay from 13 feet to its termination depth at 16½ feet, and Boring No. RB-12, which displayed a similar layer from 4½ to 7 feet.

Bulkhead

Subsurface conditions encountered in the borings were similar. Essentially, underlying the surface soils with varying root content, loose to medium sand and clayey sand was exhibited to the depths of the borings at 26½ feet.

Helicopter Landing Area

Boring No. RB-15 showed loose sand to 2 feet, followed by very stiff clay to 4½ feet, medium to very dense sand and clayey sand to 13 feet, very soft clay to 17 feet, and medium sand to the depth of the boring at 21½ feet.

It is noted; traces of wood were encountered at various depths in Boring Nos. RB-5, RB-11, RB-12, and RB-13. Inspection of this material in our laboratory indicated it may be the remnants of tree stumps; and, due to their depth, should be of no concern.

At the site of the Riverine Training Facility, the ground water table was found to vary from 5.8 feet below the existing ground surface in Boring No. RB-1 to 17 feet below existing grade in Boring No. RB-3, with most of the remaining borings showing water tables to a depth of at least 10 feet. The most likely reason for the relatively shallow measurement in Boring RB-5 is due to the low permeability of the shallow layers of soil, resulting in possible retention of the drilling water. In the area of the Proposed Bulkhead, the ground water was noted at 1.5 feet below grade, which would be expected due to their close proximity to the canal. In Boring No. RB-15, in the vicinity of the planned Helicopter Landing Area, the water table was noted at a depth of 15.4 feet below grade.

It must be noted that fluctuations in the level of the ground water table may occur due to rainfall, elevation, drainage, tides, temperature and other factors not evident at the time measurements were made. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on such assumptions of variation.

USDA NRCS SOILS CLASSIFICATION

Based on information obtained from the Natural Resource Conservation Service of the United States Department of Agriculture, the predominant soil classes at these sites are the Atmore silt loam (At), Harleston fine sandy loam (H1a), and the Plummer loamy sand (Pm). Summaries of the soil surveys for these sites are included in **APPENDIX D**.

EXPANSIVE SOIL CHARACTERISTICS

As previously mentioned, the upper strata of soils at these sites were primarily sands. In areas where clays were evident at shallow depths, results of Atterberg Tests performed on selected samples indicate that these soils showed little potential for volume change under conditions of varying moisture content. With regards to Section 1802.3.2 of the 2003 Edition of the International Building Code (IBC), clays and clayey soils encountered at relatively shallow depths do not exhibit the characteristics of expansive soils.

SEISMIC CONSIDERATIONS

Based on the subsurface conditions encountered, with reference to Table 1615.1.1 of the IBC, these sites would best be categorized as **Site Class "E"**. It is noted, borings for this project were performed to a maximum depth of 61½ feet and the IBC normally requires soil information to a depth of 100 feet be used in site classification. In Section 1615.1.1, however, it states that appropriate soil properties can be estimated by a registered design professional if site-specific data is not available. Data available in our files from previous projects near this site was used for this purpose.

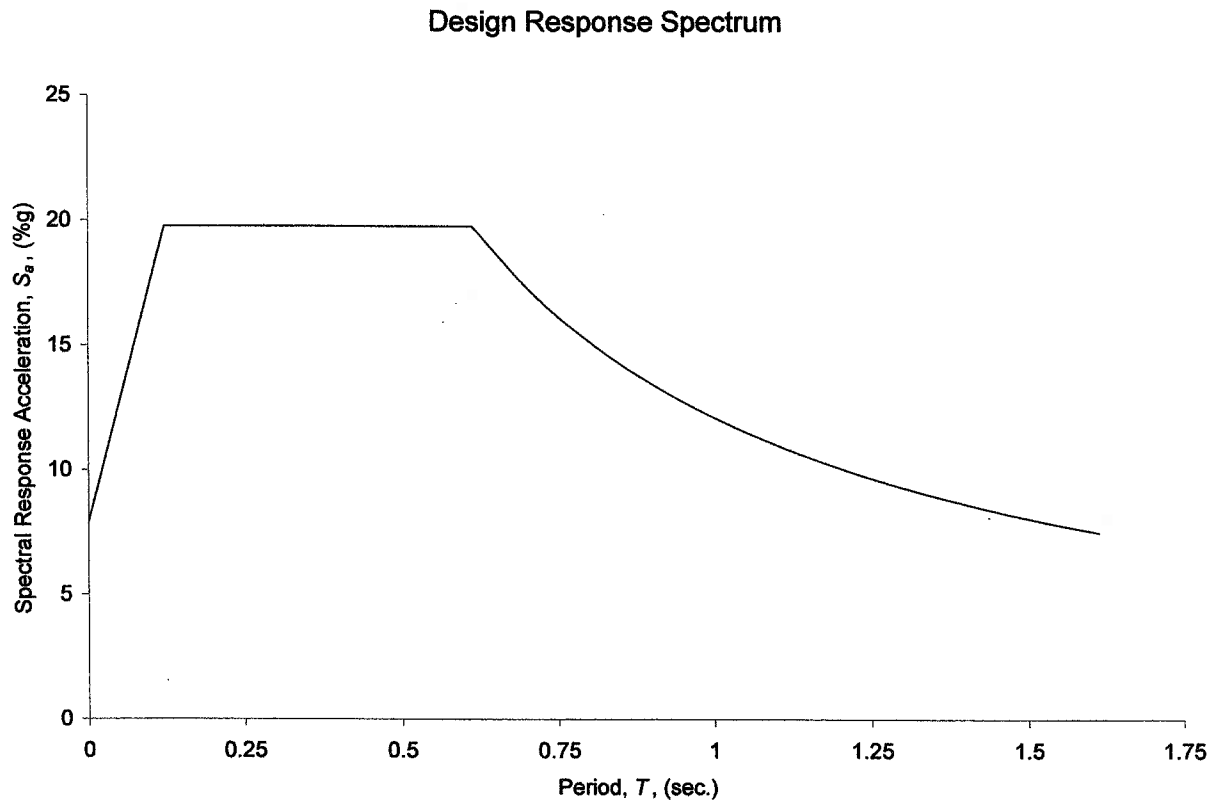
In accordance with Sections 1615.1.2, 1615.1.3, and 1615.1.4 of the IBC, design parameters were calculated for an earthquake having a 2% probability of exceedence in a 50-year period using seismic data available from the United States Geological Survey (USGS). The results of these calculations, expressed as a percent of the gravitational force (g) are as follows:

Five-Percent Damped Design Spectral Response Acceleration Parameters

Short Periods (0.2 sec) $S_{DS} = 19.77 \%g$

1-Second Periods $S_{D1} = 12.11 \%g$

Based on the IBC Site Class and the above seismic data, a typical spectral response curve for this site was developed and is shown below:



FOUNDATION ANALYSIS

Riverine Training Facility

Since this is the only area where a structure will be built, this section will address the conditions as encountered in Borings RB-1 through RB-12. Further, comments and recommendations as provided in the following paragraphs will apply only to this particular part of the project.

A review of the subsurface conditions encountered shows that beneath the very loose to medium surface sands with varying root content, soils of reasonable density and consistency were evident to a depth of at least 13 feet. Calculations indicate that stresses from shallow foundations would

be effectively dissipated prior to reaching these questionable strata. Based on these conditions and the assumed design data, this structure could be supported on shallow foundations.

It is noted; as previously mentioned, Boring RB-12 revealed a layer of weak clay at a relatively shallow depth. We have assumed that the location of this boring is not in the area of the proposed building, therefore the existence of this potentially compressible soil would not be considered critical.

Bulkhead

Based on the results of the field exploration, approximated soil properties for Boring Nos. B-13 and B-14 are shown below in TABLES I and II:

TABLE I
 APPROXIMATE SOIL PROPERTIES
 BORING B-13

Depth Interval (feet below grade)		Unit Weight (γ) (pcf)	Friction Angle (ϕ) (deg)	Cohesion (c) (psf)
0	5	110	27	0
5	10	120	30	0
10	13	110	27	0
13	25	120	30	0

TABLE II
 APPROXIMATE SOIL PROPERTIES
 BORING B-14

Depth Interval (feet below grade)		Unit Weight (γ) (pcf)	Friction Angle (ϕ) (deg)	Cohesion (c) (psf)
0	8	110	27	0
8	25	120	30	0

SUBGRADE PREPARATION

Initially, the existing structures should be demolished and removed. The site should be cleared, grubbed, and stripped of all soils containing roots and organic matter and any remnants of the previous structure, including old foundations, pavements, utility lines, etc. Topsoil and other organic laden soils obtained during site stripping operations could be stockpiled on site for reuse in landscaped areas and on the sides of roads. The remaining surface soils should be thoroughly and uniformly compacted in place, and any soft or unstable soils encountered should be removed. Thoroughly compacted backfill and fill should then be placed to the desired subgrade elevations.

Backfill and Fill

Backfill and Fill material should be non-plastic and granular in nature with a maximum of 20% passing the Wash 200 Sieve. It should be placed in thin successive layers 8" to 10" loose measurement and each layer should be compacted to at least 95% of its maximum laboratory dry density, within $\pm 2\%$ of its optimum moisture content, in accordance with ASTM D1557 (Modified Proctor). In-place field density tests should be performed as this material is being placed and compacted in order to insure that required density is being achieved. Since these testing services are within the scope of our activities, we urge that our firm be retained to assist you during the earthwork phase of this project.

RECOMMENDATIONS

Footings

We would recommend that footings be designed for a maximum net allowable unit soil pressure of 2,000 pounds per square foot in order to minimize post-construction settlement. Bearing depths should be a minimum of 18 inches below finished grade. Based on the assumed design data and this maximum soil pressure, total settlement of the foundations would not be expected to exceed 1 inch, approximately 50% of which could be differential between interior columns and load bearing walls.

Concrete Floor Slabs

After the subgrade has been prepared as outlined, conventionally designed concrete slabs could be placed on grade. These slabs should be appropriately jointed such that minor differential movement does not cause excessive distortion or damage. For design purposes, a modulus of subgrade reaction (k) of 250 pounds per cubic inch (pci) could be used.

Pavement Design Data

Bulk samples were obtained at several locations for California Bearing Ratio (CBR) testing. The results of these tests and corresponding estimates of modulus of subgrade reaction (k) are shown below in TABLE III:

TABLE III
DESIGN DATA

<i>Location</i>	<i>Boring No.</i>	<i>CBR</i>	<i>k</i>
Riverine Training Facility	RB-2	32.2	300 pci
	RB-3	1.1	N/A
Helicopter Landing Area	RB-15	40.5	375 pci

It is noted; the sample in the vicinity of RB-3 appeared to contain a higher amount of organic material than those from other areas of the site. Although the samples were sieved to remove as much of this deleterious material as practicable, it is our opinion that the results of this test were affected by this material.

For design purposes, we would recommend that a subgrade modulus (*k*) value of 225 pci and a CBR of 15 be used for roads, paved parking areas, and the helicopter landing pad.

GENERAL COMMENTS

The soil samples obtained during the subsurface investigation will be retained for a period of 6 months from the date of this report. If no instructions are received, they will be disposed of at that time.

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The boring logs and related information are based on the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate and the description represents our interpretation of subsurface conditions at the designated boring location and on the particular date drilled.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering works and judgments rendered meet the standard of care of our profession.

URS GROUP, INC.
SESI Project M06-462
January 12, 2007
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This report has been prepared in order to aid in the evaluation of this project and to assist the architects and engineers in the structural design. It is intended for use with regard to the specific project discussed herein and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

As the project geotechnical engineer of record that developed the foundation design recommendations, please be aware that we cannot accept responsibility for the performance of the foundation system if we are not afforded the opportunity to confirm that our recommendations have been followed. Accordingly, we recommend that Southern Earth Sciences, Inc. be retained on this project to perform observation and field-testing services during the construction phase of the foundation system.

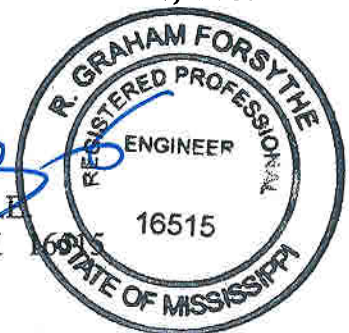
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We appreciate the opportunity to serve you on this project. If you have any questions or if we may be of further assistance, please call at your convenience.

Very truly yours,

SOUTHERN EARTH SCIENCES, INC.


R. Graham Forsythe, P.E.
Registered, Mississippi 16515



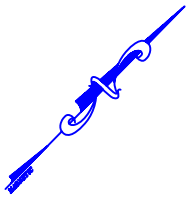
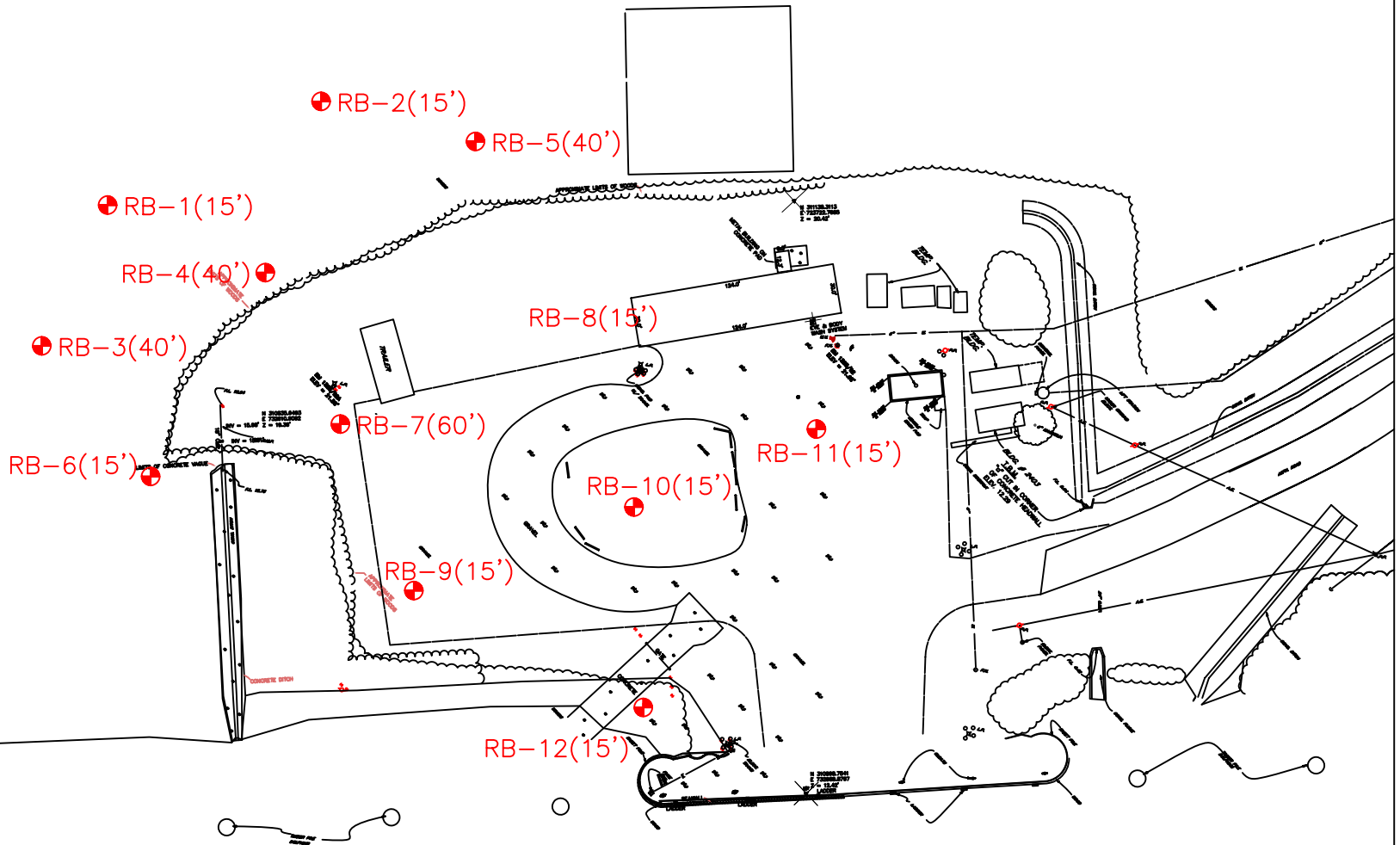
RGF/rf

Enclosures

APPENDIX A

TEST LOCATION PLANS

PROPOSED RIVERINE AND COMBAT CRAFT
OPERATIONS FACILITY – PROJECT NO. P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT NO. 06-462

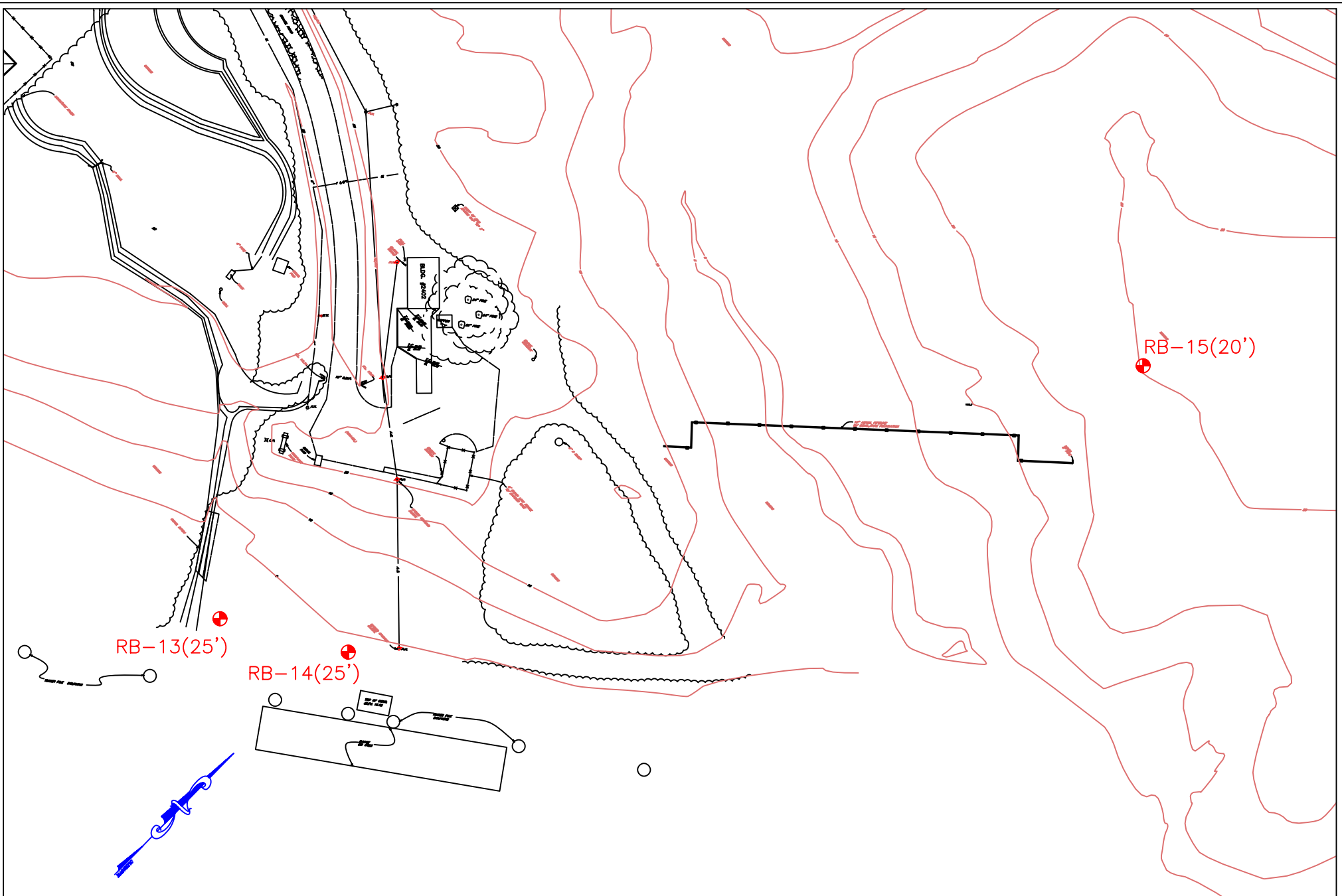


RIVERINE AND COMBAT
 CRAFT OPERATIONS FACILITY
 PROJECT P-210
 STENNIS SPACE CENTER
 HANCOCK COUNTY, MS

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TEST LOCATION PLAN
 RIVERINE TRAINING FACILITY
 PAGE 1 OF 2
 SESI PROJECT M06-462



RIVERINE AND COMBAT
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 PROJECT P-210
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TEST LOCATION PLAN
 BULKHEAD AND HELO PAD
 PAGE 2 OF 2
 SESI PROJECT M06-462

APPENDIX B

BORING LOGS

PROPOSED RIVERINE AND COMBAT CRAFT
OPERATIONS FACILITY – PROJECT NO. P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT NO. 06-462

SOIL BORING LOG

BORING NO.: RB-1

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/19/06

DATE COMPLETED: 12/19/06

WATER LEVEL: 10.5 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		SC	Very Loose Tan & Yellow Clayey Fine SAND with Some Organics	4		
5		SP-SM	Medium Brown & Tan Fine SAND with Some Silt	12		
10		CL	Medium Orange & Gray CLAY with Little Sand	23		
15		SC	Loose Gray & Yellow Fine Clayey SAND	12	18.2	66
20				10		
25				9	22.8	43
30						

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-2

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/20/06

DATE COMPLETED: 12/20/06

WATER LEVEL: 12.5 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		SP-SM	Very Loose Tan & Orange Fine SAND with Some Silt & Organics	4		
4		CL	Stiff Orange CLAY with Some Sand	18	17.2	73
5		SP-SM	Loose to Dense Orange & Gray Fine SAND with Some Silt	31		
7				7		
10		CL	Medium Orange & Gray CLAY with Little Sand	6		
15		SC	Medium Tan Fine Clayey SAND	17		
20						
25						
30						

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-3

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: MUD ROTARY

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/19/05

DATE COMPLETED: 12/19/06

WATER LEVEL: 17 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %	
0		SP-SM	Loose Tan Fine SAND with Some Silt & Organics	4			
		SC	Medium to Dense Gray & Yellow Fine Clayey SAND	19	15.9	46	
		CL	Stiff to Very Stiff Yellow & Gray CLAY with Trace Sand	44			
-10				16			
				14			
				10			
-20			SP-SM	Medium to Dense Gray, Orange & Tan Fine SAND with Some Silt	14		
				36			
-30			SP-SM	Dense to Very Dense Tan & Dark Brown Fine SAND with Some Silt	27	20.8	8
				56			
-40			31				
-50							

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-4

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: MUD ROTARY

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/20/06

DATE COMPLETED: 12/20/06

WATER LEVEL: NOT MEASURED

WATER LEVEL DATE:

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0	2/6 1/6 3/6	SP-SM	Loose Tan & Gray Fine SAND with Some Silt & Organics	4		
	4/6 3/6 4/6	SC	Loose to Medium Tan, Gray & Yellow Clayey Fine SAND	7		
	6/6 7/6 9/6	CL	Medium Gray & Orange CLAY with Trace Sand	16	14.2	31
10	2/6 3/6 4/6			7		
	2/6 2/6 3/6			5		
	7/6 6/6 9/6	SP-SM	Medium to Dense Gray, Tan & Brown Fine SAND with Some Silt	15		
20	10/6 14/6 14/6			28		
	5/6 9/6 19/6			28		
30	10/6 19/6 26/6			45		
	9/6 11/6 7/6			18		
40	1/6 1/6 3/6	CL	Soft Gray CLAY with Trace Sand	4		
50						

Remarks: Ground water table not measured due to collapse of borehole.

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-5

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: MUD ROTARY

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/20/06

DATE COMPLETED: 12/20/06

WATER LEVEL: 15.6 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0	1/6 2/6 2/6	SP-SM	Loose Orange Fine SAND with Some Silt & Organics	4		
	2/6 3/6 5/6	CL	Medium to Stiff Gray & Orange CLAY with Some Sand	8		
	7/6 11/6 16/6			27		
	14/6 12/6 15/6			27		
10	5/6 5/6 5/6			10	26.8	71
	3/6 9/6 10/6			19		
	5/6 6/6 7/6	SP-SM	Dense Gray Fine SAND with Some Silt & Traces of Wood	13		
	14/6 15/6 23/6			38		
	11/6 18/6 25/6	SP-SM	Medium to Dense Tan & Gray Fine SAND with Some Silt	43		
30	15/6 19/6 17/6			36		
	6/6 9/6 14/6			23		
40						
50						

Remarks: Presence of wood noted in the sample at 25'.

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-6

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/20/06

DATE COMPLETED: 12/20/06

WATER LEVEL: 15.2 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">0</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">30</div> </div>		<p>SP-SM</p> <hr style="border-top: 1px dashed black;"/> <p>CL</p>	<p>Medium Tan Fine SAND with Some Silt</p> <hr style="border-top: 1px dashed black;"/> <p>Stiff to Very Stiff Orange and Gray CLAY with Trace Sand</p>	<p>12</p> <p>27</p> <p>17</p> <p>18</p> <p>13</p> <p>8</p>

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-7

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: MUD ROTARY

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/18/06

DATE COMPLETED: 12/18/06

WATER LEVEL: 14 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SP-SM	Medium Orange Fine SAND with Some Silt	28			
10		CL	Stiff to Very Stiff Gray CLAY with Trace Sand	17	19.8	29	95
20		SP-SM	Medium to Very Dense Tan & Orange Fine SAND with Little Silt	39			
30				22	19.0		6
40				50/4"			
50		SP-SM	Dense Brown Fine SAND with Some Silt & Gravel	44			
60		SP-SM	Loose Gray Fine SAND with Some Silt	9			
70		CL	Medium Gray CLAY with Trace Sand	5			
				8			
				7			
				6			

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-8

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/20/06

DATE COMPLETED: 12/20/06

WATER LEVEL: 14 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SP-SM	Medium Tan Fine SAND with Some Silt	23			
		CL	Medium Orange CLAY with Trace Sand	5	56.8	20	97
5		CL-ML	Stiff to Very Stiff Gray CLAYEY SILT with Some Sand	13	15.5	19	57
		SP-SM	Dense Tan & Gray Fine SAND with Some Silt	36			
10		CL	Soft Gray & Tan CLAY with Trace Sand	29			
15		CL		4			
20							
25							
30							

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-9

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/18/06

DATE COMPLETED: 12/18/06

WATER LEVEL: 14 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %	
0		SP-SM	Medium Gray & Orange Fine SAND with Some Silt and Gravel	19				
5		CL	Medium Gray CLAY with Little Sand	9	19.8	35	98	
10					11			
15			SP-SM	Medium Tan & Orange Fine SAND with Some Silt	13			
20					11			
25					16			
30								

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-10

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/18/06

DATE COMPLETED: 12/18/06

WATER LEVEL: 14 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		SP-SM	Medium Tan & Orange Fine SAND with Some Silt	20		
5		SC	Dense Tan & Orange Clayey Fine SAND	39		
10		CL	Stiff to Very Stiff Gray CLAY with Trace Sand	24	14.5	71
15				15		
20				13		
30				21		

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-11

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/18/06

DATE COMPLETED: 12/18/06

WATER LEVEL: 13.9 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1; padding-left: 10px;"> <p>14/6 18/6 21/6</p> <p>5/6 13/6 14/6</p> <p>11/6 13/6 11/6</p> <p>6/6 9/6 7/6</p> <p>2/6 2/6 2/6</p> <p>3/6 8/6 12/6</p> </div> </div>	<p>SP-SM</p> <hr/> <p>SC</p> <hr/> <p>SP-SM</p>	<p>Medium to Dense Tan & Orange Fine SAND with Some Silt</p> <hr/> <p>Loose Gray Clayey SAND with Traces of Wood</p> <hr/> <p>Medium Tan Fine SAND with Some Silt</p>	<p>39</p> <hr/> <p>27</p> <hr/> <p>24</p> <hr/> <p>16</p> <hr/> <p>4</p> <hr/> <p>20</p>	

Remarks: Presence of wood noted in the sample at 10'.

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-12

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: HOLLOW STEM AUGER

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/22/06

DATE COMPLETED: 12/18/06

WATER LEVEL: 5.8 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SP-SM	Medium Orange and Gray Fine SAND with Some Silt	11			
		CL	Medium Gray CLAY with Some Sand	8	16.2	24	68
5		CL	Soft Gray CLAY with Traces of Wood	4			
		SM	Very Loose Gray SAND with Some Silt	3			
10		SP-SM	Dense Gray & Tan SAND with Some Silt and Wood	31			
		SP-SM	Medium Tan & Orange Fine SAND with Some Silt	19			
15							
20							
25							
30							

Remarks: Presence of wood noted in the samples at 5' & 10'.

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-13

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: MUD ROTARY

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/18/06

DATE COMPLETED: 12/22/06

WATER LEVEL: 1.5 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %	
0		SP-SM	Loose to Medium Tan & Brown Fine SAND with Some Silt	6				
5					7			
10					21			
15			SP-SM	Medium Tan Fine SAND with Some Silt and Traces of Wood	13			
20			SC-SM	Loose Gray Clayey, Silty SAND with Organics	5	28.2	22	42
25			SP-SM	Loose to Medium Tan Fine SAND with Some Silt	6			
30					13			

Remarks: Presence of wood noted in the sample at 7.5'.

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-14

PROJECT: RIVERINE TRAINING FACILITY

PROJECT NO.: 06-462

PROJECT LOCATION: HANCOCK COUNTY, MS

METHOD: MUD ROTARY

BORING LOCATION: SEE TEST LOCATION PLAN

BORING ELEVATION: EXISTING GRADE

DATE DRILLED: 12/22/06

DATE COMPLETED: 12/22/06

WATER LEVEL: 1.5 ft

WATER LEVEL DATE: 12/22/06

GEOL / ENGR: G. FORSYTHE

DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N
0		SP-SM	Loose to Medium Brown and Tan Fine SAND with Some Silt	7
5		9		
10		14		
15		13		
20		18		
25		21		
30				

Remarks:

GEOLOG3 F:\JOB\FOL-12006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

SOIL BORING LOG

BORING NO.: RB-15
PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MS
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 12/22/06
WATER LEVEL: 15.4 ft
GEOL / ENGR: G. FORSYTHE

PROJECT NO.: 06-462
METHOD: HOLLOW STEM AUGER
BORING ELEVATION: EXISTING GRADE
DATE COMPLETED: 12/22/06
WATER LEVEL DATE: 12/22/06
DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SP-SM	Loose Brown & Yellow Fine SAND with Some Silt	5			
		CL	Very Stiff Orange CLAY with Some Sand	24	17.2	32	51
5		SC	Medium to Very Dense Orange Clayey Fine SAND	28	15.4	27	48
10		SP-SM	Medium to Dense Gray & Yellow Fine SAND with Some Silt	24			
15		CL	Very Soft Brown & Gray CLAY with Trace Organics	2			
20		SP-SM	Medium Brown Fine SAND with Some Silt	24			
25							
30							

Remarks:

GEOLOG3 F:\JOB\FOL-112006\06462--106242 RIVERINE TRNG FACILITY.GPJ SO_EARTH.GDT 1/12/07

APPENDIX C

LABORATORY TEST DATA

**Materials
Testing
Report**



**Tabulated
Data
Sheet**

Client:

URS Corp

Date: 01/05/07

Project:

Combat Watercraft Facility - Stennis Space
Center

**SESI
Project
No.** 06-462

LABORATORY TEST DATA

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
RB-1	S-4	7.5-9.0	CL	18.2			65.8
RB-1	S-6	15.0-16.5	SC	22.8			42.9
RB-2	S-2	2.5-4.0	CL	17.2			72.9
RB-3	S-2	2.5-4.0	SC	15.9			46.3
RB-3	S-9	30.0-31.5	SP-SM	20.8			7.6
RB-4	S-3	5.0-6.5	SC	14.2			31.2
RB-5	S-5	10.0-11.5	CL	26.8			70.9
RB-7	S-2	2.5-4.0	CL	19.8	29	16	95.4
RB-7	S-8	25.0-26.5	SP-SM	19.0			5.5
RB-8	S-2	2.5-4.0	CL	56.8	20	8	97.0
RB-8	S-3	5.0-6.5	CL-ML	15.5	19	7	56.9
RB-9	S-2	2.5-4.0	CL	19.8	35	22	97.6
RB-10	S-3	5.0-6.5	CL	14.5			71.2
RB-12	S-2	2.5-4.0	CL	16.2	24	10	68.1
RB-13	S-5	10.0-11.5	SC-SM	28.2	22	7	42.1
RB-15	S-2	2.5-4.0	CL	17.2	32	15	50.7
RB-15	S-3	5.0-6.5	SC	15.4	27	14	48.0

Reviewed:

COMPACTION TEST REPORT

Project No.: 06-462

Date: 12-19-06

Project: RIVERINE TRAINING FACILITY/STENNIS

Location: RB-2

Elev./Depth:

Sample No. 12-19-06

Remarks: CBR VALUE 32.2 (at 91.2% of PD)

MATERIAL DESCRIPTION

Description: GRAY CLAYEY SAND

Classifications -

USCS: SC

AASHTO:

Nat. Moist. =

Sp.G. =

Liquid Limit =

Plasticity Index =

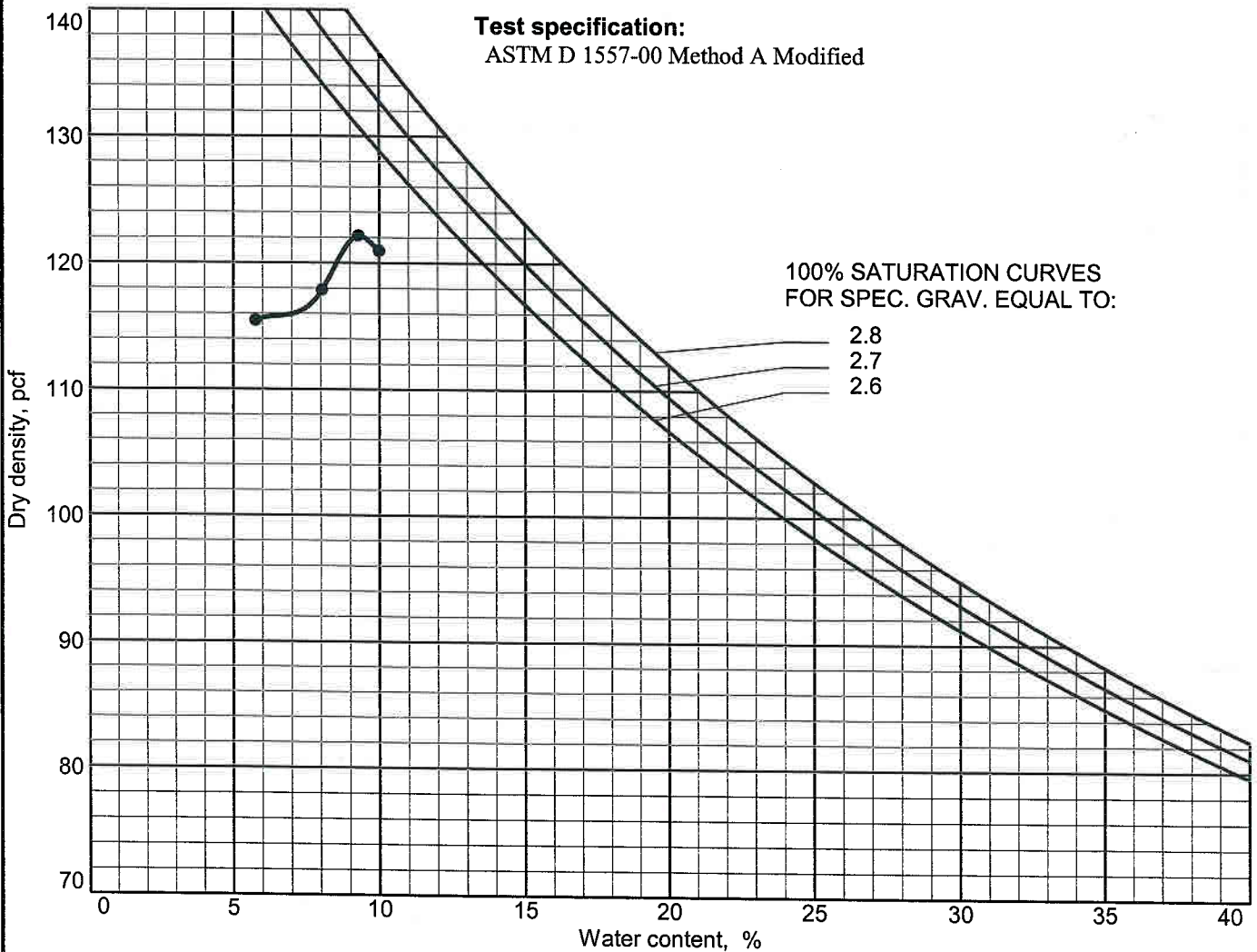
% > No.4 = %

% < No.200 = 45.7 %

TEST RESULTS

Maximum dry density = 122.2 pcf

Optimum moisture = 9.3 %



Figure

COMPACTION TEST REPORT

Project No.: 06-462

Date: 12-19-06

Project: RIVERINE TRAINING FACILITY/STENNIS

Location: RB-3

Elev./Depth:

Sample No. 12-19-06

Remarks: CBR VALUE 1.1 (at 89.4% of PD)

MATERIAL DESCRIPTION

Description: BROWN/GRAY CLAYEY SAND

Classifications -

USCS: SC

AASHTO:

Nat. Moist. =

Sp.G. =

Liquid Limit =

Plasticity Index =

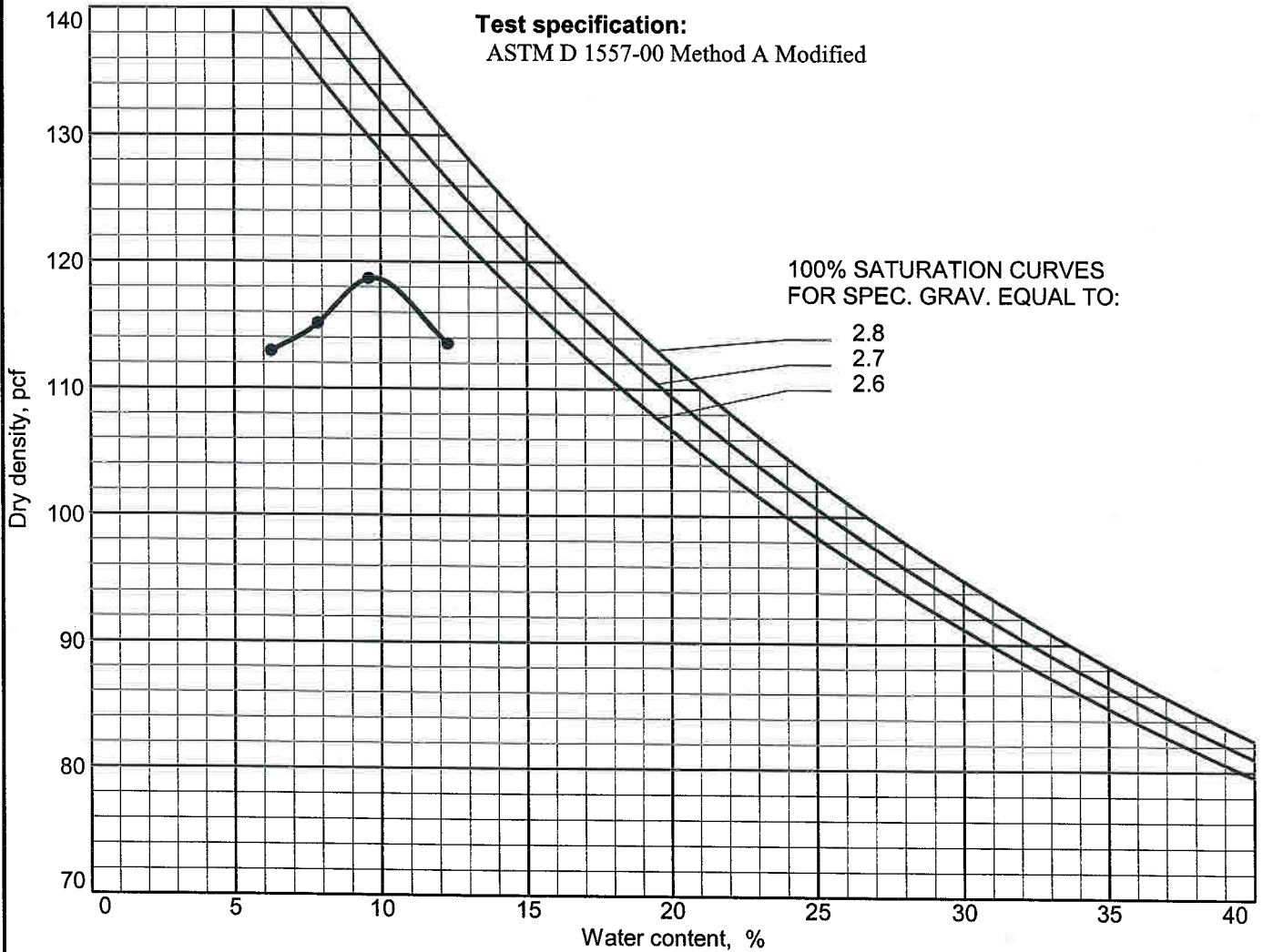
% > No.4 = %

% < No.200 = 39.7 %

TEST RESULTS

Maximum dry density = 118.7 pcf

Optimum moisture = 9.7 %



Figure

COMPACTION TEST REPORT

Project No.: 06-462

Date: 12-19-06

Project: RIVERINE TRAINING FACILITY/STENNIS

Location: RB-15

Elev./Depth:

Sample No. 12-19-06

Remarks: CBR VALUE 40.5 (at 93.1% of PD)

MATERIAL DESCRIPTION

Description: GRAY CLAY

Classifications -

USCS: CL

AASHTO:

Nat. Moist. =

Sp.G. =

Liquid Limit =

Plasticity Index =

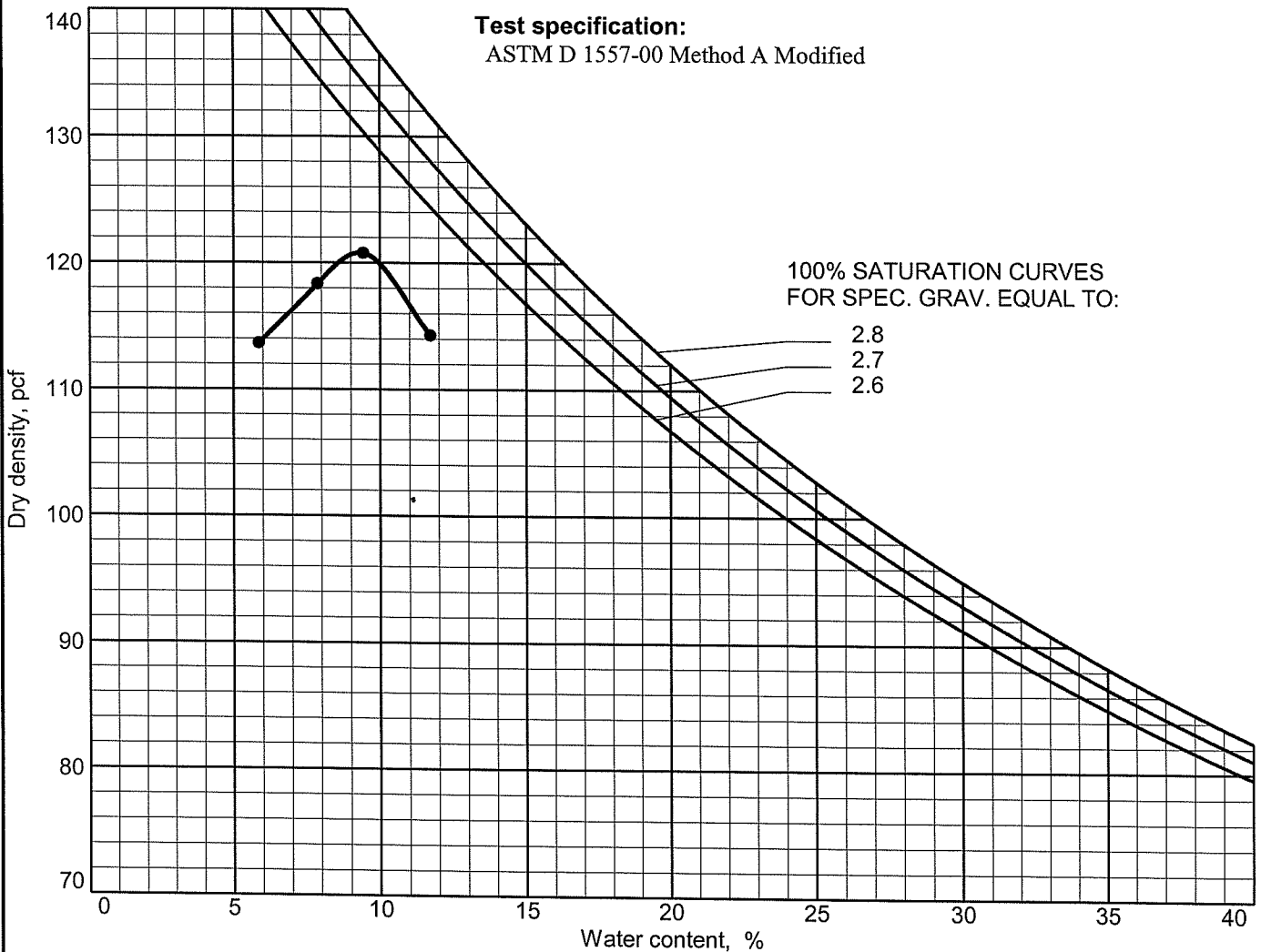
% > No.4 = %

% < No.200 = 67.3 %

TEST RESULTS

Maximum dry density = 120.8 pcf

Optimum moisture = 9.3 %



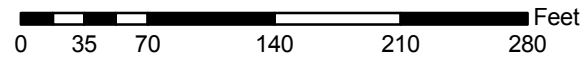
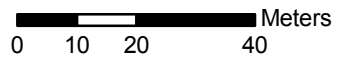
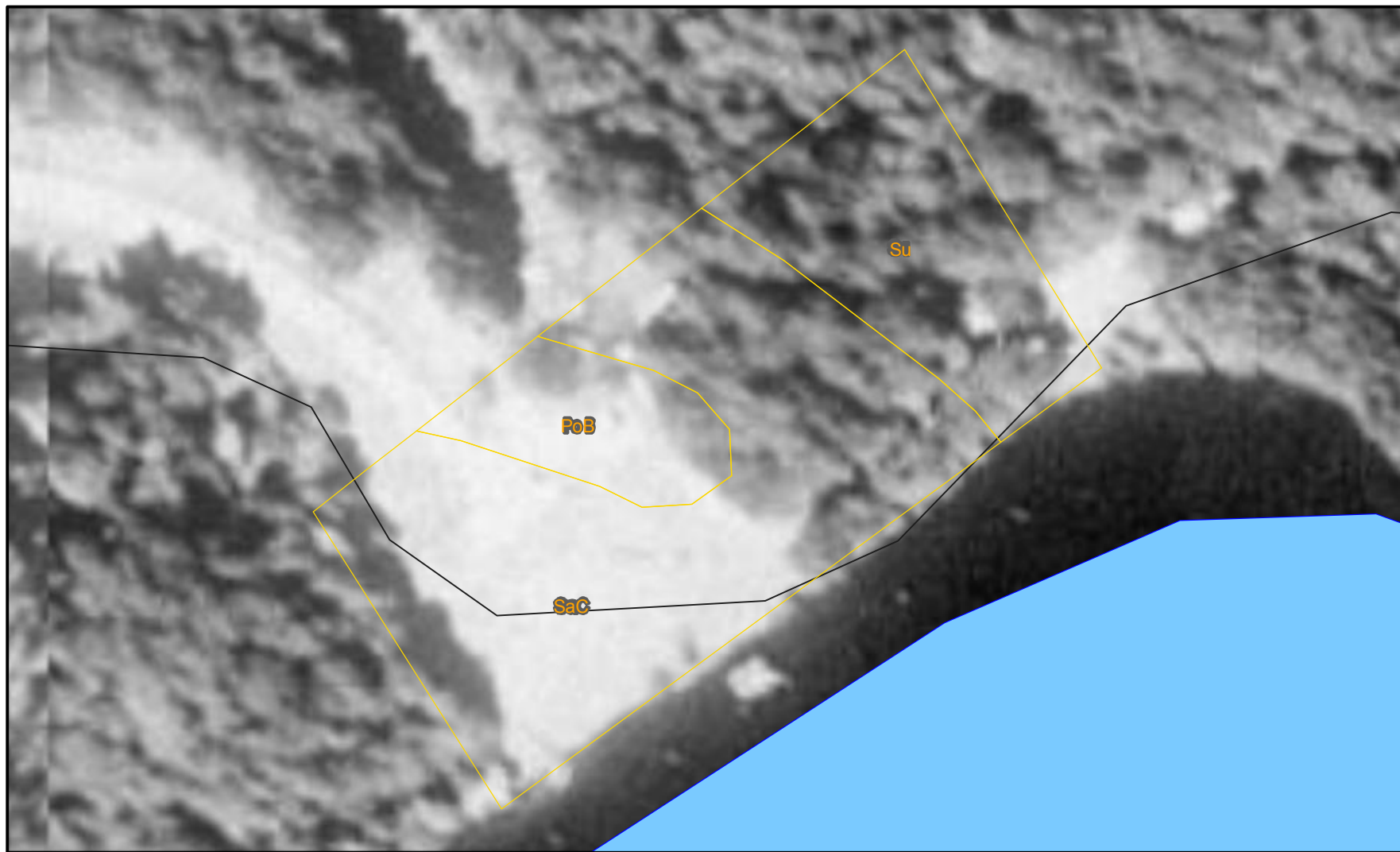
APPENDIX D

NRCS SOIL DATA

PROPOSED RIVERINE AND COMBAT CRAFT
OPERATIONS FACILITY – PROJECT NO. P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT NO. 06-462

SOIL SURVEY OF HANCOCK COUNTY, MISSISSIPPI

























Bulkhead and Helo Pad



SOIL SURVEY OF HANCOCK COUNTY, MISSISSIPPI

Bulkhead and Helo Pad

MAP LEGEND

	Soil Map Units
	Interstate Highways
	Roads
	Rails
	Water
	Hydrography
	Oceans
	Escarpment, bedrock
	Escarpment, non-bedrock
	Gulley
	Levee
	Slope
	Blowout
	Borrow Pit
	Clay Spot
	Depression, closed
	Eroded Spot
	Gravel Pit
	Gravelly Spot
	Gulley
	Lava Flow
	Landfill
	Marsh or Swamp
	Miscellaneous Water
	Rock Outcrop
	Saline Spot
	Sandy Spot
	Slide or Slip
	Sinkhole
	Sodic Spot
	Spoil Area
	Stony Spot
	Very Stony Spot
	Perennial Water
	Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>

Coordinate System: UTM Zone 16

Soil Survey Area: Hancock County, Mississippi
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:20000

Map comprised of aerial images photographed on these dates:
10/25/1989

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

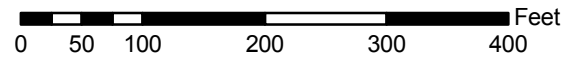
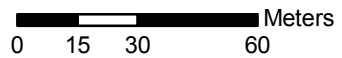
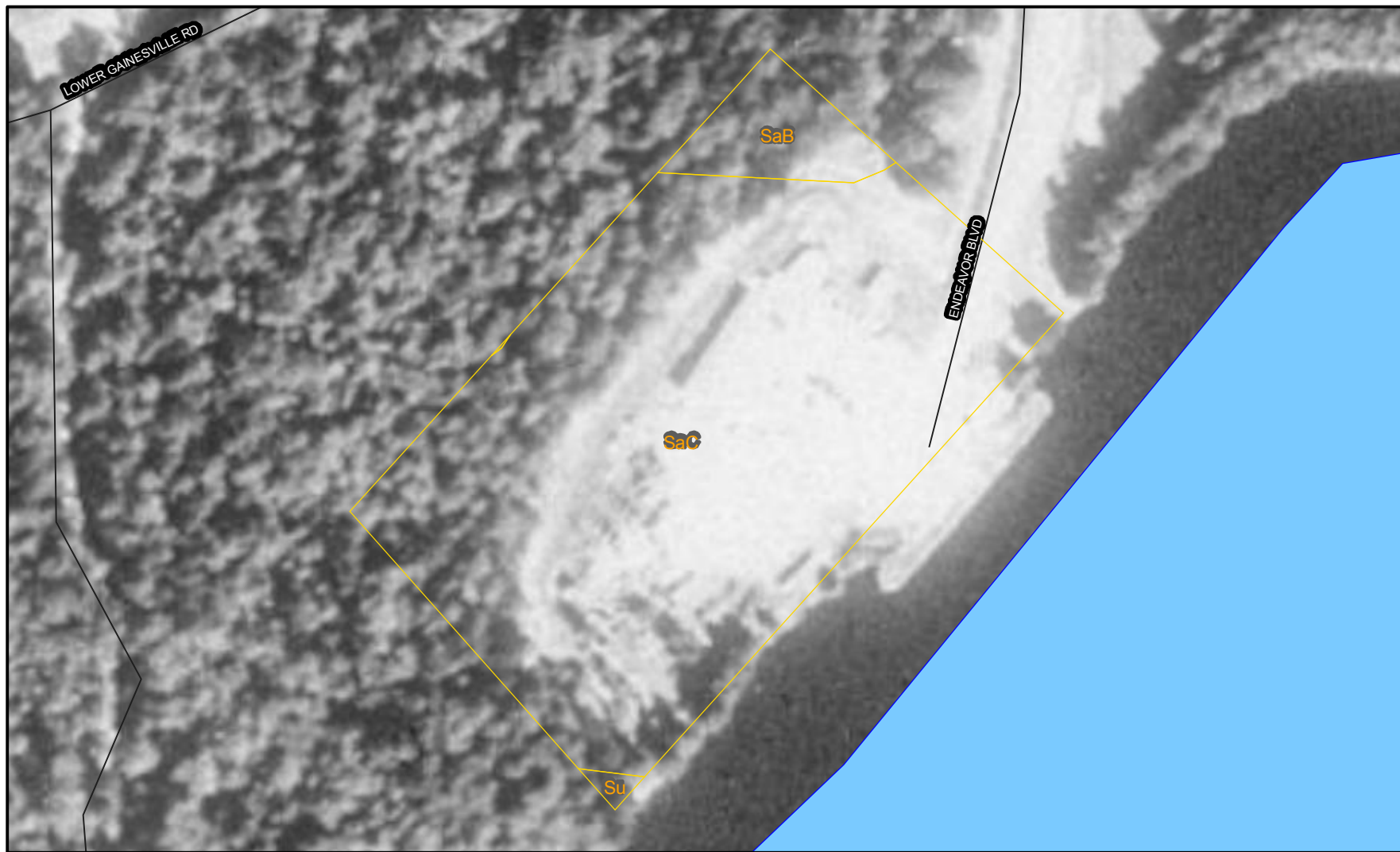
Map Unit Legend Summary

Hancock County, Mississippi

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PoB	Poarch fine sandy loam, 2 to 5 percent slopes	0.3	11.5
SaC	Saucier fine sandy loam, 5 to 8 percent slopes	1.9	63.5
Su	Smithton fine sandy loam, frequently flooded	0.8	25.0

SOIL SURVEY OF HANCOCK COUNTY, MISSISSIPPI

























Riverine Training Facility



SOIL SURVEY OF HANCOCK COUNTY, MISSISSIPPI

Riverine Training Facility

MAP LEGEND

	Soil Map Units
	Interstate Highways
	Roads
	Rails
	Water
	Hydrography
	Oceans
	Escarpment, bedrock
	Escarpment, non-bedrock
	Gulley
	Levee
	Slope
	Blowout
	Borrow Pit
	Clay Spot
	Depression, closed
	Eroded Spot
	Gravel Pit
	Gravelly Spot
	Gulley
	Lava Flow
	Landfill
	Marsh or Swamp
	Miscellaneous Water
	Rock Outcrop
	Saline Spot
	Sandy Spot
	Slide or Slip
	Sinkhole
	Sodic Spot
	Spoil Area
	Stony Spot
	Very Stony Spot
	Perennial Water
	Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>

Coordinate System: UTM Zone 16

Soil Survey Area: Hancock County, Mississippi
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:20000

Map comprised of aerial images photographed on these dates:
10/25/1989

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend Summary

Hancock County, Mississippi

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SaB	Saucier fine sandy loam, 2 to 5 percent slopes	0.4	6.4
SaC	Saucier fine sandy loam, 5 to 8 percent slopes	5.8	93.1
Su	Smithton fine sandy loam, frequently flooded	0.0	0.5

ATTACHMENT 4

GEOTECHNICAL REPORTS

March 26, 2008 Southern Earth Sciences Report

762 Downtowner Loop West
P.O. Box 160745
Mobile, AL 36616

Tel.: (251) 344-7711
Fax: (251) 341-9488
www.soeearth.com



March 26, 2008

URS GROUP, INC.
7650 West Courtney Campbell Causeway
Tampa, FL 33607

ATTENTION: Mr. Fred Walker, P.E.

REFERENCE: Proposed Riverine Training Facility – Preferred Site
Project No. P-210
Stennis Space Center
Hancock County, Mississippi
SESI Project M08-028

Dear Mr. Walker:

Southern Earth Sciences, Inc., has completed the subsurface exploration and engineering studies and analyses for the above referenced project. Authorization to proceed was given us by Ms. Kathy Hartman. The following report provides a discussion of the development, exploration procedures used, subsurface conditions encountered, considerations for site preparation, and foundation recommendations.

SITE DESCRIPTION

The area is bound by Lower Gainesville Road to the north, a wooded area to the south, a utility storage area to the east and an unpaved access road to the west. At the time of our investigation we noted the site was heavily wooded with moderate underbrush. The topography varied approximately from Elevation 7.0 to Elevation 22.0, based on a provided topographic drawing. A geographic map of the area is attached in Appendix A.

GEOLOGIC SETTING

The site is located in the southern, lower, Gulf Coastal Plain physiographic province of Mississippi. Soils encountered and sedimentary deposits are primarily from the Holocene period, and consist of loam, sands, gravels and clay of the Coastal Deposits formation. A geologic map of the area is included in Appendix A.

PROJECT INFORMATION

It is our understanding that the project will consist of several one- to two-story buildings of steel and masonry construction with concrete floor slabs on grade. We also understand that the finished floors of the structures are planned at approximately Elevation 20.0, which may require as much as 9 feet of fill in some areas. In addition, paved parking areas will be constructed adjacent to the proposed structures. For the purpose of this report, we have assumed design column loads of 100 kips and maximum wall loads of 8 kips per lineal foot, as no structural loads were provided.

FIELD INVESTIGATIVE PROCEDURES

On March 13 through 18, 2008, we performed seventeen (17) split-spoon sample soil borings with Standard Penetration Tests in locations as determined by our engineers and to depths as directed. The boring locations were staked in the field by our firm using a portable, hand-held, global-positioning receiver. The approximate locations of the borings are shown on a Test Location Plan included in Appendix A.

Boring RB-4, performed to a depth of 41½ for a previous exploration for this project, was in close vicinity of the Operations Building and its information was used for this project. A copy of the boring log is also attached in Appendix A.

The soil borings with Standard Penetration Tests (SPT) were advanced to depths of 16½ to 61½ feet using track-mounted, mud-rotary type drilling equipment. All samples obtained in the field were returned to our laboratory for visual classification in accordance with the Unified Soil Classification System and further testing. Logs for the soil borings are attached to this report in Appendix B.

LABORATORY TESTING

In order to define the soil properties more closely, classification tests were performed on selected samples obtained in the borings. Results of these tests are shown on the individual boring logs and a summary is attached in Appendix C.

SUBSURFACE CONDITIONS ENCOUNTERED

Subsurface conditions for each area will be discussed separately. All references to depth are made with respect to the existing ground surface at the time the fieldwork was performed.

Operations and Boat Maintenance Buildings

Subsurface conditions encountered in these borings varied and they will be addressed separately. All references to depth are made with respect to the existing ground surface at the times the borings were performed.

Boring No. B-1 showed very soft to soft clay to 4 feet, followed by loose sand to 7 feet, medium clay to 14 feet, loose to medium clayey sand to 23 feet, dense to very dense sand 38 feet, and loose sand to 43 feet. This was underlain by soft to medium clay to 55 feet, very dense sand to 58 feet, and soft clay to the depth of the boring at 61½ feet.

Boring No. B-2 exhibited very loose to medium sand to 4 feet, medium clay to 7 feet, medium sand to 33 feet and medium clay to the depth of the boring at 41½ feet.

Boring No. B-16 displayed soft to medium clay to 7 feet, followed by dense sand to 9½ feet, and loose to medium sand to the depth of the boring at 16½ feet.

Boring No. RB-4 revealed loose to medium sand and clayey sand to 7 feet, underlain by medium clay to 13 feet, medium to dense sand to 38 feet, and soft clay to the depth of the boring at 41½ feet.

10-Boat Storage

Boring Nos. B-3 and B-4 revealed loose to medium sand and medium to stiff clay to 4½ feet, underlain by medium sand and clay to the depth of the borings at 26½ feet.

6-Boat Storage

Boring No. B-5 showed loose to medium sand to 9½ feet, medium to very stiff clay to 13 feet, and medium to dense sand to the depth of the boring at 26½ feet.

Parking Areas

The remainder of the borings showed layers of sand and clayey sands with densities ranging from very loose to dense, alternating with strata of medium to hard consistency clays and silts. The only notable exceptions occurred in the following areas:

- Boring No. B-10, which showed a stratum of soft clay between depths of 7 to 10½ feet
- Boring No. B-15, which exhibited a layer of soft clay from 2 feet to 5½ feet

Ground Water Table

The ground water table varied from a depth of 0.9 feet in Boring No. B-13 to 11.0 feet below grade in Boring No. B-5. The most likely reasons for the variance are due to differences in elevation of the borings as well as ground water being trapped over a relatively impermeable layer, often referred to as a "perched" water table. It must be noted that fluctuations in the level of the ground water table may occur due to changes in rainfall, drainage, temperature and other factors not evident at the time measurements were made. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on such assumptions of variation.

USDA NRCS SOILS CLASSIFICATION

Based on information obtained from the Natural Resource Conservation Service of the United States Department of Agriculture, the predominant soil classes at these sites are the Saucier fine sandy loam (SaB, SaC), Saucier-Susquehanna complex (ScD), and Smithton fine sandy loam (Su). Summaries of the soil surveys for these sites are included in Appendix D.

EXPANSIVE SOIL CHARACTERISTICS

With regards to Section 1802.3.2 of the 2003 Edition of the International Building Code (IBC), laboratory tests performed on clayey soils encountered at relatively shallow depths (less than 7½ feet in depth) do not exhibit the characteristics of expansive soils.

SEISMIC CONSIDERATIONS

Based on the subsurface conditions encountered, with reference to Table 1615.1.1 of the IBC, these sites would best be categorized as **Site Class "E"**. It is noted, borings for this project were performed to a maximum depth of 61½ feet and the IBC normally requires soil information to a depth of 100 feet be used in site classification. In Section 1615.1.1, however, it states that appropriate soil properties can be estimated by a registered design professional if site-specific data is not available. Data available in our files from previous projects near this site was used for this purpose.

In accordance with Sections 1615.1.2, 1615.1.3, and 1615.1.4 of the IBC, design parameters were calculated for an earthquake having a 2% probability of exceedence in a 50-year period using seismic data available from the United States Geological Survey (USGS). The results of these calculations, expressed as a percent of the gravitational force (g) are as follows:

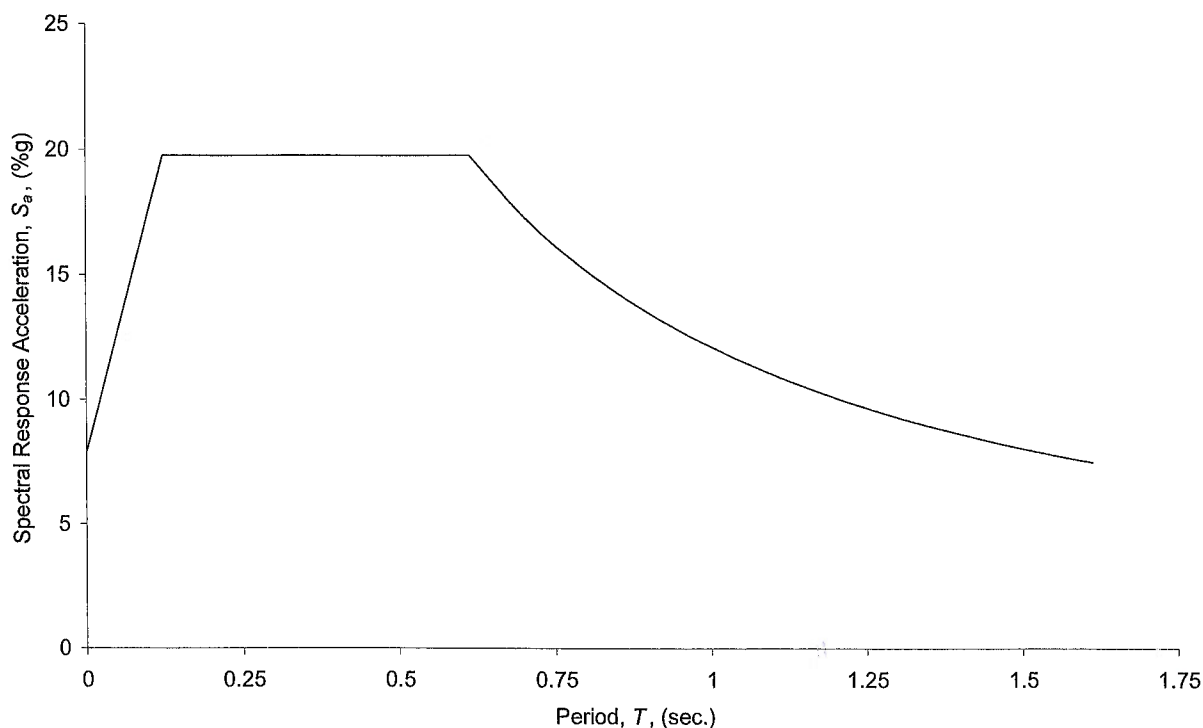
Five-Percent Damped Design Spectral Response Acceleration Parameters

Short Periods (0.2 sec) $S_{DS} = 19.77 \%g$

1-Second Periods $S_{D1} = 12.11 \%g$

Based on the IBC Site Class and the above seismic data, a typical spectral response curve for this site was developed and is shown below:

Design Response Spectrum



ENGINEERING ANALYSIS

A study of the subsurface conditions in the area of the planned structures shows that in most cases, soils of reasonable density and consistency exist to a depth of at least 35 feet. As previously mentioned, however, soft clays were discovered in Boring Nos. B-1, B-10, B-15 and B-16 at relatively shallow depths. Based on these conditions and the assumed design data, these structures could be supported on shallow foundations; however, remedial action will be required to mitigate the layers of potentially compressible clays found at shallow depths.

SUBGRADE PREPARATION

Because of the moderately low permeability of some of the shallow soils at this site, water will tend to collect in low areas. These materials, when wetted, will retain moisture for long periods, and these soils can undergo significant weakening if disturbed in the presence of excess moisture. For these reasons, design and implementation of a permanent grading and drainage plan is essential. In the initial stages of site development, effective drainage must be established and modified as necessary during construction. In areas where it will be necessary to undercut

weaker soils, control of water and drainage is vital. Further, construction traffic, especially rubber-tired vehicles, should be minimized when the soils are wet.

Initially, the site should be cleared, grubbed, and stripped of all soils containing roots and organic matter. Topsoil and other organic laden soils obtained during site stripping operations could be stockpiled on site for reuse in landscaped areas and on the sides of roads.

Remedial Action

Operations and Boat Maintenance Buildings

In the footprint of these structures, we would recommend that the subgrade be undercut to a depth of at least four feet below original grade in order to remove the layers of soft clays and very loose clayey sands.

Other Areas

In the area of lower elevation to the south of the site, we would recommend that the potentially weak layers, as noted in Boring Nos. B-3, B-15, and B-17, be undercut to at least Elevation 4.0.

An approximation of the area requiring undercut is shown on the attached Test Location Plan; however the actual depth and lateral extent of these objectionable soils can only be accurately determined by careful field inspection at the time earthwork operations are performed. If desired, additional shallow borings could be performed to further isolate the areas requiring undercutting. If you would like to discuss this in more detail, please contact us.

The remaining surface soils should be proof rolled with a loaded, tandem-axle, dump truck in the presence of a geotechnical engineer or his representative to expose any soft or yielding areas. Where encountered, these soils should be excavated and replaced with thoroughly compacted backfill. The remaining surface soils should then be thoroughly and uniformly compacted in place. Thoroughly compacted backfill and fill should then be placed to the desired subgrade elevations.

Backfill and Fill

Backfill and Fill material should be non-plastic and granular in nature with a maximum of 20% passing the Wash 200 Sieve. It should be placed in thin successive layers 8" to 10" loose measurement and each layer should be compacted to at least 95% of its maximum laboratory dry density, within $\pm 2\%$ of its optimum moisture content, in accordance with ASTM D1557 (Modified Proctor). In-place field density tests should be performed as this material is being placed and compacted in order to insure that required density is being achieved. Since these testing services are within the scope of our activities, we urge that our firm be retained to assist you during the earthwork phase of this project.

RECOMMENDATIONS

Footings

We would recommend that footings be designed for a maximum net allowable unit soil pressure of 2,000 pounds per square foot in order to minimize post-construction settlement. Bearing depths should be a minimum of 18 inches below finished grade with a minimum width of 18 inches. Based on the assumed design data and this maximum soil pressure, total settlement of the foundations would not be expected to exceed 1 inch, approximately 50% of which could be differential between interior columns and load bearing walls.

Concrete Floor Slabs

After the subgrade has been prepared as outlined, conventionally designed concrete slabs could be placed on grade. These slabs should be appropriately jointed such that minor differential movement does not cause excessive distortion or damage. For design purposes, a modulus of subgrade reaction (k) of 200 pounds per cubic inch (pci) could be used.

PAVEMENT DESIGN DATA

A bulk samples was obtained for California Bearing Ratio (CBR) testing. In a sample obtained in the vicinity of Boring No. B-7, a CBR value of 8 was determined. For subgrade soils composed of fill materials placed and compacted as outlined above, a CBR value of 10 would apply.

Is must be noted; as discussed above, a layer of soft clay was encountered in Boring No. B-10 at a depth of 7 feet. Calculations indicate that if four feet of fill material are placed to achieve the final subgrade elevation, long-term settlements of $\frac{1}{2}$ to $\frac{3}{4}$ inches could occur. If this amount of settlement is unacceptable, design changes or remedial action will be necessary to mitigate this condition.

GENERAL COMMENTS

The soil samples obtained during the subsurface investigation will be retained the end of 2008. If no further instructions are received, they will be disposed of at that time.

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The boring logs and related information are based on the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate and the description represents our interpretation of subsurface conditions at the designated boring location and on the particular date drilled.

Professional judgments on design alternatives and criteria are presented in this report. These are based partly on our evaluations of technical information gathered, partly on our understanding of the characteristics of the project being planned, and partly on our general experience with subsurface conditions in the area. We do not guarantee performance of the project in any respect, only that our engineering works and judgments rendered meet the standard of care of our profession.

This report has been prepared in order to aid in the evaluation of this project and to assist the architects and engineers in the structural design. It is intended for use with regard to the specific project discussed herein and any substantial changes in the project, loads, locations, or assumed grades should be brought to our attention so that we may determine how such changes may affect our conclusions and recommendations. We would appreciate the opportunity to review the plans and specifications for construction to ensure that our conclusions and recommendations are interpreted correctly.

As the project geotechnical engineer of record that developed the foundation design recommendations, please be aware that we cannot accept responsibility for the performance of the foundation system if we are not afforded the opportunity to confirm that our recommendations have been followed. Accordingly, we recommend that Southern Earth Sciences, Inc. be retained on this project to perform observation and field-testing services during the construction phase of the foundation system.

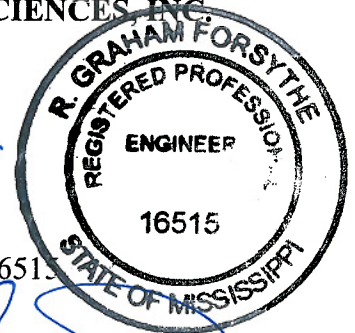
This report is exclusively for the use and benefit of the addressee(s) identified on the first page of this report and is not for the use or benefit of, nor may it be relied upon by any other person or entity. The contents of this report may not be quoted in whole or in part or distributed to any person or entity other than the addressee(s) hereof without, in each case, the advance written consent of the undersigned.

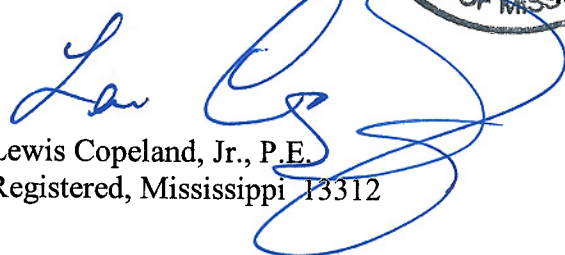
We appreciate the opportunity to serve you on this project. If you have any questions or if we may be of further assistance, please call at your convenience.

Very truly yours,

SOUTHERN EARTH SCIENCES, INC.


R. Graham Forsythe, P.E.
Registered, Mississippi 16515



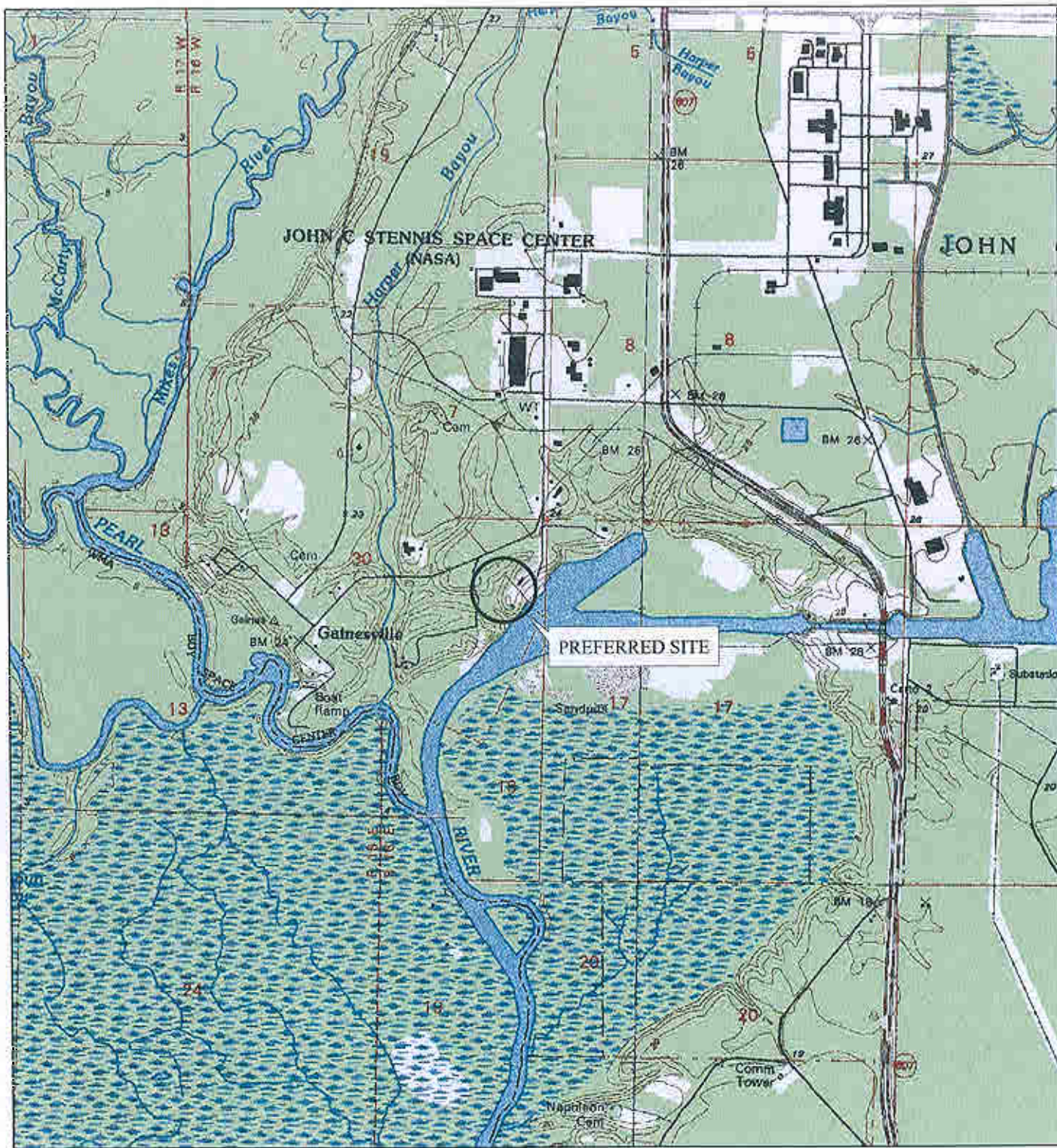

Lewis Copeland, Jr., P.E.
Registered, Mississippi 13312

RGF/LCJR/gf
Enclosures

APPENDIX A

TEST LOCATION PLAN

PROPOSED RIVERINE TRAINING FACILITY – PREFERRED SITE
URS PROJECT NO. P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT NO. M08-028



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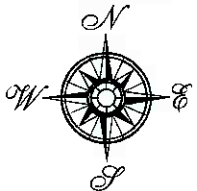
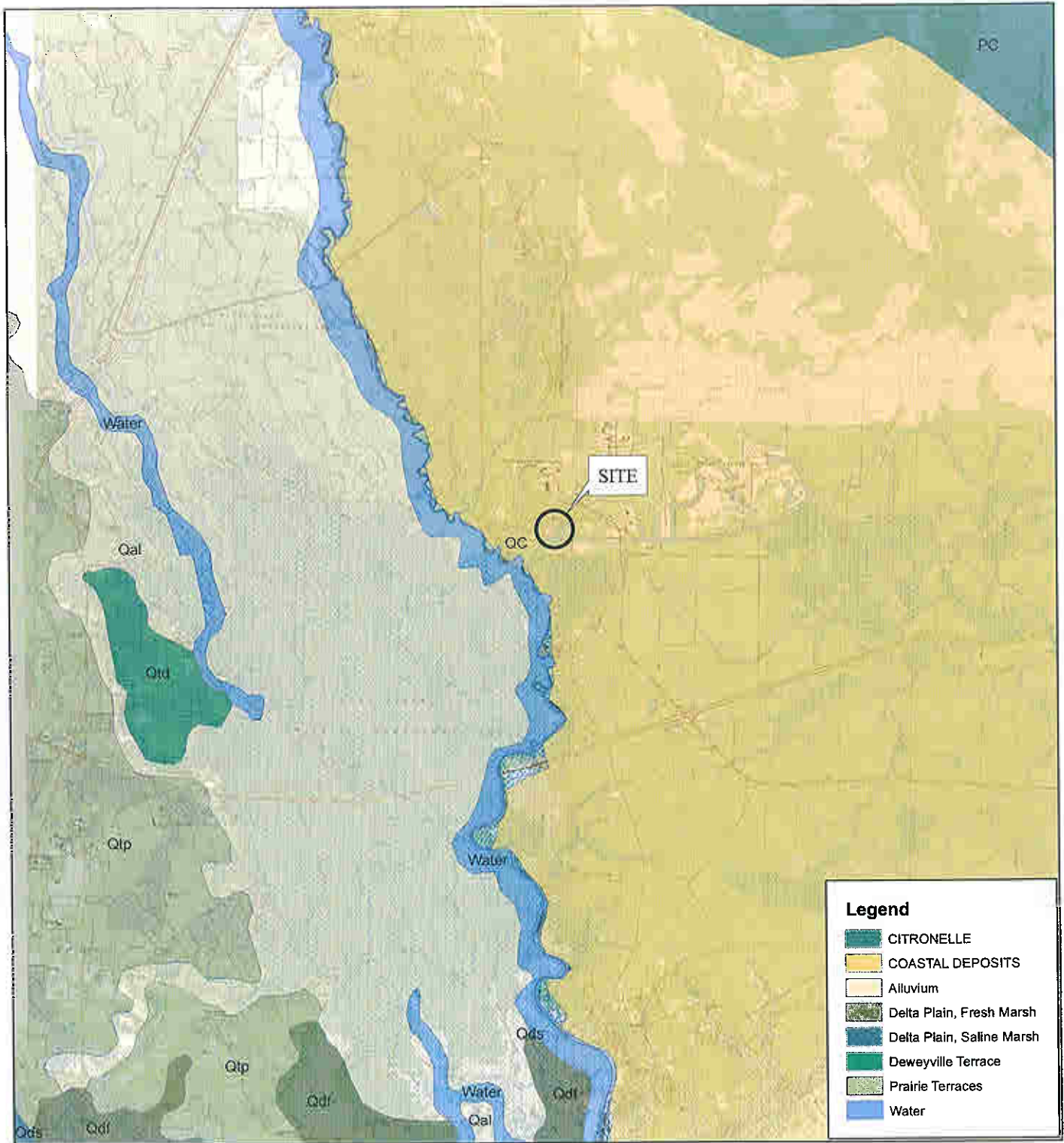
EXTRACTED FROM THE USGS PHOTOMOSAIC OF HANCOCK COUNTY

**RIVERINE TRAINING FACILITY
PREFERRED SITE
HANCOCK COUNTY, MISSISSIPPI**

SOUTHERN EARTH SCIENCES, inc.

 AN EMPLOYEE OWNED COMPANY

**TOPOGRAPHIC MAP
SITE LOCATION
SESI JOB NO.: 08-028**



1:120,000

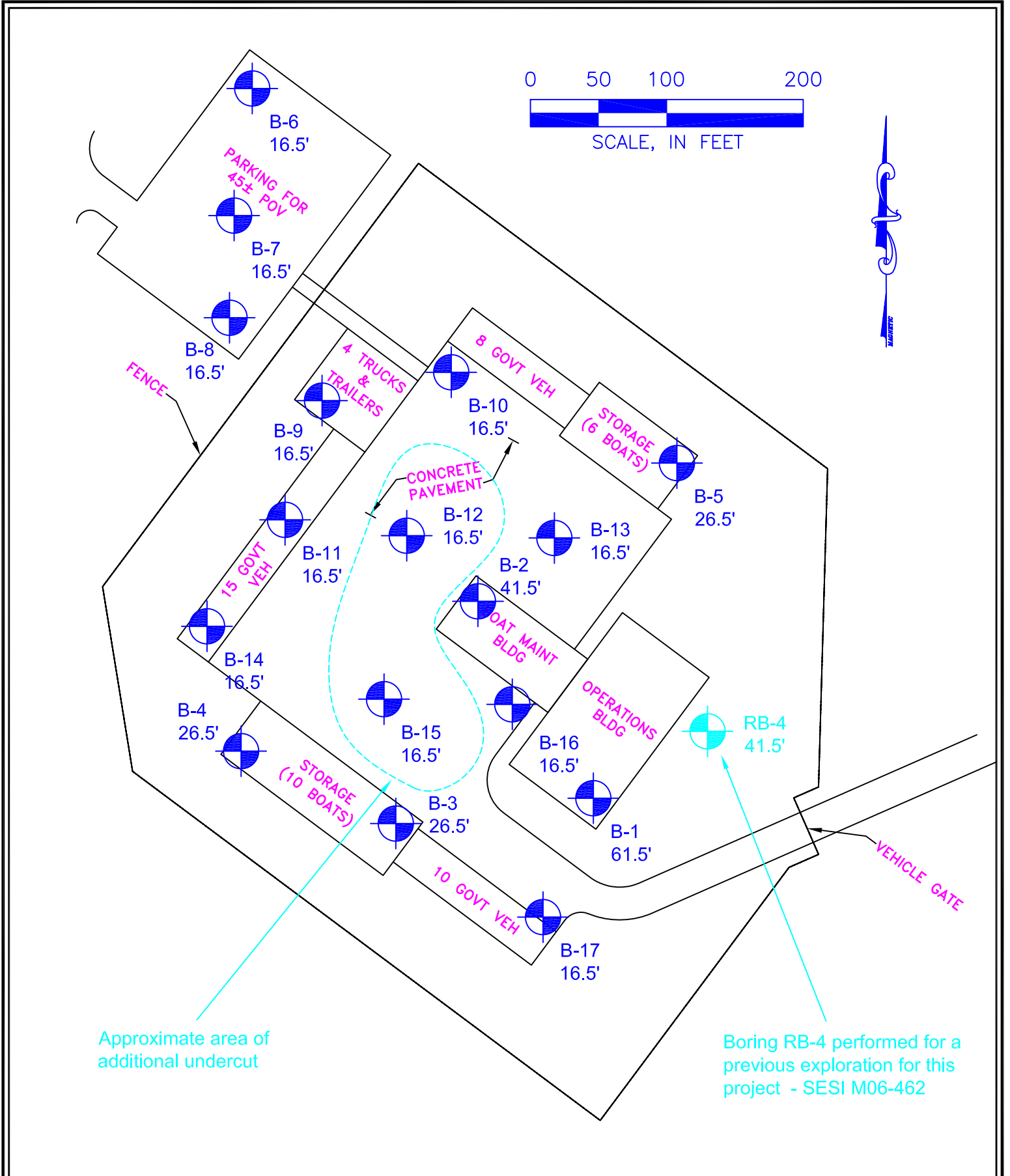


EXTRACTED FROM THE USGS PHOTOMOSAIC OF HANCOCK COUNTY
GEOLOGIC MAPS OF LA AND MS FROM THE USGS

**RIVERINE TRAINING FACILITY
PREFERRED SITE
HANCOCK COUNTY, MISSISSIPPI**



**GEOLOGIC MAP
SITE LOCATION
SESI JOB NO.: 08-028**



PROPOSED RIVERINE TRAINING FACILITY – PREFERRED SITE
 STENNIS SPACE CENTER
 HANCOCK COUNTY, MISSISSIPPI
 SESI PROJECT M08-028



FIGURE 1
 TEST LOCATION PLAN

APPENDIX B

BORING LOGS

PROPOSED RIVERINE TRAINING FACILITY – PREFERRED SITE
URS PROJECT NO. P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT NO. M08-028

LOG OF BOREHOLE NO. B-1

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/13/08
WATER LEVEL: 10 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER/WASH
BORING ELEVATION: 18.5 ft
DATE COMPLETED: 03/13/08
WATER LEVEL DATE: 03/14/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		CL	Very Soft Dark Brown Sandy CLAY with Organics	2	32.0		76
15		CL	Soft Orange and Gray Sandy CLAY	4	30.8	20	82
5		SP-SM	Loose Tan Fine SAND with Silt	6	22.7		7
10		CL	Medium Gray Sandy CLAY	5	20.7	30	81
15		SC	Loose to Medium Gray and Orange Clayey Fine SAND	10			
20				12			
25		SP	Very Dense Dark Brown Silty Fine SAND and Organics	9			
30				49	26.1		4
35		SP	Loose to Dense Gray Fine SAND	70			
40				46			
45		CH	Soft to Medium Gray CLAY with Trace Sand	9			
50				4			
55				7			
60		SP	Very Dense Gray Fine SAND	78			
65		CH	Soft Gray CLAY with Trace Sand	4			
70							

Remarks:

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LOG OF BOREHOLE NO. B-2

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/16/08
WATER LEVEL: 4.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER/WASH
BORING ELEVATION: 9.5 ft
DATE COMPLETED: 03/16/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SC	Very Loose Dark Brown and Tan Clayey Fine SAND	4	22.4		44
5		SC-SM	Medium Brown and Orange Clayey SAND	15	19.3	20	42
5		CH	Medium to Very Stiff Gray CLAY with Trace Sand	6	23.0	51	70
0		SM	Medium Tan and Orange Silty Fine SAND	19			
10				17			
-5		SP	Medium Dark Brown Fine SAND with Organics	13			
15				17			
-10		SP	Medium Gray and Orange Fine SAND	24			
-15				25	26.6		4
-20		SM	Medium Gray Silty Fine SAND	25			
-25		CH	Medium Gray CLAY with Trace Sand	5			
-30				7			
-40							

Remarks:

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LOG OF BOREHOLE NO. B-3

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/13/08
WATER LEVEL: 2 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER/WASH
BORING ELEVATION: 7.5 ft
DATE COMPLETED: 03/13/08
WATER LEVEL DATE: 01/24/00
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		CL	Medium to Stiff Orange Sandy CLAY	5		
5		SM	Medium Orange and Gray Silty Fine SAND	12	26.0	74
-5		SM	Medium Tan Silty Fine SAND with Wood	23	13.9	76
0		SP	Medium to Dense White Fine SAND	21		
-10		SP	Medium to Dense White Fine SAND	24		
-5		SP	Medium to Dense White Fine SAND	33		
-15		SP	Medium to Dense White Fine SAND	33		
-10		SP	Medium Dark Brown Fine SAND	27		
-20		SP	Medium Dark Brown Fine SAND	32		
-25						

Remarks:

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LOG OF BOREHOLE NO. B-4

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 7.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER/WASH
BORING ELEVATION: 17 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %	
0		SM	Loose Tan and Orange Silty Fine SAND	7				
15		SP	Medium Orange and Brown Fine SAND	23				
5		24			24			
10		SM	Medium Gray Silty Fine SAND	11				
-10		CH	Medium Brown CLAY with Trace Sand	10	53.6	80	98	
5		SP	Medium White to Gray Fine SAND	16	18.3		2	
-15		20			20			
-20		22			22	17.0		5
-5		SP	Medium Dark Brown Fine Sand					
-25		15			15			
-30								

Remarks:

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LOG OF BOREHOLE NO. B-5

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/13/08
WATER LEVEL: 11 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER/WASH
BORING ELEVATION: 17.5 ft
DATE COMPLETED: 03/13/08
WATER LEVEL DATE: 03/14/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %	
0		SM	Loose to Medium Orange Silty Fine SAND	5				
15		13						
5		16				13.9		
10		8	SM	Loose Gray and Orange Silty Fine SAND				17
-10		14	CH	Medium to Very Stiff Brown CLAY with Trace Sand		32.7	54	93
5		29	SP	Medium to Dense White Fine SAND				
15		27						
0		35						
-20			SP	Medium Dark Brown Fine SAND				
-5		24						
-25								
-10								
30								

Remarks:

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LOG OF BOREHOLE NO. B-6

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 6.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 22 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		CL	Medium Tan Sandy CLAY	8	18.8	73
20		CL	Stiff to Very Stiff Orange and Tan Clayey Sandy CLAY	15	19.2	73
5		SP	Medium Tan to Gray Fine SAND	31	22.9	67
15		CL	Medium to Stiff Gray and Brown Sandy CLAY	27		
10		CL	Medium to Stiff Gray and Brown Sandy CLAY	18		
10				11		
15				10		
5						
20						

Remarks:

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LOG OF BOREHOLE NO. B-7

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 9.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 20 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/17/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
20 0		SC	Loose Brown Clayey Fine SAND with Organics	8			
15 5		SC	Medium to Dense Orange and Brown Clayey Fine SAND	11	20.8		41
10 10		SP	Medium Tan Fine SAND	39			
5 15		SM	Loose Orange and Tan Silty Fine SAND	17			
0 20		CH	Medium Brown and tan CLAY with Trace Sand	8	27.6	21	40
		SM	Medium Brown and Orange Silty Fine SAND	8	51.2	61	95
				21			

Remarks:

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LOG OF BOREHOLE NO. B-8

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 4.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 16 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/17/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SC	Loose Brown and Tan Clayey Fine SAND	6	14.6		47
15		SM	Medium Orange Silty Fine SAND	8	18.9		44
5		MH	Medium to Stiff Gray SILT with Trace Sand	16	22.0	20	23
10		SP	Medium White and Gray Fine SAND	10	72.9	58	99
5				16			
15				19			
0				21			
20							

Remarks:

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LOG OF BOREHOLE NO. B-9

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 4 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 16 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/17/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		SC	Loose Dark Brown and Tan Clayey Fine SAND			
15		6	21.1	49		
5		8				
10		21	20.8	7		
5		11				
10		19				
5		20				
15		18				
0						
20						

Remarks:

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LOG OF BOREHOLE NO. B-10

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 6.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 16 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/17/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		SM	Loose Brown and Tan Silty Fine SAND			
15		SM	Very Loose Orange Silty Fine SAND	6		
20		SC	Medium Gray and Orange Clayey Fine SAND	4	17.5	35
25		CL	Soft Tan and Orange Sandy CLAY	18	20.9	45
30		SP	Medium Orange To White Fine SAND	4		
35		SP	Medium Orange To White Fine SAND	16		
40				16		
45				16		

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Remarks:

LOG OF BOREHOLE NO. B-11

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/18/08
WATER LEVEL: 9.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 18 ft
DATE COMPLETED: 03/18/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SM	Loose Brown and Tan Silty Fine SAND	5			
15		6	17.2	19			
5		8					
10		10	23.7	63	93		
10		11					
5		16					
15		27					
0							
20							

Remarks:

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LOG OF BOREHOLE NO. B-12

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 3.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 11 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/17/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		SM	Very Loose Dark Brown Silty Fine Sand with Organics	3			
10		SM	Very Loose Tan Silty Fine SAND	3			
5		CL	Medium Gray Sandy CLAY	6	50.5	33	89
5		SP	Medium Tan, Brown and White Fine SAND	15			
10		SP	Medium Tan, Brown and White Fine SAND	14			
0	SP	Medium Tan, Brown and White Fine SAND	17				
15	SP	Medium Tan, Brown and White Fine SAND	16				
-5							
-20							

Remarks:

GEOLOG4 F:\JOB FOLDERS\2008\08028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO. EARTH.GDT 3/26/08

LOG OF BOREHOLE NO. B-13

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/13/08
WATER LEVEL: 0.9 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 9.5 ft
DATE COMPLETED: 03/13/08
WATER LEVEL DATE: 03/14/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0		SM	Very Loose Gray Silty Fine SAND	6	18.4	30
5		SC	Loose Gray Clayey SAND	7	33.7	41
5		SP	Medium to Dense White to Brown and Tan Fine SAND	37		
0				32		
10				21		
-5		SM	Medium Brown Silty Fine SAND with Organics	16	91.5	21
-15			12			
-10						
-20						

Remarks:

GEOLOG4 F:\JOB FOLDERS\200808028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO. EARTH.GDT 3/26/08

LOG OF BOREHOLE NO. B-14

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 10.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 19 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0	2/6 2/6 3/6	SC	Loose Brown and Tan Silty Fine SAND	5			
15	6/6 7/6 9/6	CL	Stiff Orange and Tan Sandy CLAY	16	17.3	25	45
5	9/6 10/6 12/6	SM	Loose to Medium Orange and Tan Silty Fine SAND	22			
10	7/6 5/6 3/6			8	17.4		17
10	3/6 6/6 5/6			11	21.8		35
5	2/6 4/6 4/6	CH	Medium Orange and Gray CLAY with Trace Sand	8			
15	6/6 7/6 8/6	SP	Medium White and Tan Fine SAND	15			
0							
20							

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Remarks:

LOG OF BOREHOLE NO. B-15

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/17/08
WATER LEVEL: 1.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 9 ft
DATE COMPLETED: 03/17/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0	1/6 1/6 1/6	SM	Very Loose Gray and Tan Silty Fine SAND	2	19.8	34
5	2/6 2/6 2/6	CL	Soft Orange and Tan Sandy CLAY	4		
5	10/6 14/6 14/6	SP	Medium Tan to White and Gray Fine SAND	28		
0	10/6 11/6 10/6			21		
10	4/6 5/6 6/6			11		
-5	10/6 9/6 13/6	SP	Medium Dark Brown Fine Sand with Organics	22	22.2	2
-15	7/6 8/6 7/6			15		
-10						
-20						

GEOLOG4 F:\JOB FOLDERS\200808028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO. EARTH.GDT 3/26/08

Remarks:

LOG OF BOREHOLE NO. B-16

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/13/08
WATER LEVEL: 2.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 9.5 ft
DATE COMPLETED: 03/13/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1; font-size: small;"> <p>0</p> <p>5</p> <p>10</p> <p>15</p> <p>-10</p> <p>-20</p> </div> </div>	<p>1/6 2/6 1/6</p> <p>2/6 3/6 3/6</p> <p>3/6 5/6 5/6</p> <p>11/6 18/6 22/6</p> <p>3/6 3/6 4/6</p> <p>5/6 5/6 7/6</p> <p>9/6 12/6 14/6</p>	<p>CL</p> <p>SP</p> <p>SM</p> <p>SP</p>	<p>Soft to Medium Gray and Orange Sandy CLAY</p> <p>Dense White and Gray Fine SAND</p> <p>Loose to Medium Gray Silty Fine SAND</p> <p>Medium Brown and Tan Fine SAND with Organics</p>	<p>3</p> <p>6</p> <p>10</p> <p>40</p> <p>7</p> <p>12</p> <p>26</p>	<p>19.4</p> <p>33.3</p>	<p>27</p>	<p>60</p> <p>59</p>

Remarks:

GEOLOG4 F:\JOB FOLDERS\200808028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO. EARTH.GDT 3/26/08

LOG OF BOREHOLE NO. B-17

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 03/13/08
WATER LEVEL: 6.5 ft
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: AUGER
BORING ELEVATION: 8 ft
DATE COMPLETED: 03/13/08
WATER LEVEL DATE: 03/18/08
DRILLER: D. GARDNER

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	LL %	200 %
0		CL	Medium Orange and Gray Sandy CLAY	6	21.0	27	60
5		SC	Loose Orange and Gray Clayey Fine SAND	9	16.1		41
5		SM	Medium Orange and Gray Silty Fine SAND	22			
0		CL	Medium to Hard Gray Sandy CLAY	14			
10		CL	Medium to Hard Gray Sandy CLAY	17			
-5				26	23.3	32	85
-15				34			
-20							

Remarks:

GEOLOG4 F:\JOB FOLDERS\2008\08028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO. EARTH.GDT 3/26/08

LOG OF BOREHOLE NO. RB-4

PROJECT: RIVERINE TRAINING FACILITY
PROJECT LOCATION: HANCOCK COUNTY, MISSISSIPPI
BORING LOCATION: SEE TEST LOCATION PLAN
DATE DRILLED: 12/20/06
WATER LEVEL: NOT MEASURED
GEOL / ENGR: G. FORSYTHE

SESI PROJECT: 08-028
METHOD: MUD ROTARY
BORING ELEVATION: 19 ft
DATE COMPLETED: 12/20/06
WATER LEVEL DATE:
DRILLER: M. CONNIFF

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	SPT N	NM %	200 %
0	2/6 1/6 3/6	SP-SM	Loose Tan & Gray Fine SAND with Some Silt & Organics	4		
15	4/6 3/6 4/6	SC	Loose to Medium Tan, Gray & Yellow Clayey Fine SAND	7		
5	6/6 7/6 9/6	CL	Medium Gray & Orange CLAY with Trace Sand	16	14.2	31
10	2/6 3/6 4/6			7		
-10	2/6 2/6 3/6			5		
5	7/6 6/6 9/6	SP-SM	Medium to Dense Gray, Tan & Brown Fine SAND with Some Silt	15		
15	10/6 14/6 14/6			28		
0	5/6 9/6 19/6			28		
-5	10/6 19/6 26/6			45		
-20	9/6 11/6 7/6			18		
-30	1/6 1/6 3/6	CL	Soft Gray CLAY with Trace Sand	4		
-40						
-45						
-50						

GEOLOG4 F:\JOB FOLDERS\2008\08028 - RIVERINE TRAINING FACILITY\SITE - PREFERRED\08-028 RIVERINE TRAINING (PREFERRED).GPJ SO. EARTH.GDT 3/26/08

Remarks: Ground water table not measured due to collapse of borehole.
 This boring performed for a previous exploration for this project (SESI M06-462)

APPENDIX C

LABORATORY TEST DATA

PROPOSED RIVERINE TRAINING FACILITY – PREFERRED SITE
URS PROJECT NO. P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT NO. M08-028

**Materials
Testing
Report**



**Tabulated
Data
Sheet**

Client:

URS Corporation

Date: 03/10/08

Project:

Riverine Training Facility - Preferred Site -
Stennis Space Center

**SESI
Project
No.** 08-028

LABORATORY TEST DATA

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
B-1	S-1	0.0-1.5	CL	32.0			76.0
B-1	S-2	2.5-4.0	CL	30.8	27	10	82.4
B-1	S-3	5.0-6.5	SP-SM	22.7			7.1
B-1	S-4	7.5-9.0	CL	20.7	30	13	81.0
B-1	S-9	25.0-26.5	SP	26.1			4.0
B-2	S-1	0.0-1.5	SC	22.4			43.6
B-2	S-2	2.5-4.0	SC-SM	19.3	20	5	41.5
B-2	S-3	5.0-6.5	CH	23.0	51	24	70.1
B-2	S-9	25.0-26.5	SP	26.6			3.7
B-3	S-1	0.0-1.5	CL	0.0			73.8
B-3	S-2	2.5-4.0	CL	26.0			76.4
B-4	S-5	10.0-11.5	CH	53.6	80	50	98.2
B-4	S-6	12.5-14.0	SP	18.3			2.3
B-4	S-8	20.0-21.5	SP	17.0			5.0
B-5	S-3	5.0-6.5	SM	13.9			17.1
B-5	S-5	10.0-11.5	CH	32.7	54	26	93.3
B-6	S-1	0.0-1.5	CL	18.8			73.4

Reviewed:

**Materials
Testing
Report**



**Tabulated
Data
Sheet**

Client:

URS Corporation

Date: 03/10/08

Project:

Riverine Training Facility - Preferred Site -
Stennis Space Center

SESI
Project No. 08-028

LABORATORY TEST DATA

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
B-6	S-2	2.5-4.0	CL	19.2			73.2
B-6	S-3	5.0-6.5	CL	22.9			67.3
B-7	S-2	2.5-4.0	SC	20.8			41.0
B-7	S-5	10.0-11.5	SM	27.6	21	0	39.7
B-7	S-6	12.5-14.0	CH	51.2	61	33	95.1
B-8	S-1	0.0-1.5	SC	14.6			46.9
B-8	S-2	2.5-4.0	SC	18.9			44.2
B-8	S-3	5.0-6.5	SM	22.0	20	1	23.4
B-8	S-4	7.5-9.0	MH	72.9	58	21	98.6
B-9	S-1	0.0-1.5	SC	21.1			49.2
B-9	S-3	5.0-6.5	SP-SM	20.8			6.5
B-10	S-2	2.5-4.0	SM	17.5			35.0
B-10	S-3	5.0-6.5	SC	20.9			44.5
B-11	S-2	2.5-4.0	SM	17.2			19.4
B-11	S-4	7.5-9.0	CH	23.7	63	38	92.7
B-12	S-3	5.0-6.5	CL	50.5	33	17	89.3
B-13	S-1	0.0-1.5	SM	18.4			30.4

Reviewed:

**Materials
Testing
Report**



**Tabulated
Data
Sheet**

Client:

URS Corporation

Date: 03/10/08

Project:

Riverine Training Facility - Preferred Site -
Stennis Space Center

SESI
Project No. 08-028

LABORATORY TEST DATA

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Moisture Content (%)	Atterberg Limits		Passing No. 200 (%)
					LL	PI	
B-13	S-2	2.5-4.0	SC	33.7			41.2
B-13	S-6	12.5-14.0	SM	91.5			21.2
B-14	S-2	2.5-4.0	SC	17.3	25	11	44.7
B-14	S-4	7.5-9.0	SM	17.4			16.7
B-14	S-5	10.0-11.5	SM	21.8			35.1
B-15	S-1	0.0-1.5	SM	19.8			34.1
B-15	S-6	12.5-14.0	SP	22.2			2.1
B-16	S-1	0.0-1.5	CL	19.4			59.9
B-16	S-2	2.5-4.0	CL	33.3	27	11	58.6
B-17	S-1	0.0-1.5	CL	21.0	27	14	60.2
B-17	S-2	2.5-4.0	SC	16.1			41.1
B-17	S-6	12.5-14.0	CL	23.3	32	18	84.9

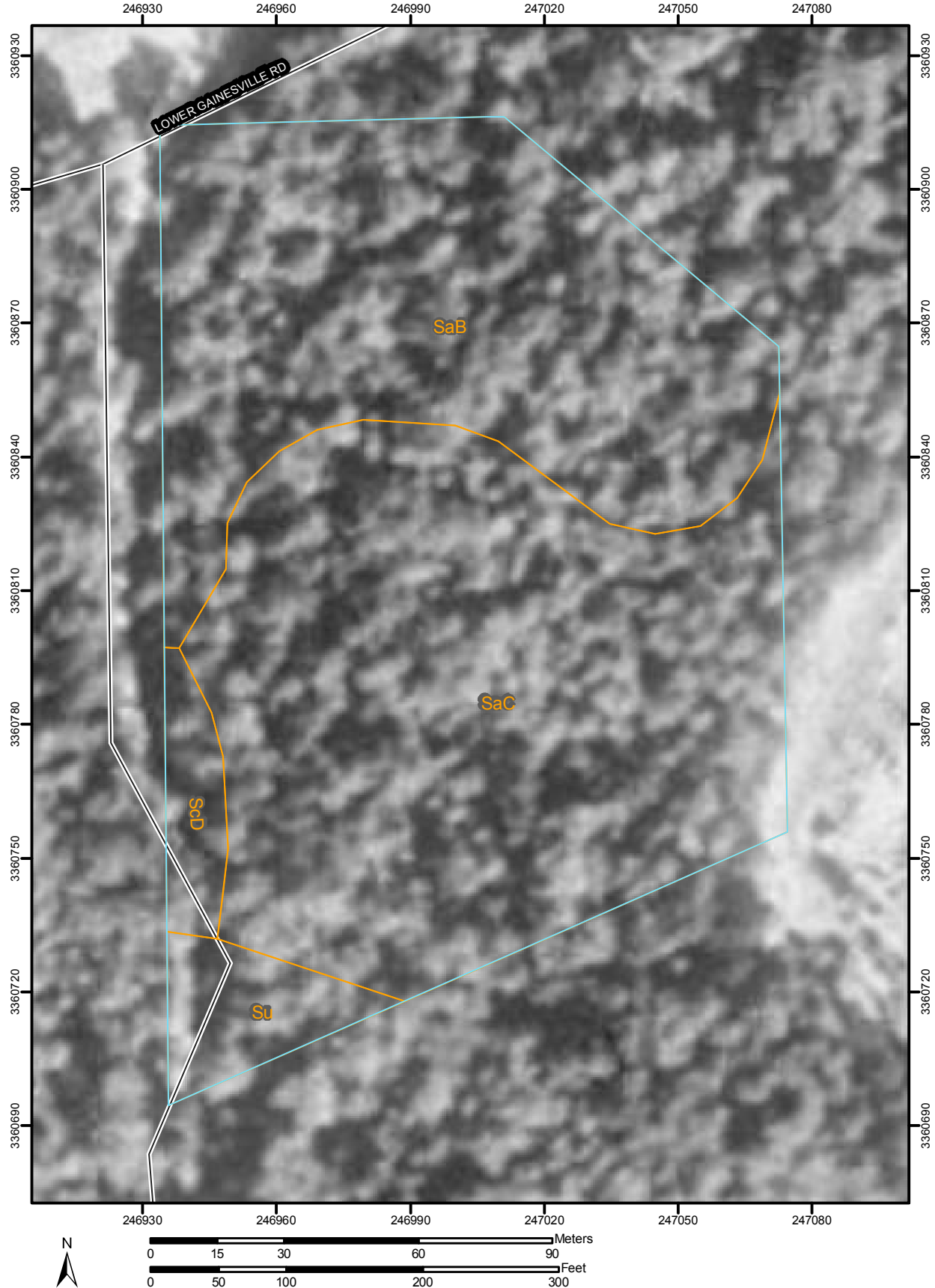
Reviewed:

APPENDIX D

NRCS SOIL DATA

PROPOSED RIVERINE TRAINING FACILITY – PREFERRED SITE
URS PROJECT NO. P-210
STENNIS SPACE CENTER
HANCOCK COUNTY, MISSISSIPPI
SESI PROJECT NO. M08-028


Soil Map—Hancock County, Mississippi
(Riverine Training Facility - Preferred Site)



Soil Map—Hancock County, Mississippi
(Riverine Training Facility - Preferred Site)

MAP LEGEND






















Area of Interest (AOI)




 Area of Interest (AOI)

Soils




 Soil Map Units

Special Point Features



-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

-  Very Stony Spot
-  Wet Spot
-  Other

Special Line Features

-  Gully
-  Short Steep Slope
-  Other






Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails

Roads

-  Interstate Highways
-  US Routes
-  State Highways
-  Local Roads
-  Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 16N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hancock County, Mississippi
Survey Area Data: Version 7, Feb 5, 2008

Date(s) aerial images were photographed: 10/25/1989

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Hancock County, Mississippi (MS045)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SaB	Saucier fine sandy loam, 2 to 5 percent slopes	2.4	39.2%
SaC	Saucier fine sandy loam, 5 to 8 percent slopes	3.3	53.5%
ScD	Saucier-Susquehanna complex, 5 to 12 percent slopes	0.2	3.0%
Su	Smithton fine sandy loam, frequently flooded	0.3	4.3%
Totals for Area of Interest (AOI)		6.1	100.0%